DRINKING WATER WATERSHED PROTECTION

Public Information Meeting
October 29th 2013
Gabriola Island, BC

PRESENTATION

1. DWWP update
   - → Program 1
   - → Program 2
   - → Program 3
   - → Program 4
   - → Program 5
   - → Program 6
   - → Program 7
2. Water Budget
   - → Background
   - → Overview
   - → Methodology
   - → Findings
   - → Conclusion
3. Watershed Management
   - → What & Why
   - → How & Who

REGIONAL DISTRICT OF NANAIMO

Introduction

In 2008, residents voted to establish a Drinking Water and Watershed Protection Service…

Today, we are going to talk about where we are:

- **DWWP program update**
- **Water Budget Study review**
- **Integrated Watershed Management Planning**

DRINKING WATER WATERSHED PROTECTION

Introduction: Partnerships

Our program is founded on partnerships and collaboration

Municipalities:

City of Parksville

CITY OF NANAIMO THE HARBOUR CITY

District of Lantzville

The public: residents, community associations, streamkeeper groups, professionals, students.

Other governmental organizations:

BRITISH COLUMBIA The Best Place on Earth

Natural Resources Canada | Ressources naturelles Canada

Canada

Other RDN departments:

REGIONAL DISTRICT OF NANAIMO

Sustainability, Wastewater, Rec & Park

Introduction: Program development

2008

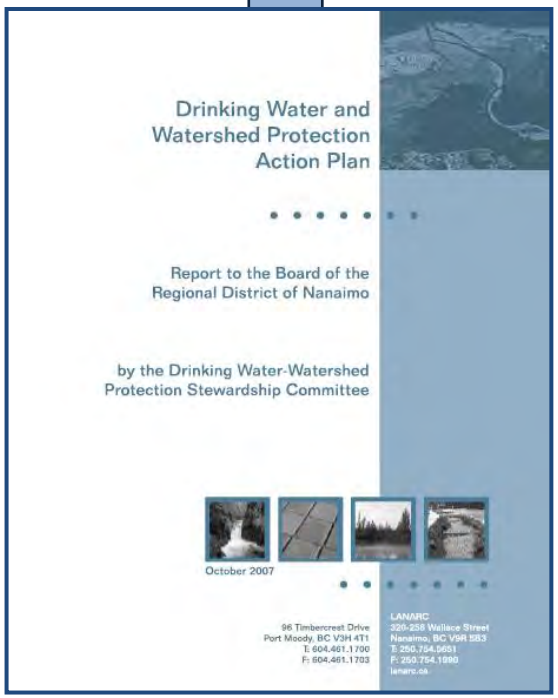
The RDN became **the first regional government in British Columbia to start a Drinking Water & Watershed Protection service**

2009-Present

The DWWP is guided by a **technical advisory committee** of experts from: forestry, hydrogeology, academia, community stewardship, fisheries, water services

The program is guided by the an Action Plan that outlines the key goals and objectives

7 Program Actions



1. DWWP Program Update

DRINKING WATER
WATERSHED
PROTECTION

REGIONAL DISTRICT OF NANAIMO

PRESENTATION

REGIONAL DISTRICT OF NANAIMO

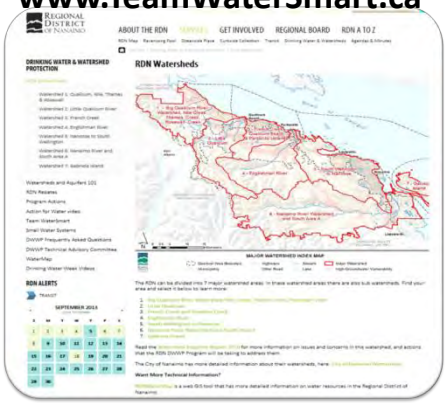
DWWP update: Program 1

Public Awareness and Involvement

- Free Workshops
- Websites
- Community Booth
- Home Visits
- School Program

wellSMART

www.TeamWaterSmart.ca



we practice watersmart because every drop counts irrigation

www.RDNgetinvolved.ca

REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 1

Public Awareness and Involvement

School Program: Fieldtrips

From the classroom….

To the watershed…..

2014 – field trips for Gr. 4 & 5

- Nanaimo River watershed
- Englishman River watershed

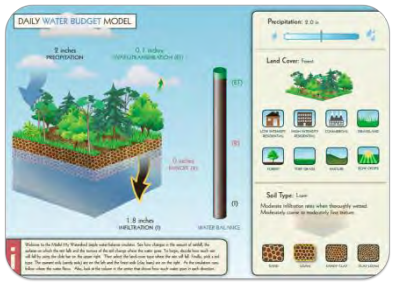
PRESENTATION

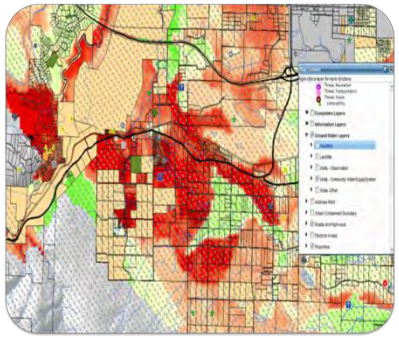
REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 2

Water Resources Inventory & Monitoring

- Water Budget Study
- Water Map
- Provincial Observation Well Network Expansion
- Volunteer Well Level Monitoring
- Community Watershed Monitoring





PRESENTATION

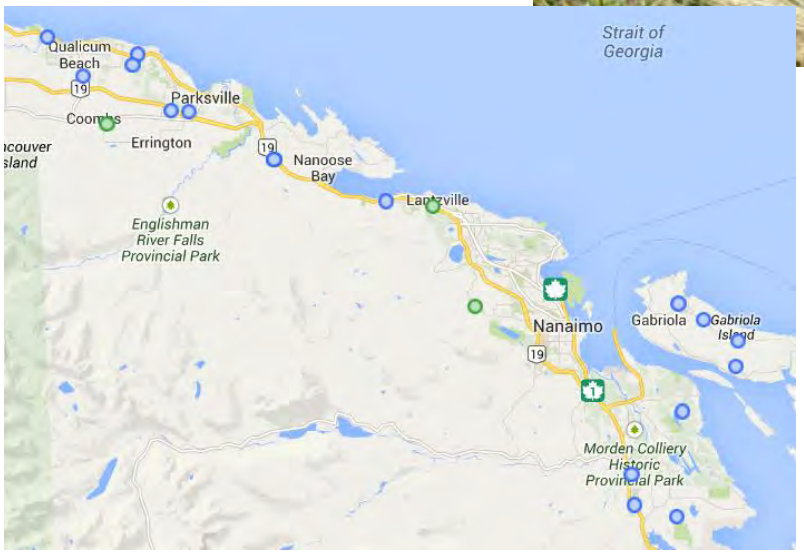
REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 2

Water Resources Inventory & Monitoring: Highlights

Provincial Observation Well Network Expansion

Groundwater monitoring



Volunteer Well Level Monitoring

PRESENTATION

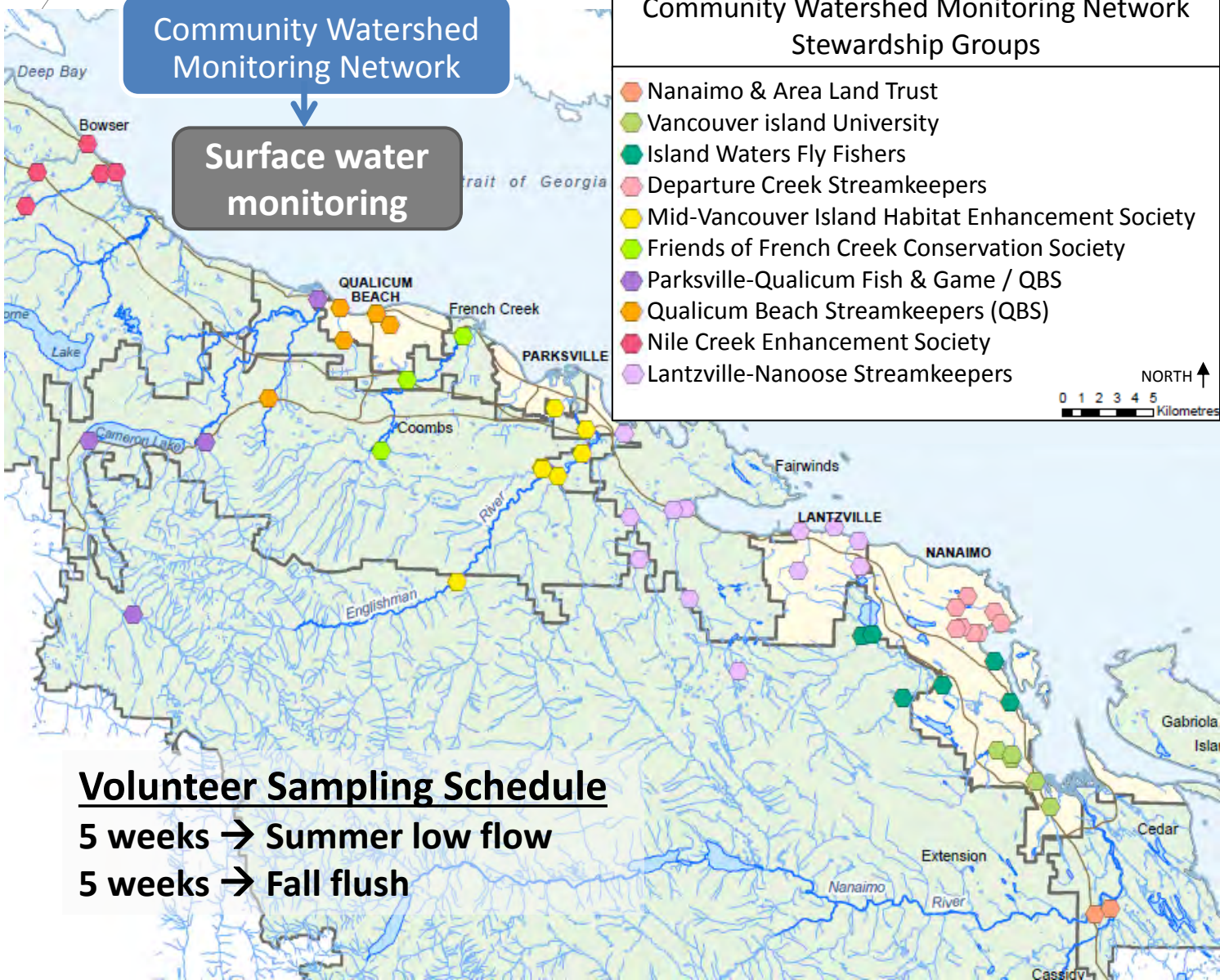
REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 2

Water Resources Inventory & Monitoring: Highlights

Community Watershed Monitoring Network

Surface water monitoring



Volunteer Sampling Schedule

5 weeks → Summer low flow

5 weeks → Fall flush

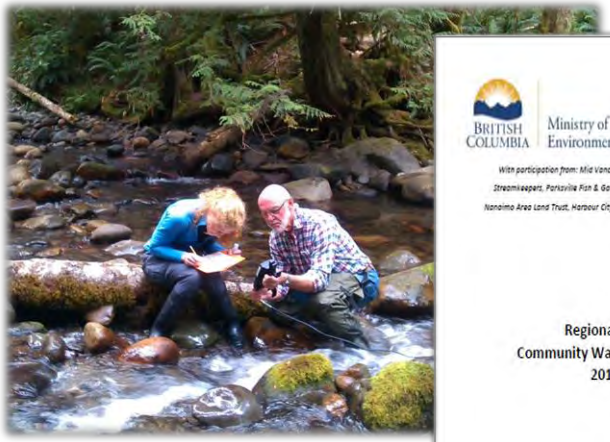
PRESENTATION

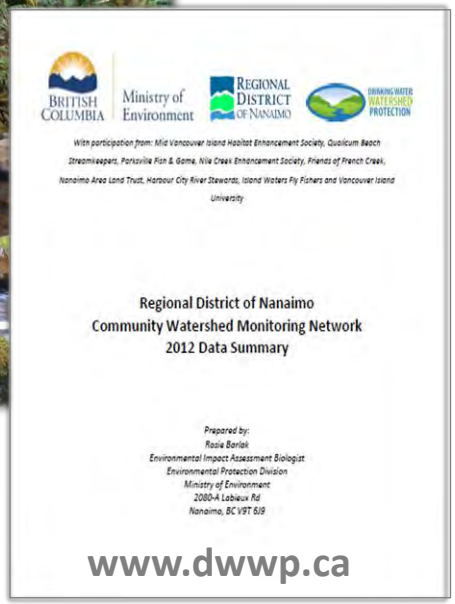
REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 2

Water Resources Inventory & Monitoring: Highlights

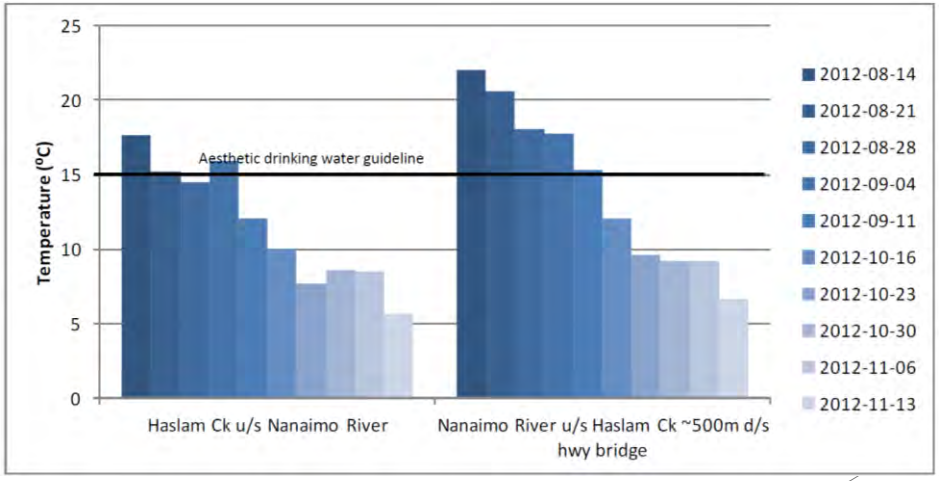
Community Watershed Monitoring Network





Measurements

- **Temperature**
- **Turbidity**
- **Dissolved Oxygen**
- **Specific Conductance**



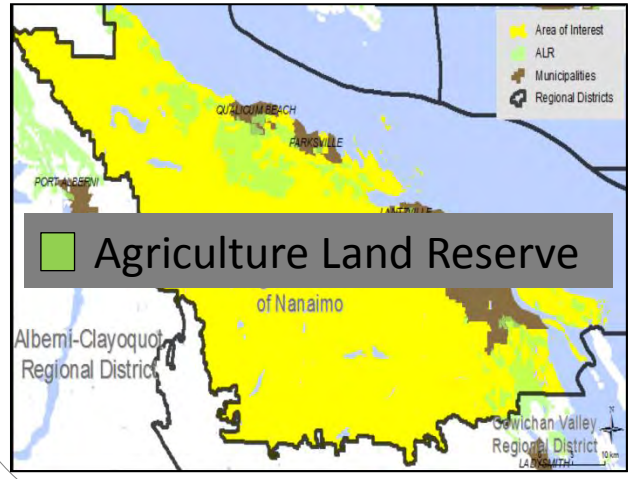
PRESENTATION

REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 3

Land Use Planning & Development

Agricultural Water Demand Model



Yellow Point Development Permit Area

PRESENTATION

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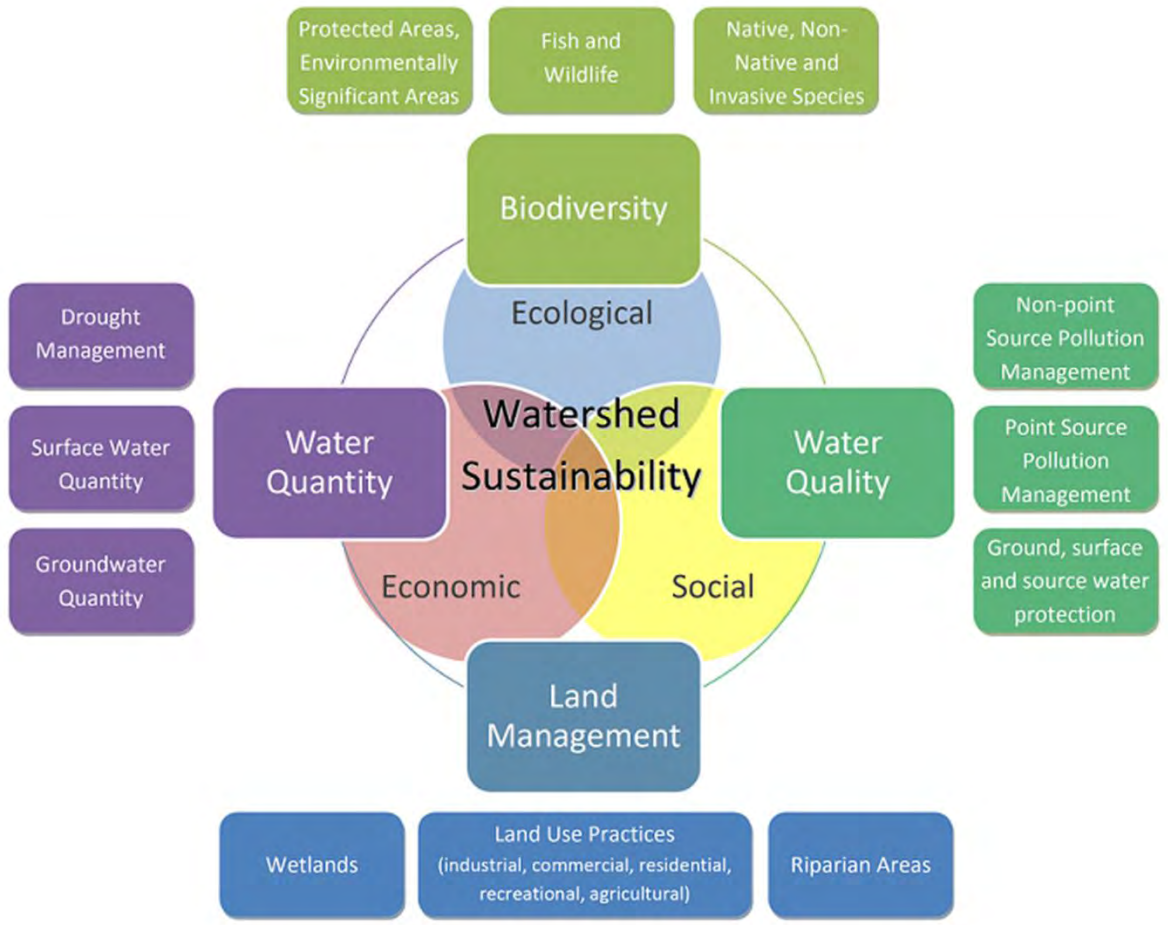
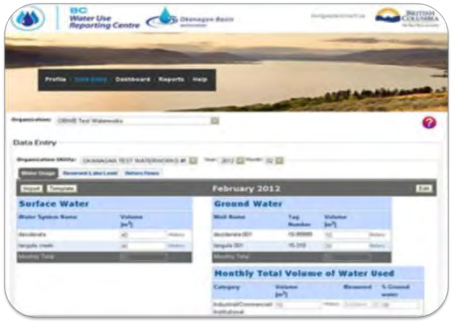
DWWP update: Program 4



PRESENTATION

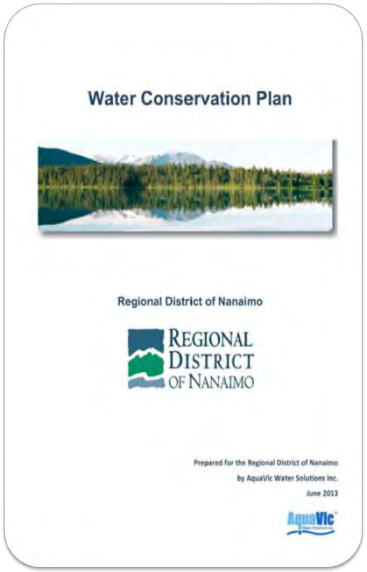
REGIONAL DISTRICT OF NANAIMO

DWWP update: Program 5



Water Use Management

- Water Conservation Plan
- Toilet Replacement Rebate
- Water Purveyor Working Group
- Water Use Reporting Centre
- Rainwater Harvesting Incentive & Guidebook



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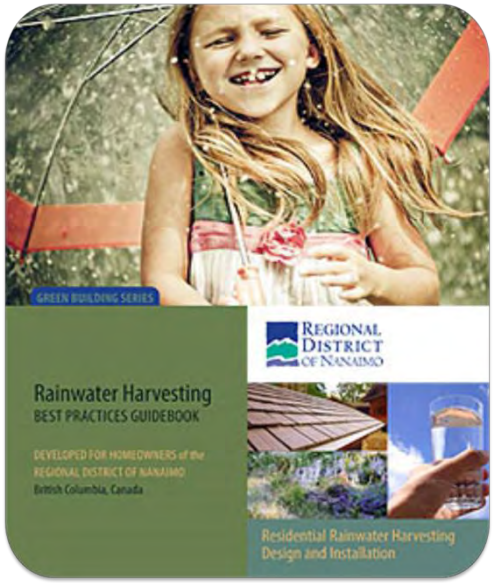
DWWP update: Program 5

Water Use Management

$750 rebate for > 1000 imperial gallons

Rainwater Harvesting Incentive & Guidebook



Storing winter/spring rainwater for summer usage takes pressure off aquifers & municipal supplies

PRESENTATION

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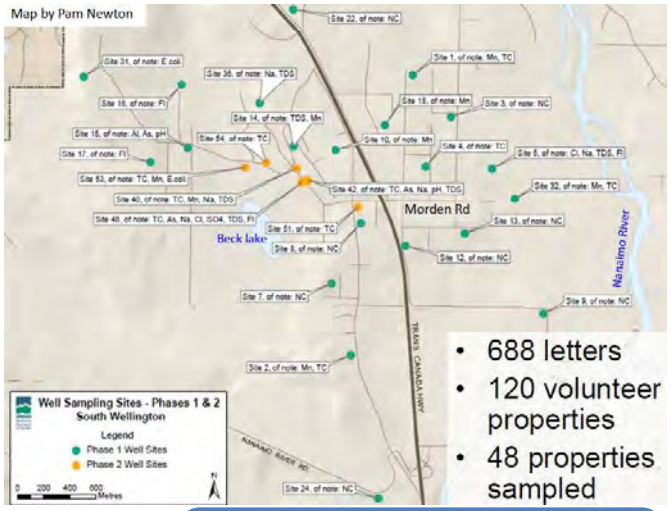
DWWP update: Program 6

Water Quality Management

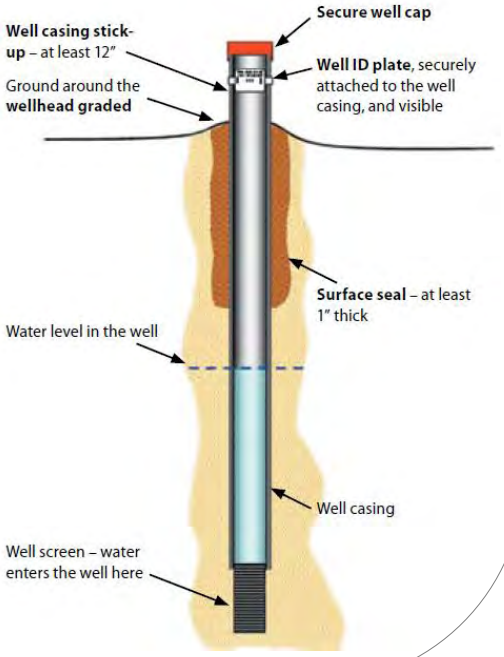


2011 Volunteer Well Water Quality Survey

New!

Rural Water Quality Stewardship Program

No.	Rebate Item
1	Well Cap
2	Surface Seal
3	Well Casing Stick-up
4	Well deactivation
5	Water Quality Testing



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DWWP update: Program 7

Adapting to Climate Change

- **Sustainability -** ensure sustainable aquatic ecosystems with intact riparian vegetation and adequate instream flows.
- **Adaptability -** find ways to do more in-season management of water that is based on real time data.
- **Collaboration -** public processes at the watershed level that develop information and inform decision-making in a public way
- **Efficiency -** conservation of water and more efficient use

2. Water Budget Study

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REGIONAL DISTRICT OF NANAIMO

Water Budget Study

7 Water Regions within the RDN:

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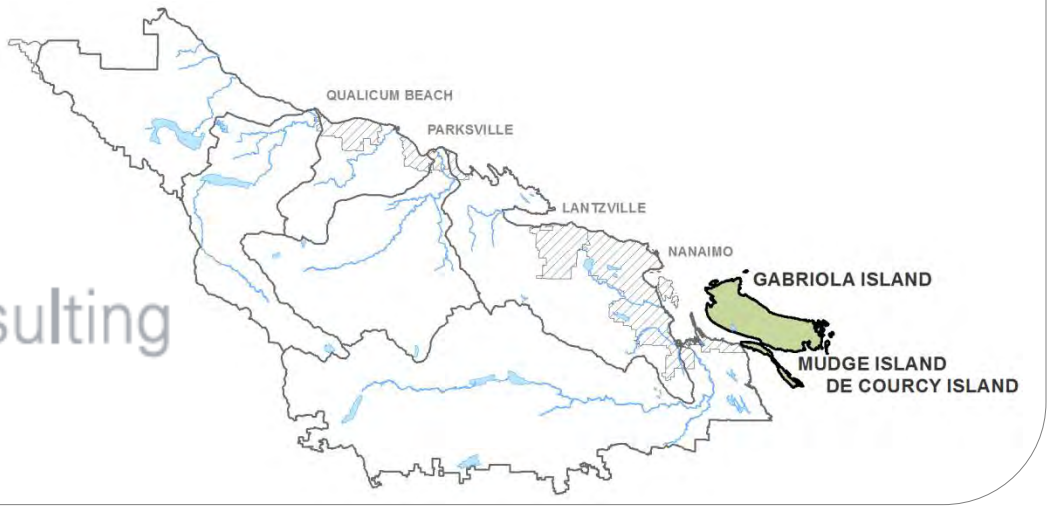
REGIONAL DISTRICT OF NANAIMO

Water Budget Study

- **Gabriola, Mudge, & Decourcey Water Budget Project Report**

Prepared by:

srk consulting



- **Vancouver Island Water Budget Project Report**

Prepared by:

Waterline Resources Inc.

REGIONAL DISTRICT OF NANAIMO

Water Budget Study: Background

Project Goal

To **improve understanding** of regional water resources by:

- Identifying **water stores**
- Estimating **how much water** they hold
- Characterizing **how water moves** between the stores
- Identifying water stores **under stress**

Justification

The Water Budget Project was specifically developed to…..

✓ Meet the goal of the DWWP program:

[to ensure that we have a sufficient, safe and sustainable supply of water]

✓ Address the direction of the 2010 Snapshot Report:

[to ensure sufficient clean water for human, environmental, and economic needs]

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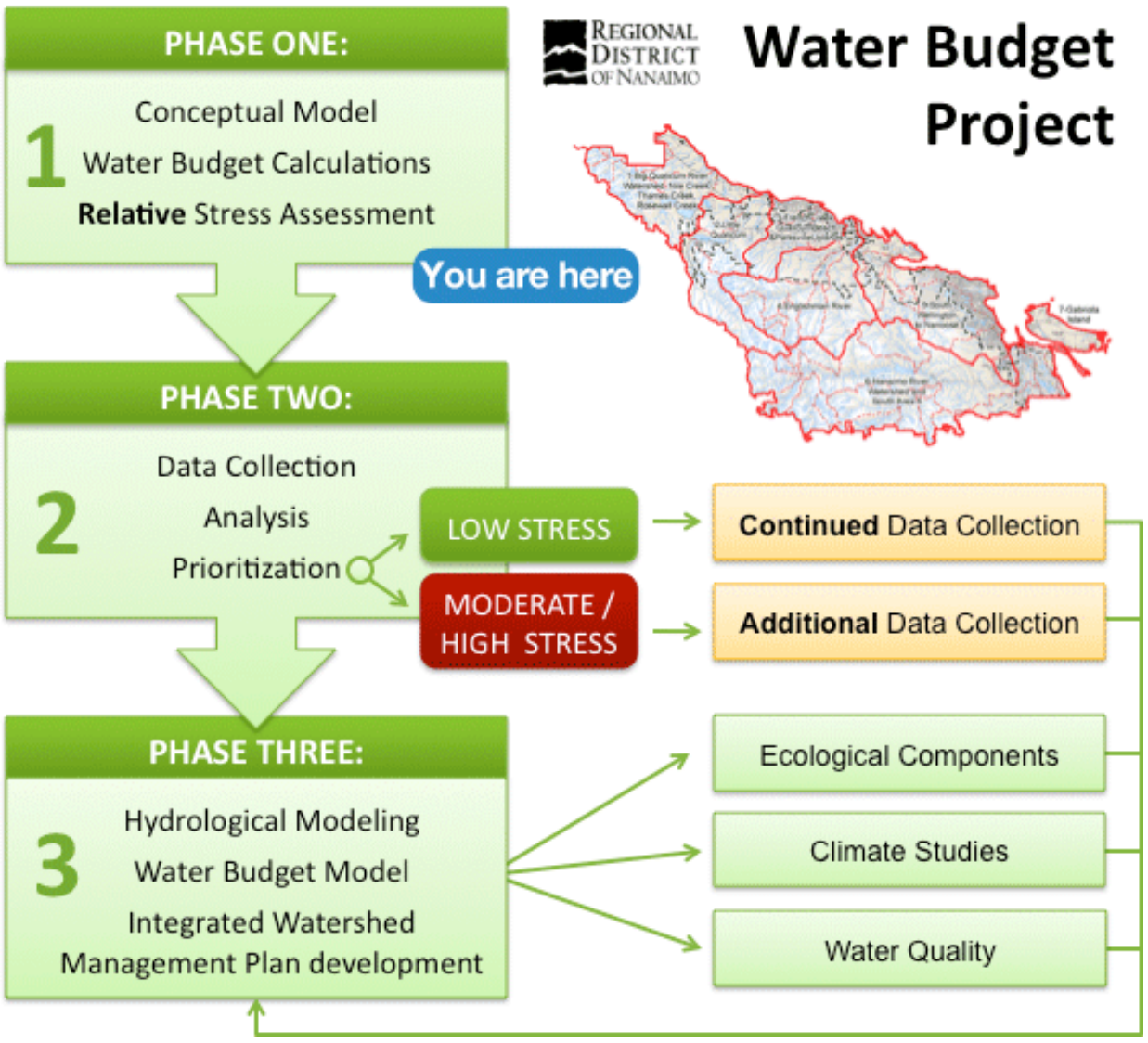
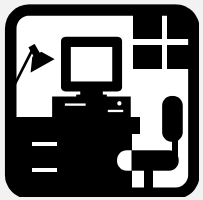
Water Budget Study: Project overview



REGIONAL DISTRICT OF NANAIMO

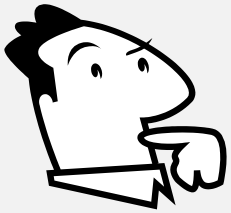
Water Budget Study: methodology

1. Desk study:
   - resource mapping
   - Data compilation



2. Data collection:
   - Water level monitoring
   - Pump tests
   - Geological logging

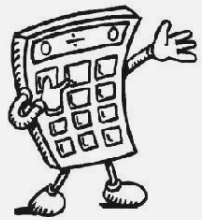
3. **Conceptual model development**
   - Based on physical characteristics
   - Current scientific understanding



4. **Water budget calculation**

   = Supply – Demand

   ↓ (Recharge) ↓ (Abstraction)



5. **Stress assessment**

   Supply Demand

   - Low Stress → <50%
   - Moderate Stress → >50%
   - High Stress → >100%

REGIONAL DISTRICT OF NANAIMO

Water Budget Study: methodology

Conceptual model development

Example.....

Groundwater flow

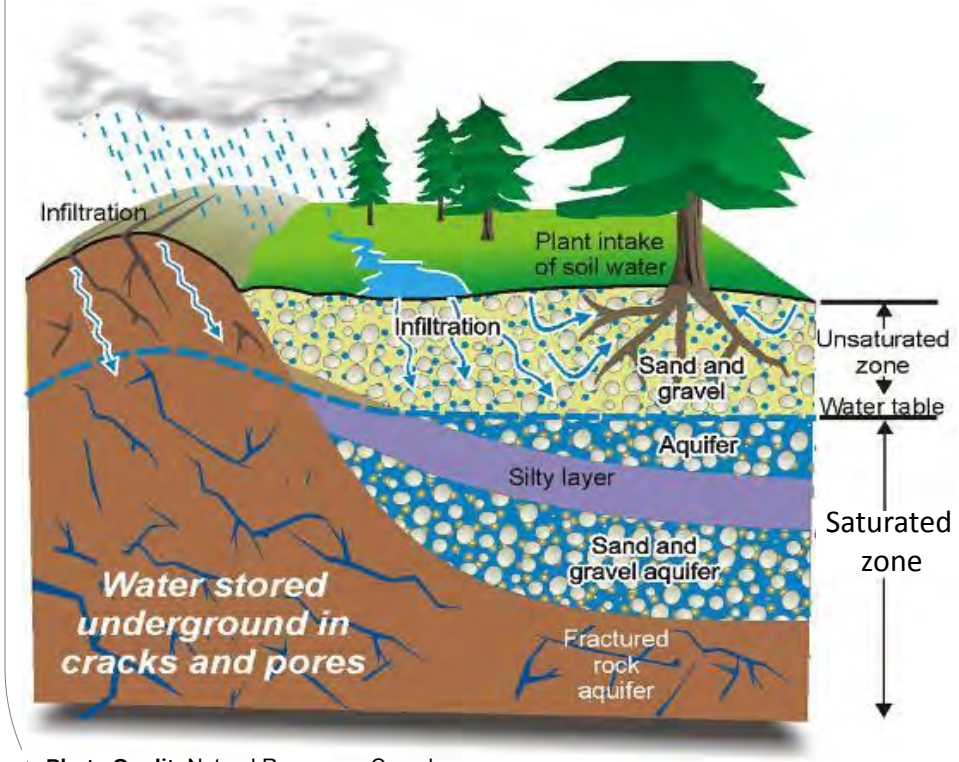
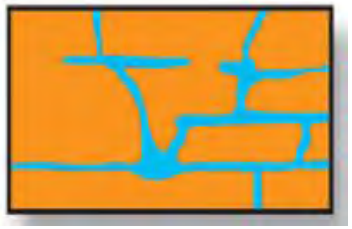
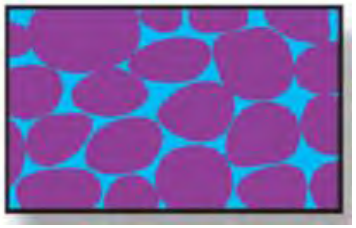


Photo Credit: Natural Resources Canada

1. 

Water in rock fractures

2. 

Water between grains

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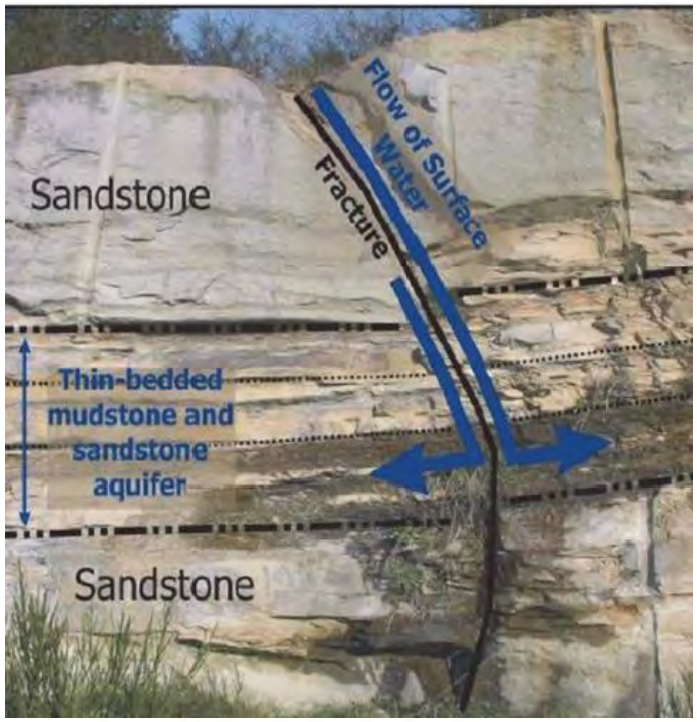
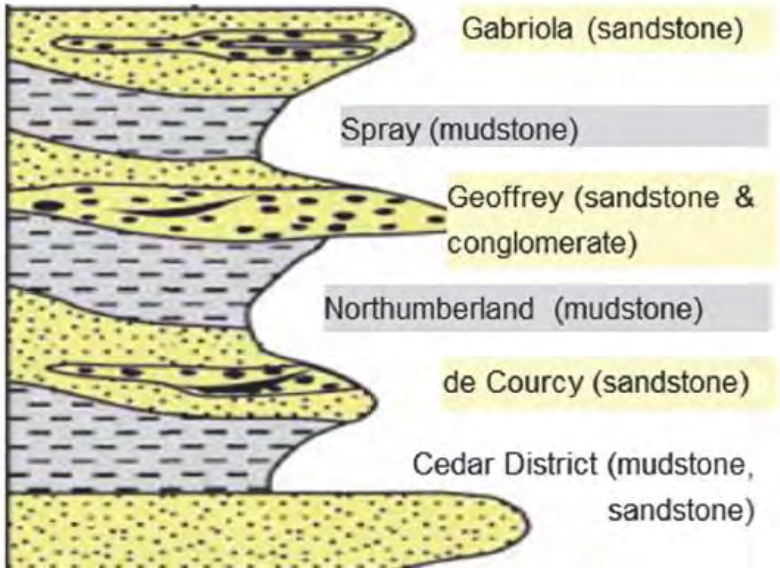
Water Budget: Gab conceptual model development



Geological Logging

- Thickness of strata
- Hydraulic characteristics
  - Fractures: low porosity, high Ks
  - Matrix: high porosity/low Ks
- Orientation of fractures



→Thick layer, visible cliff tops

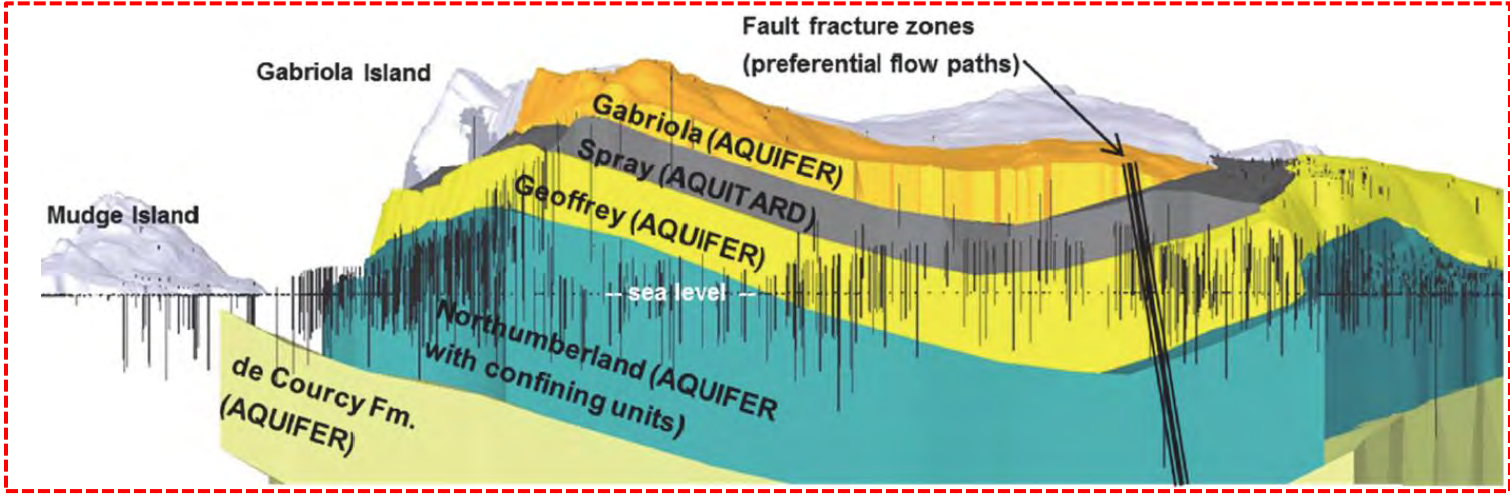
→ Visible cliff bottoms

→ Thick layer, lower elevations

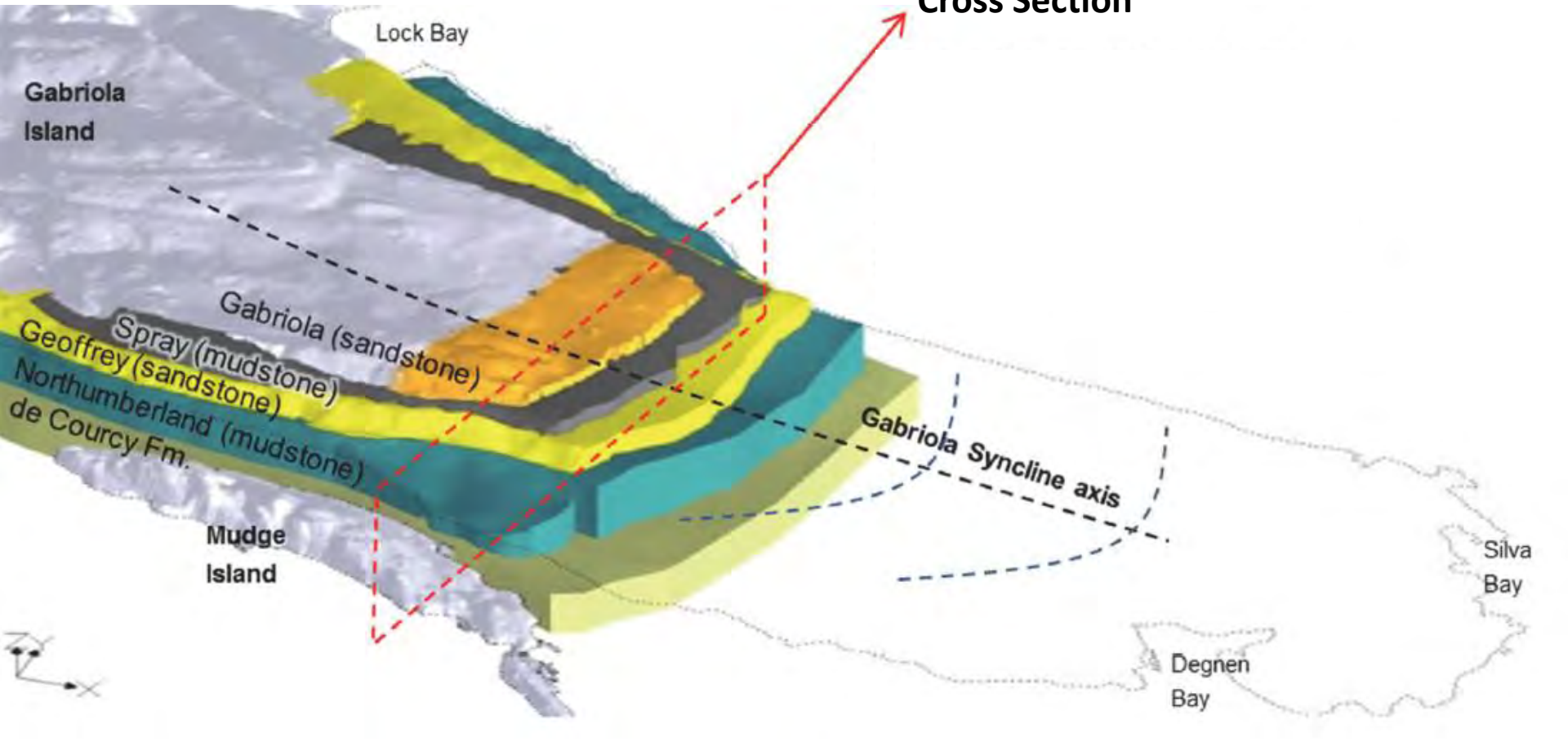
→ Visible along shores /sea bed

→Deep below Gabriola

→ Visible on Mudge



Cross Section



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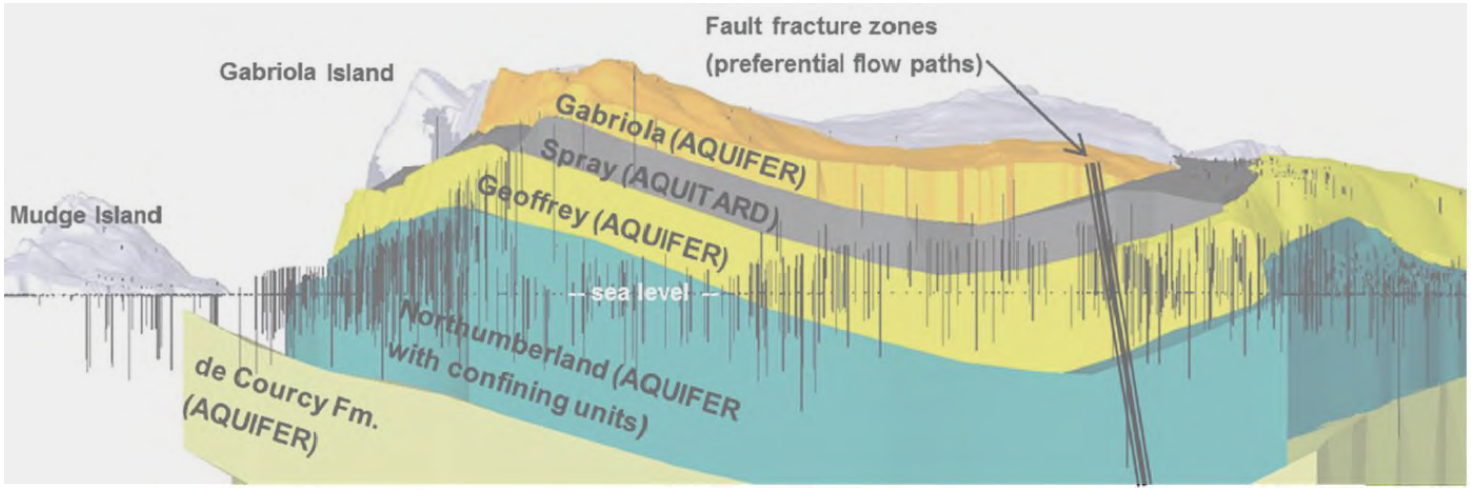
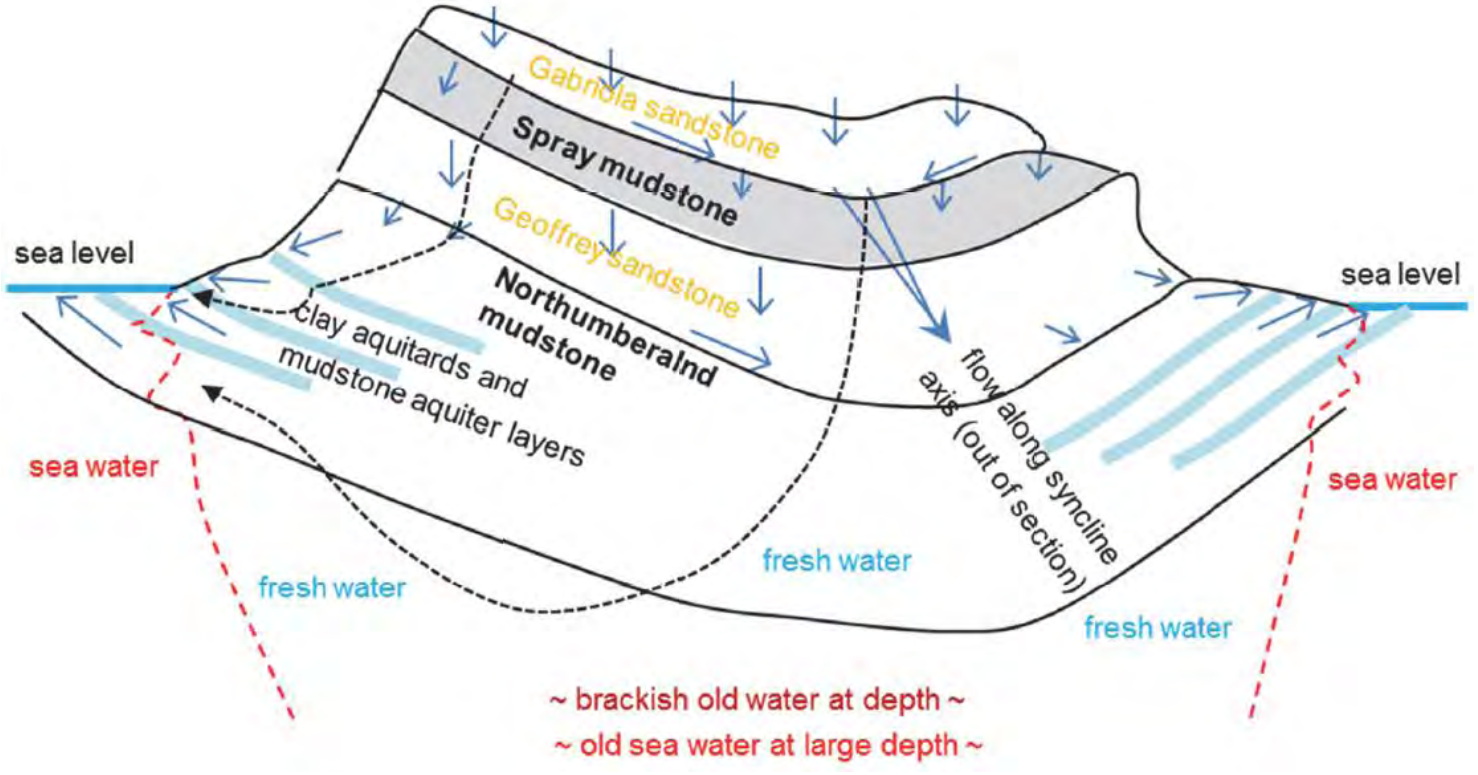
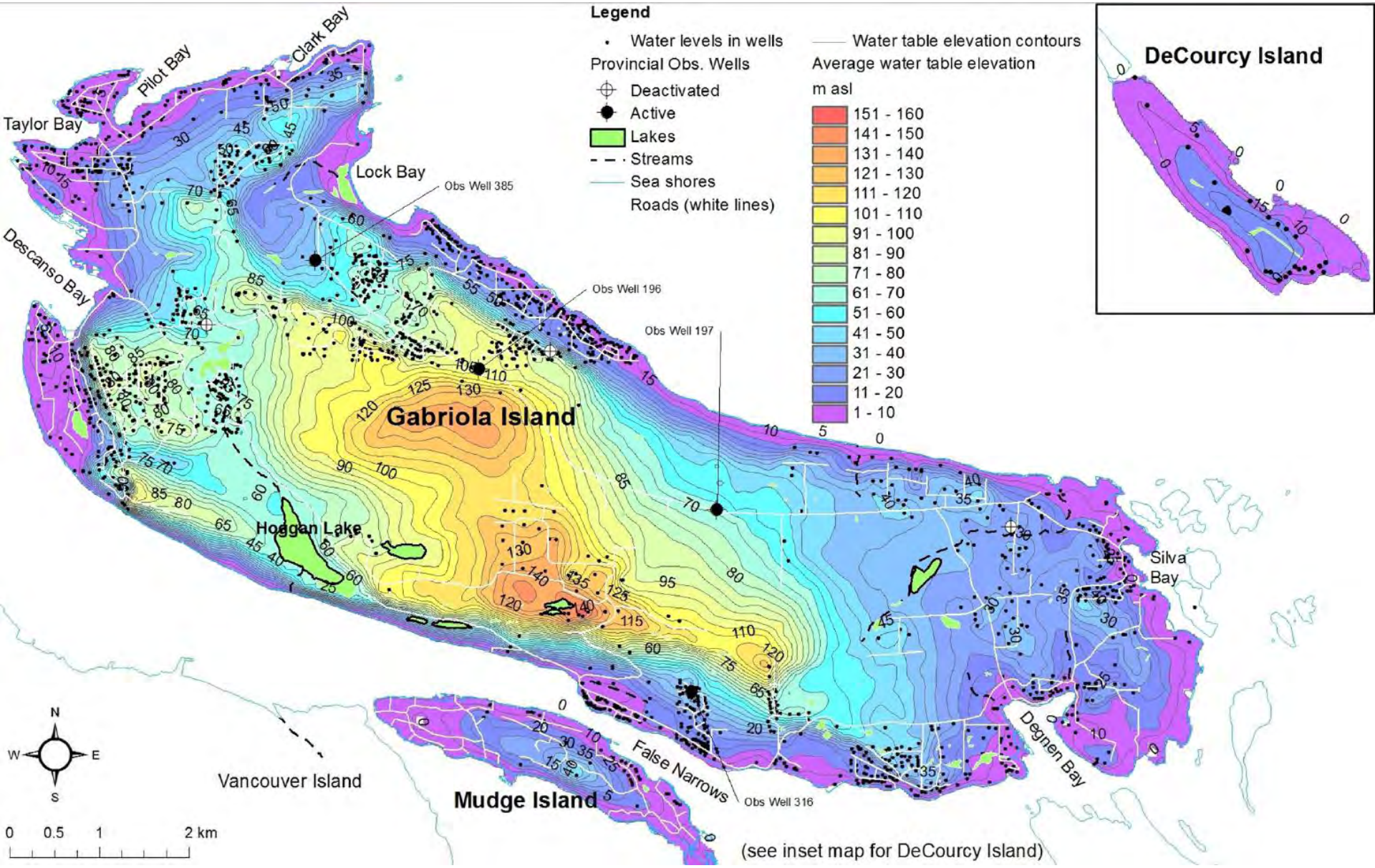
Water Budget: VI Conceptual model development





Water Level Contour Map



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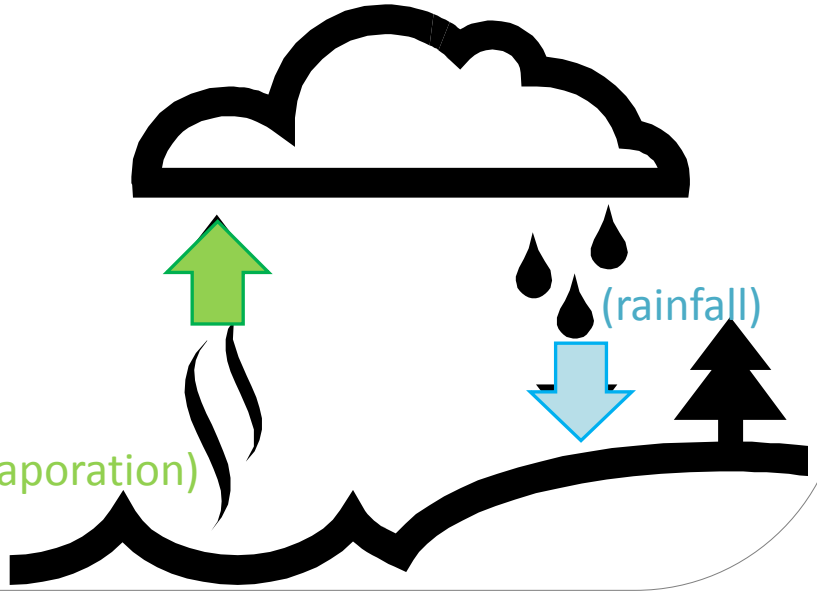
Water Budget Calculations

Accounting.....

for water.....



PRESENTATION

REGIONAL DISTRICT OF NANAIMO

Water Budget Study

Stress Assessment Calculation

Input:
Supply

Output:
Demand

Recharge

STRESS LEVEL

- LOW: <50%
- MOD: >50%
- HIGH: >100%

Residential
Commercial
Agricultural

REGIONAL DISTRICT OF NANAIMO

Water Budget Study

Stress Assessment Calculation

Input:

Recharge

10% of rainfall –lower limit

25% of rainfall –upper limit

Recharge is highly spatially variable and dependent on:

- *Rainfall*
- *Soil type & soil zone thickness*
- *Rock type*

REGIONAL DISTRICT OF NANAIMO

Water Budget Study

Stress Assessment Calculation

Output:

Residential Demand

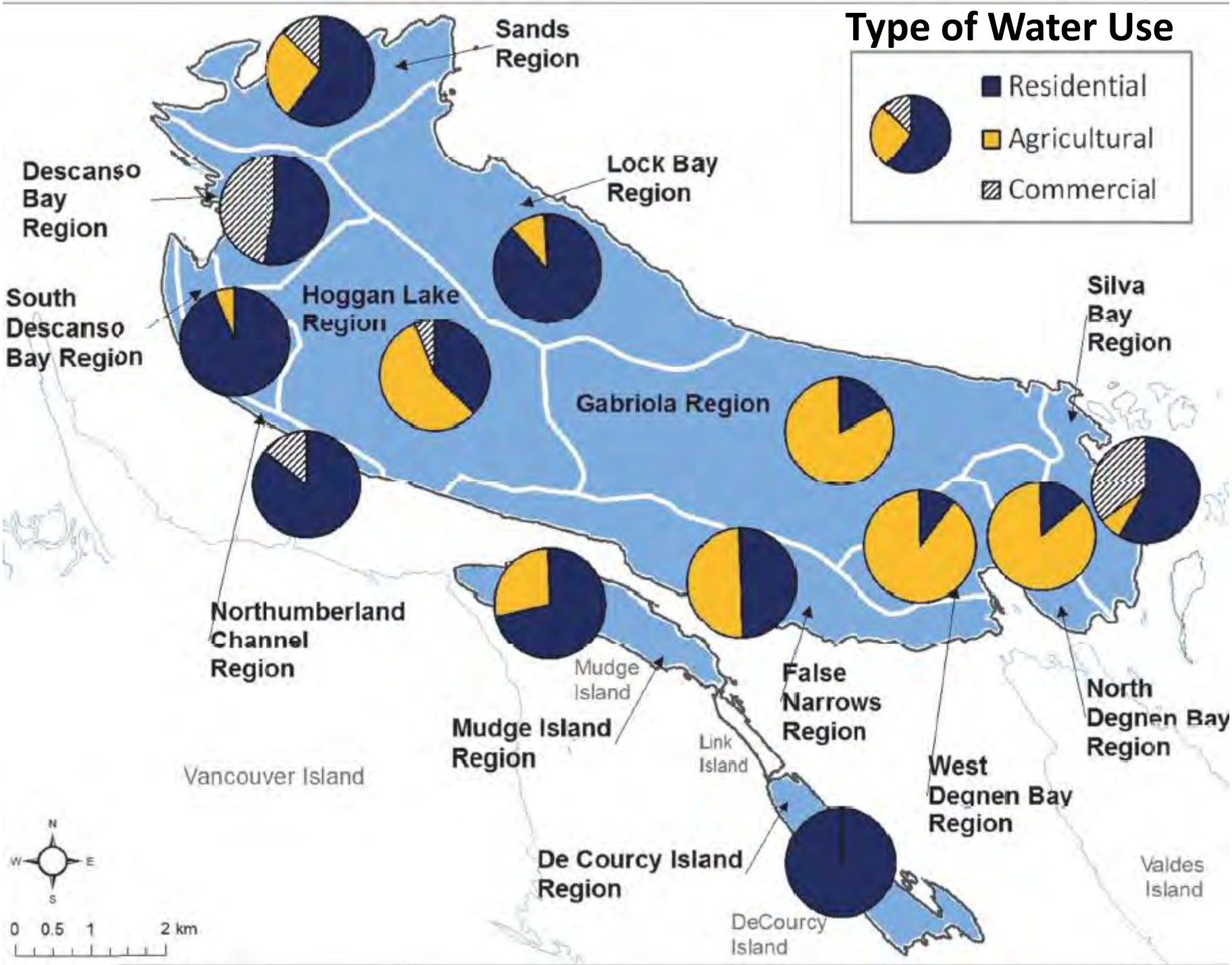
- survey respondents (10.8%)

Commercial Demand

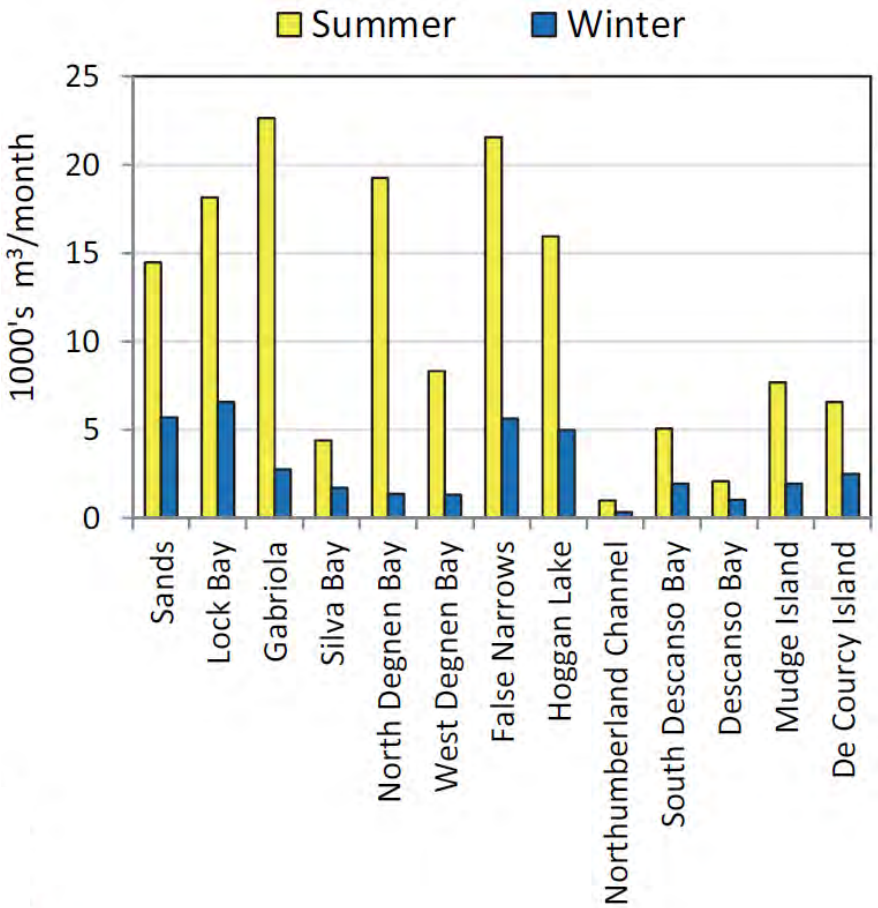
- Survey respondents
- Daily max industrial water demands

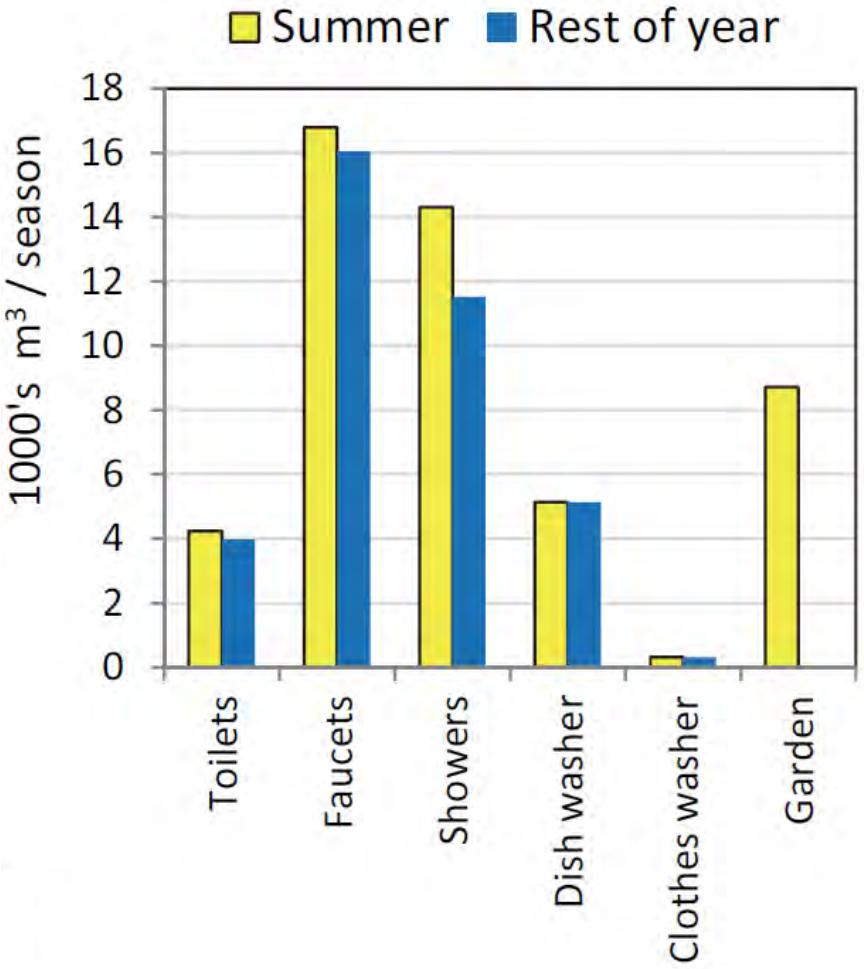
Agricultural Demand

- Survey respondents
- Max licensed allocation (farm type)


Type of Water Use
Residential
Agricultural
Commercial
Sands Region
Descanso Bay Region
Lock Bay Region
South Descanso Bay Region
Hoggan Lake Region
Silva Bay Region
Gabriola Region
Northumberland Channel Region
Mudge Island
Mudge Island Region
False Narrows Region
North Degnen Bay Region
Link Island
West Degnen Bay Region
Vancouver Island
De Courcy Island Region
Valdes Island
DeCourcy Island
N
W
E
S
0 0.5 1 2 km

Seasonal Water Use





Residential Water Use Type

REGIONAL DISTRICT OF NANAIMO

Findings: Water Stress Assessment

10% recharge scenario: lower limit

→ **4 deficit regions July - Aug**

Sands, West Degnen Bay, False Narrows & Mudge

→ **1 deficit region Apr - Sept**

North Degnen Bay

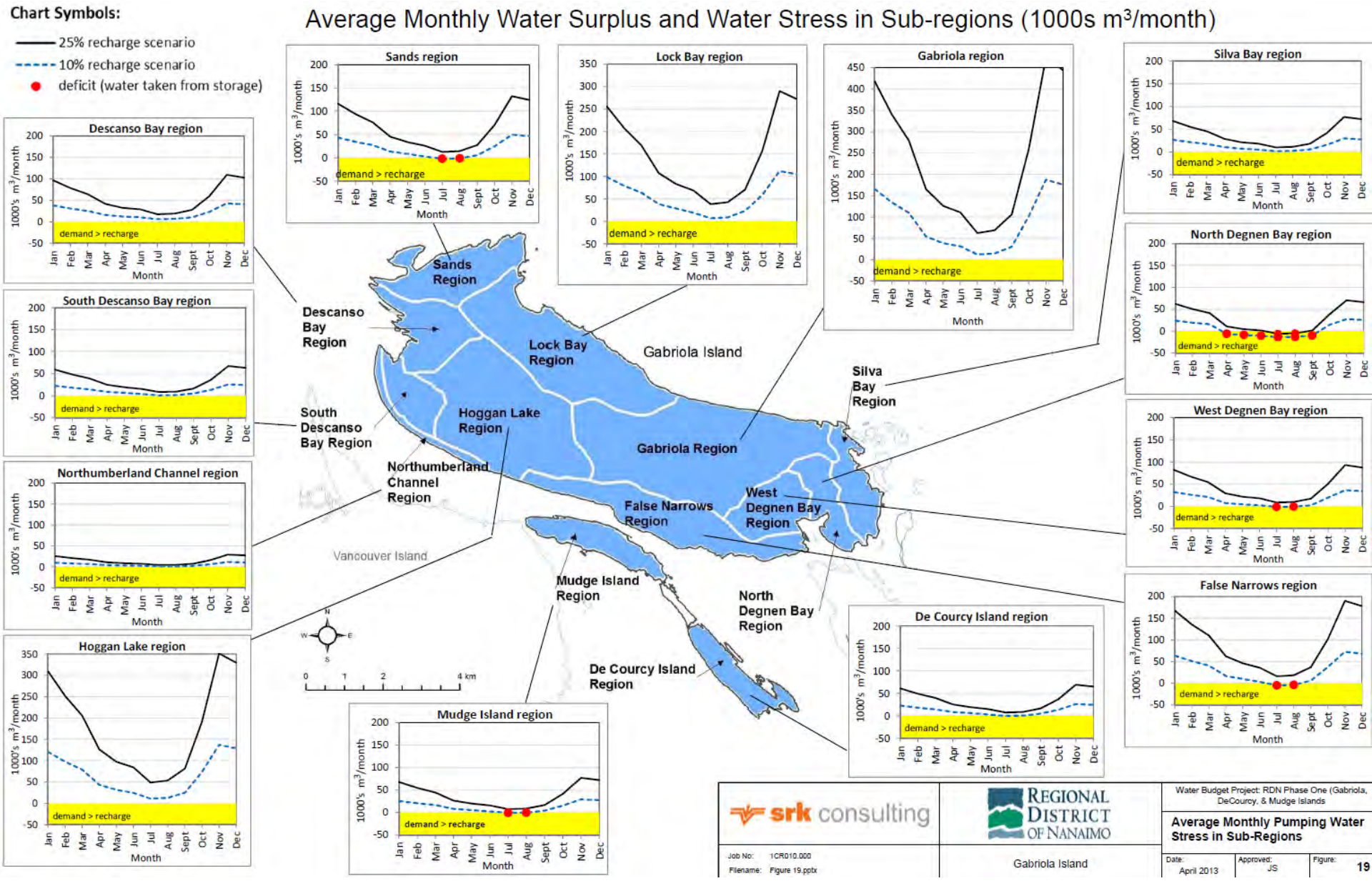
25% recharge scenario: upper limit

→ **1 deficit region Jun - Aug**

North Degnen Bay

demand > supply

Water Deficit: Demand > Recharge



	Sub-regions	Monthly Pumping Water Stress (Groundwater Demand / Recharge) %												Annual (%)
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
10% recharge scenario	Sands	11	14	17	37	50	82	121	112	63	19	10	10	27
	Lock Bay	6	8	9	16	21	42	67	62	25	10	6	6	14
	Gabriola	2	2	2	26	33	41	64	60	40	3	1	2	12
	Silva Bay Region	4	5	6	13	28	43	67	62	33	9	5	5	13
	North Degnen Bay	5	7	8	154	197	231	364	338	230	9	5	5	64
	West Degnen Bay	4	5	6	49	62	77	121	112	78	6	4	4	23
	False Narrows	8	10	12	45	58	86	136	126	71	13	7	8	27
	Hoggan Lake	4	5	6	21	27	38	56	52	33	6	3	4	12
	Northumberland Channel	3	4	4	7	13	23	37	34	14	5	3	3	7
	South Descanso Bay	8	10	12	18	23	49	78	72	28	13	7	7	17
	Descanso Bay	2	3	4	6	10	15	23	21	11	4	2	2	5
	Mudge Island	7	8	10	33	43	70	110	102	49	11	6	7	21
	DeCourcy Island	10	12	15	22	28	61	97	90	33	16	9	9	21
25% recharge scenario	Sands	5	5	7	15	20	33	48	45	25	7	4	4	11
	Lock Bay	2	3	4	7	8	17	27	25	10	4	2	2	6
	Gabriola	1	1	1	11	13	16	26	24	16	1	1	1	5
	Silva Bay Region	2	2	3	5	11	17	27	25	13	4	2	2	5
	North Degnen Bay	2	3	3	62	79	92	146	135	92	3	2	2	26
	West Degnen Bay	2	2	2	20	25	31	48	45	31	3	1	2	9
	False Narrows	3	4	5	18	23	34	54	50	29	5	3	3	11
	Hoggan Lake	2	2	2	8	11	15	22	21	13	3	1	1	5
	Northumberland Channel	1	1	2	3	5	9	15	14	6	2	1	1	3
	South Descanso Bay	3	4	5	7	9	20	31	29	11	5	3	3	7
	Descanso Bay	1	1	1	2	4	6	9	9	4	2	1	1	2
	Mudge Island	3	3	4	13	17	28	44	41	20	4	2	3	9
	DeCourcy Island	4	5	6	9	11	24	39	36	13	6	3	4	8

STRESS LEVEL

LOW: <50%

MOD: >50%

HIGH: >100%

Residential 37% increase

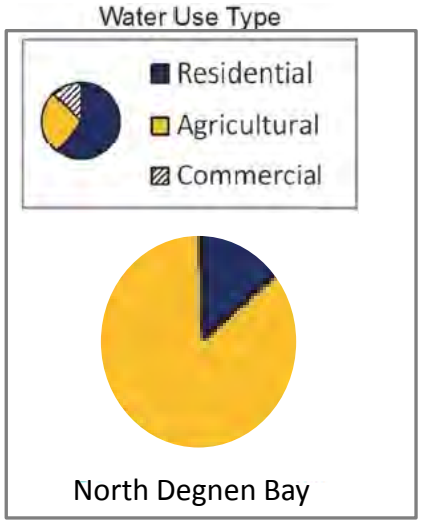
Commercial increase

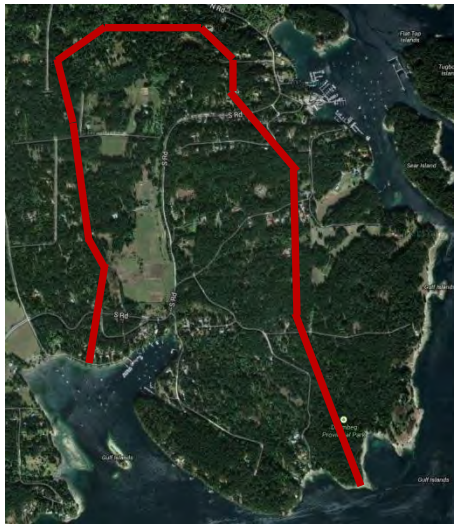
Agricultural increase

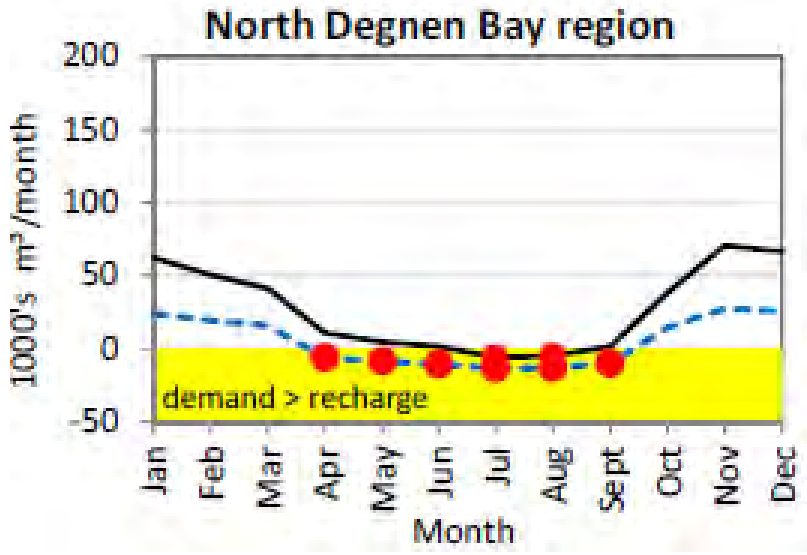
How reliable are the stress assessments?

Example: North Degnen Bay

- Assumes ~85% of water use in North Degnen is agricultural
- High agricultural demand April-Sept (irrigation period)
- Agricultural demand values assume maximum licensed volume of water across the entire irrigation period
- Low total demand/km^2 compared to other sub-regions
- % recharge assumed uniform year round







Water Budget Study: Conclusion

Author recommendations:

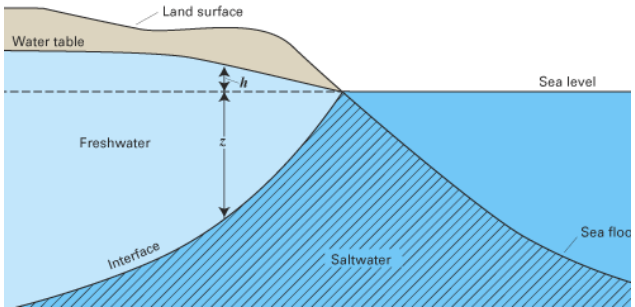
- ✓ Improved estimates of **hydraulic parameters** (pump tests)
- ✓ Increased **water level monitoring** (Mudge & DeCourcy)
- ✓ Monitoring of **rainfall and water level rise**
- ✓ Increased monitoring of coastal wells for **Saline intrusion**
- ✓ Water budget calculation **parameters need improved accuracy** (survey #s, commercial & agricultural use is unknown, surface water!)

REGIONAL DISTRICT OF NANAIMO

Findings: data gaps

Study recommendations:

1. Mandatory **well log** submission
2. Standardization of **aquifer testing**
3. Increase **well observation** network
4. Reactivation of **stream gauging** (WSC)
5. Increase **saline intrusion monitoring**
6. Improve Water Budget **calculation parameters**

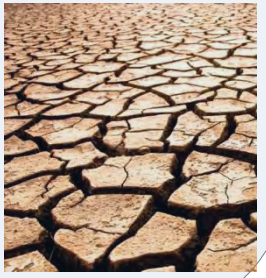


REGIONAL DISTRICT OF NANAIMO

Conclusion

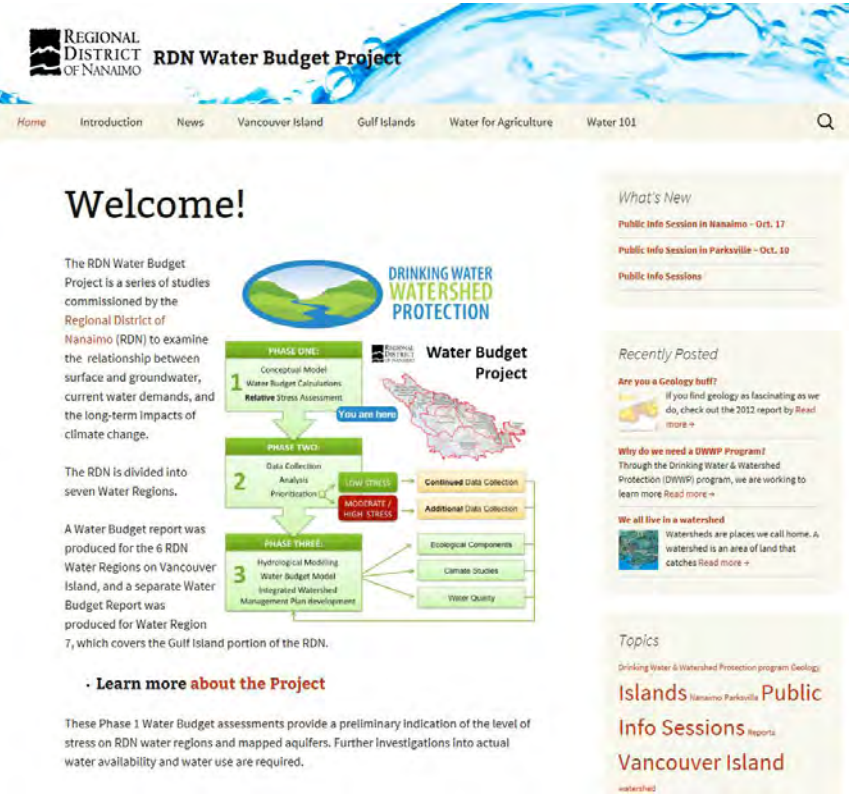
The Phase One Water Budgets provide the most comprehensive collation of information on the region's water resources that has been made available to date

- Results are **purely conceptual** and not intended for water management decision making or policy development
- Large degree of **uncertainty** due to lack of data
- Highlights data gaps and need for **increased monitoring**
- Stepping stone for the future!

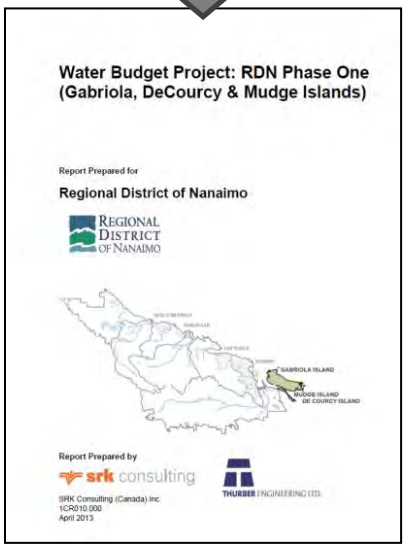


For more details
and to
download the complete reports
VISIT:

www.rdnwaterbudget.ca



Report Download




now
what?
tomorrow
yesterday

3. Integrated Watershed Management Planning

DRINKING WATER
WATERSHED
PROTECTION

REGIONAL DISTRICT OF NANAIMO

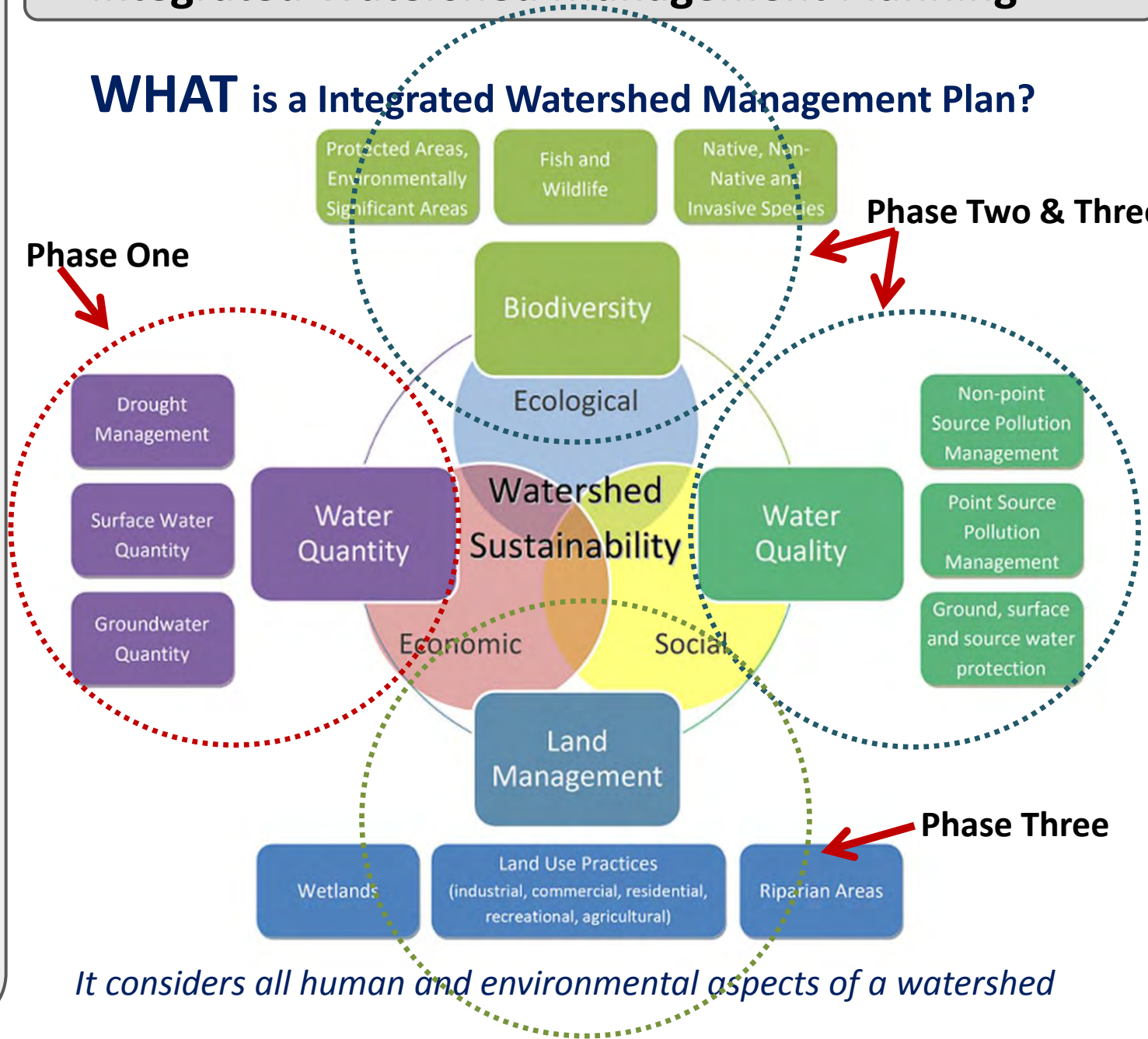
PRESENTATION

1. DWWP update
   - → Program 1
   - → Program 2
   - → Program 3
   - → Program 4
   - → Program 5
   - → Program 6
   - → Program 7
2. Water Budget
   - → Background
   - → Overview
   - → Methodology
   - → Findings
   - → Conclusion
3. Watershed Management
   - → What & Why
   - → How & Who

REGIONAL DISTRICT OF NANAIMO

Integrated Watershed Management Planning

WHAT is a Integrated Watershed Management Plan?



It considers all human and environmental aspects of a watershed

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Integrated Watershed Management Planning

WHY is it needed?

- Land use activities such as forestry, mining, agriculture, urbanization, fisheries and recreation all impact water resources



- Water resource problems are reaching global proportions; how we manage our water and how our neighbors manage theirs has an impact on all of us



- There is a wide variety of processes that affect the hydrological cycle; only managing one aspect is mismanagement. A holistic approach is the only way forward

PRESENTATION

REGIONAL DISTRICT OF NANAIMO

Integrated Watershed Management Planning

HOW? *What does a planning framework include?*

1. *Identification of **river basin areas** (water regions)* ☑
2. *Identification of **water resources** (surface and ground water)* ☑
3. *Identification of **measurement** parameters (chemical/ecological/social)*
4. *Identification of **protected areas** (forests, parks, fisheries)*
5. *Assess **current state** (i.e. poor, good, high)* → ***WHAT***
6. *Reasons for **not achieving** good status* → ***WHY***
7. ***Action plan** to achieve good status/improve* → ***HOW***

PRESENTATION

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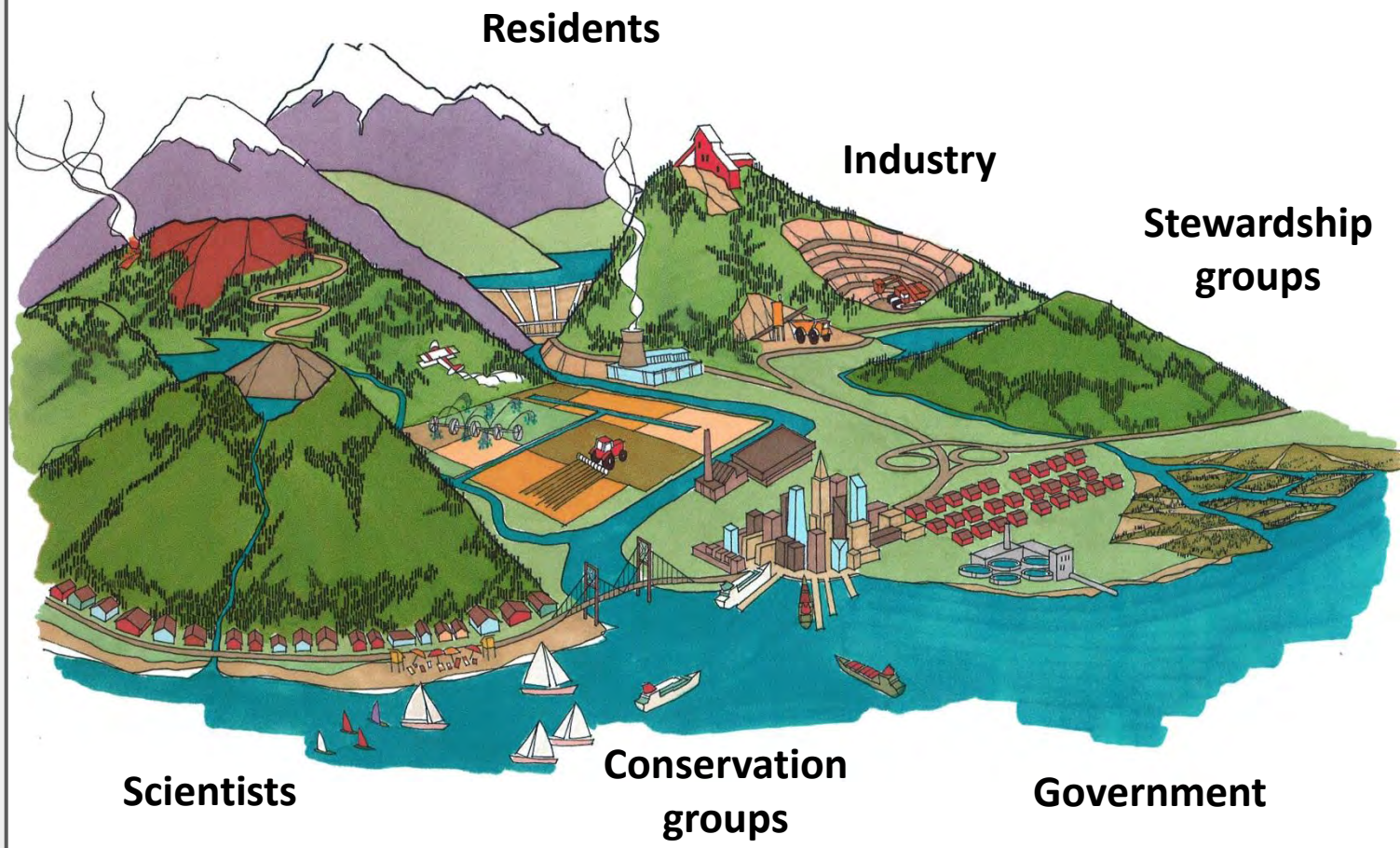
REGIONAL DISTRICT OF NANAIMO

Integrated Watershed Management Planning

WHO?



A key component to the success of these plans is public input…you live in the watershed! You know it best

Where do we go from here?

In your opinion:

- what are the priority watershed issues?
- who is responsible for watershed management?
- what do you think the DWWP program should focus on?

DRINKING WATER WATERSHED PROTECTION

DRINKING WATER
WATERSHED
PROTECTION

Thank You!