

RDN Drinking Water & Watershed Protection Technical Advisory Committee April 19th, 2018

Roundtable Updates



Agenda



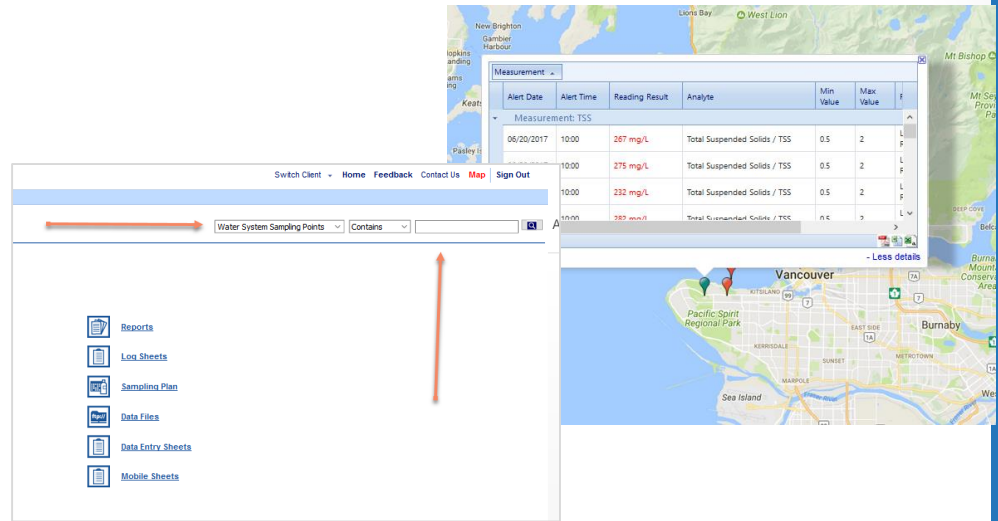
Presentation Topics	
DWWP Water Data Mgmt	Verbal update
Surface Water Quality Trend Analysis – Upcoming Project	Verbal overview
DWWP Action Plan Review & Update	Verbal overview
Cowichan Valley RD's Proposed Watershed Service	Invited presentation
VIU Wetland Research Update	Invited presentation
Team WaterSmart Activities	Verbal update
Rebate Programs	Verbal update
Provincial Groundwater Quality Data Consolidation Pilot	Invited presentation
Englishman River Watershed Recharge Study	Invited presentation
Irrigation Check-up Evaluation	REPORT
RDN Water Conservation Plan Evaluation	DRAFT REPORT

Presentations

Water Data Management

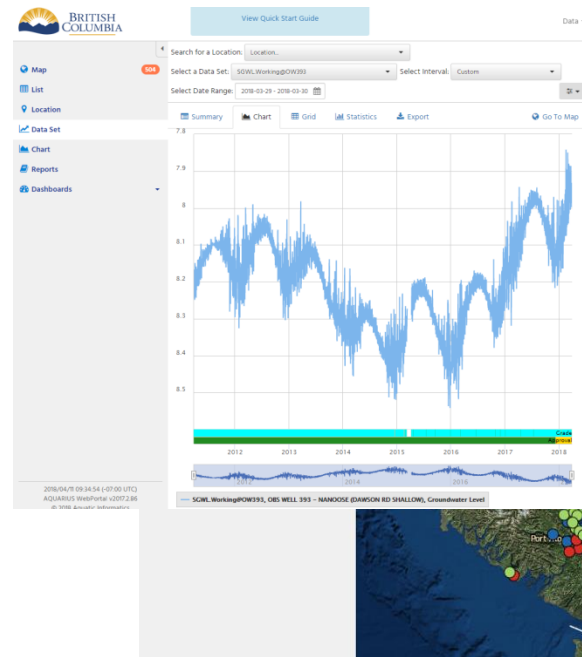
- Groundwater Quality – Voluntary Submission from Well Water Testing Rebate Program

- WATERTRAX (Internal)



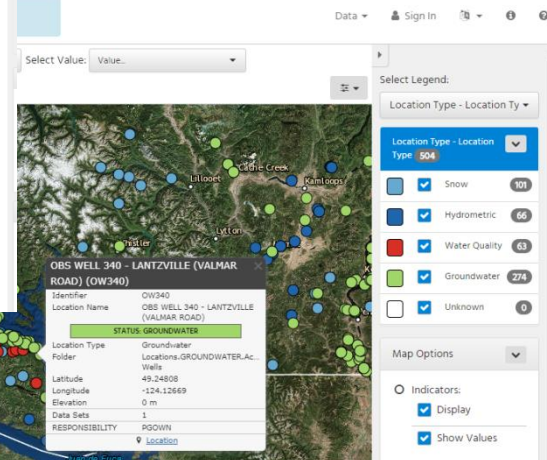
- Groundwater Levels – Volunteer Obs Wells

- AQUARIUS (Public)
- 3rd Party Data Submission to Province

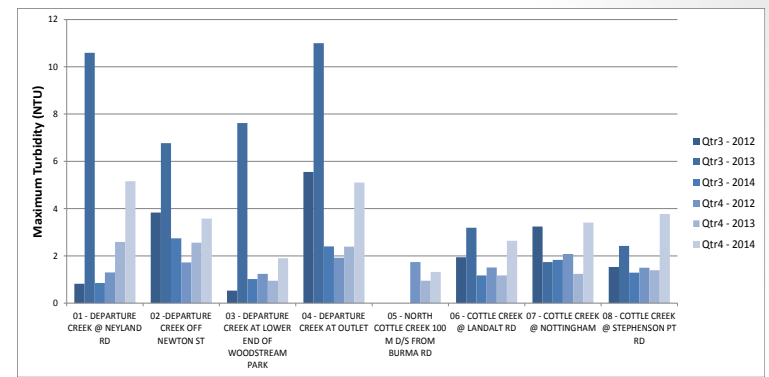


- Hydrometric: Streamflow & Lake Levels –

- AQUARIUS (Public)
- 3rd Party Data Submission to Province



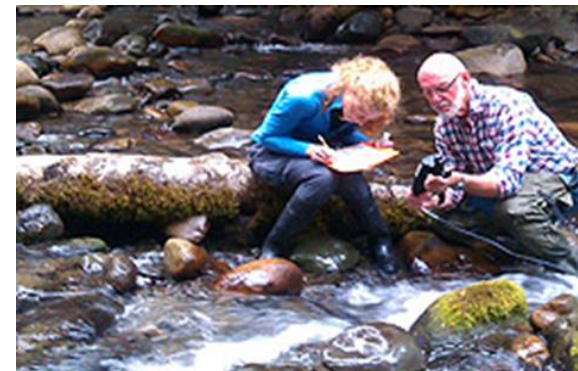
Surface Water Quality Trend Analysis



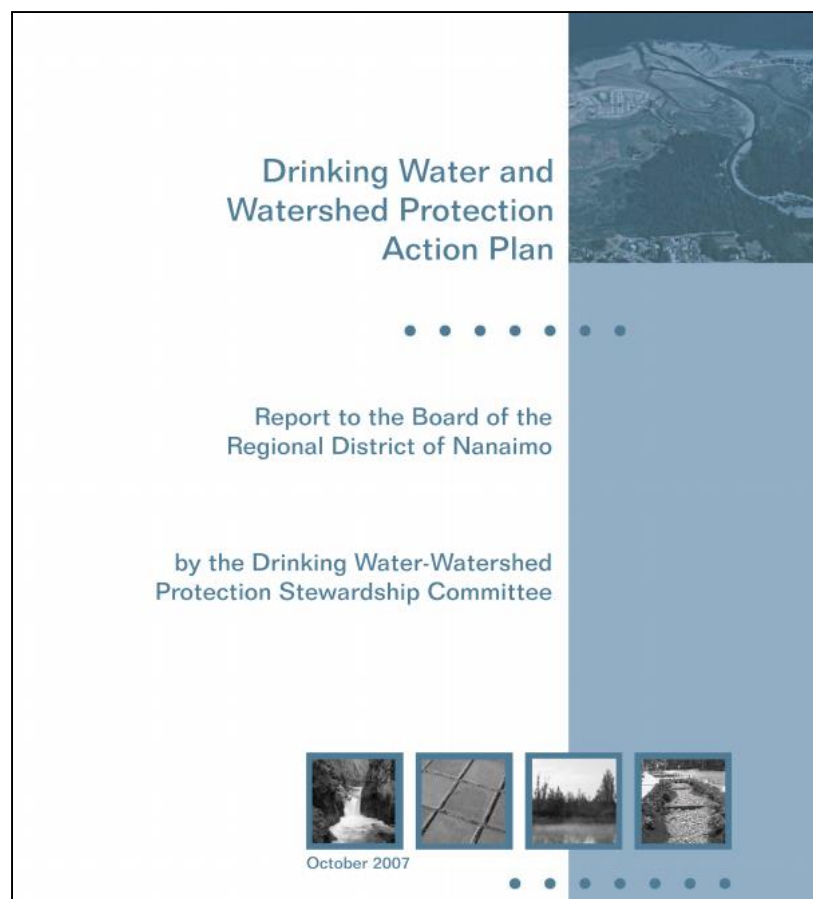
PURPOSE: to compile and analyze the entire dataset collected since 2011, and to include other relevant data (climate, streamflow, land use) in the review to help develop a sound interpretation of trends over time.

VALUE: to make meaning out of the data collected through the CWMN & make recommendations for action.

Just selected **Ecoscope Environmental Consultants** from Kelowna to be the lead consultant on this project. Due mid-September. TAC will see draft this summer.



DWWP Action Plan Review & Update (2018-2019)



Cowichan Valley Regional District

Kate Miller – Manager of Environmental Services



DRINKING WATER and WATERSHED PROTECTION SERVICE



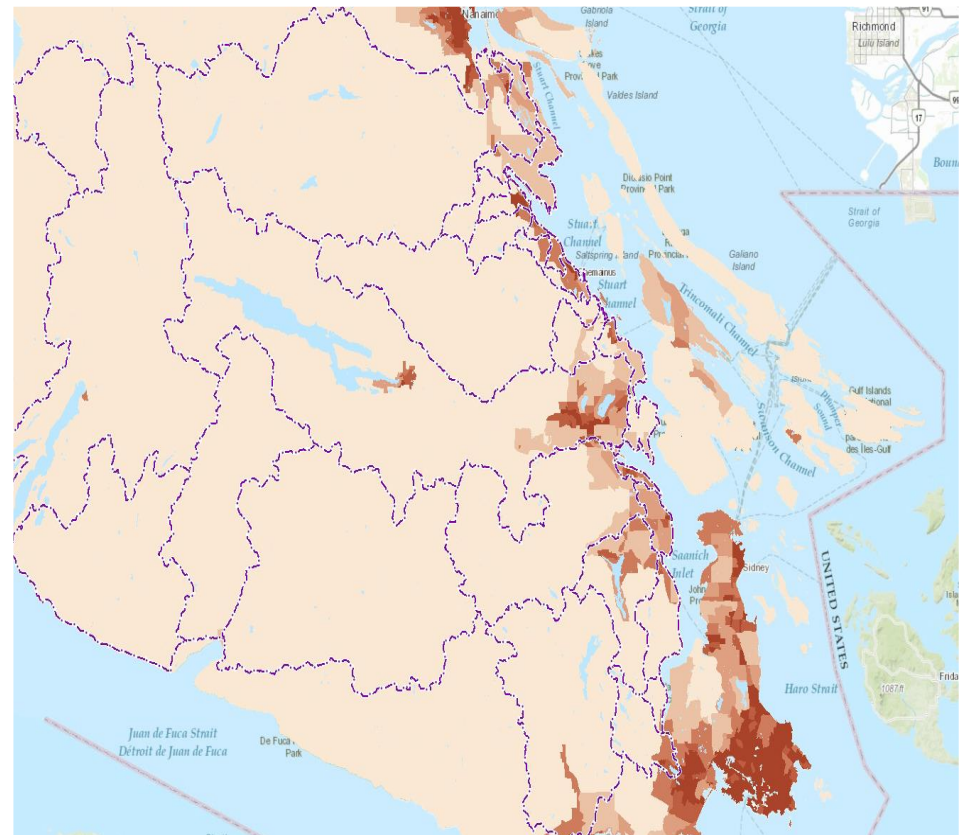
presentation to the RDN DWWP Technical Advisory
Committee – April 19, 2018



DRINKING WATER and WATERSHED PROTECTION

A-made-for-Cowichan solution

- 16 watershed groupings
- More than 50% of population takes from ground
- Major surface water deficits
- Key regulated species
- First Nations interests



DRINKING WATER and WATERSHED PROTECTION

A-made-for-Cowichan solution

Our story to date – we are not with out a plan

- Riparian Areas Regulation
- Cowichan Watershed Management Plan
- Regional Environmental Initiatives Service
- Environment Commission
- Regional Environmental Strategy – Plan 12
- South Cowichan Watershed Management Plan
- Development of the Cowichan Watershed Board
- Cowichan Koksilah Integrated Flood Management Strategy
- Regional Water Governance Study
- Cowichan Flood Service

DRINKING WATER and WATERSHED PROTECTION

A-made-for-Cowichan solution

Focus on:

- Risk based priorities and continues improvement
- Partnerships, at multiple levels
- Skills and capacity development,
- Supporting and enabling and development of a community watershed ethic.
- Science based decisions
- Recognize current state but future focused.
- Little G
- Case studies and projects

DRINKING WATER and WATERSHED PROTECTION

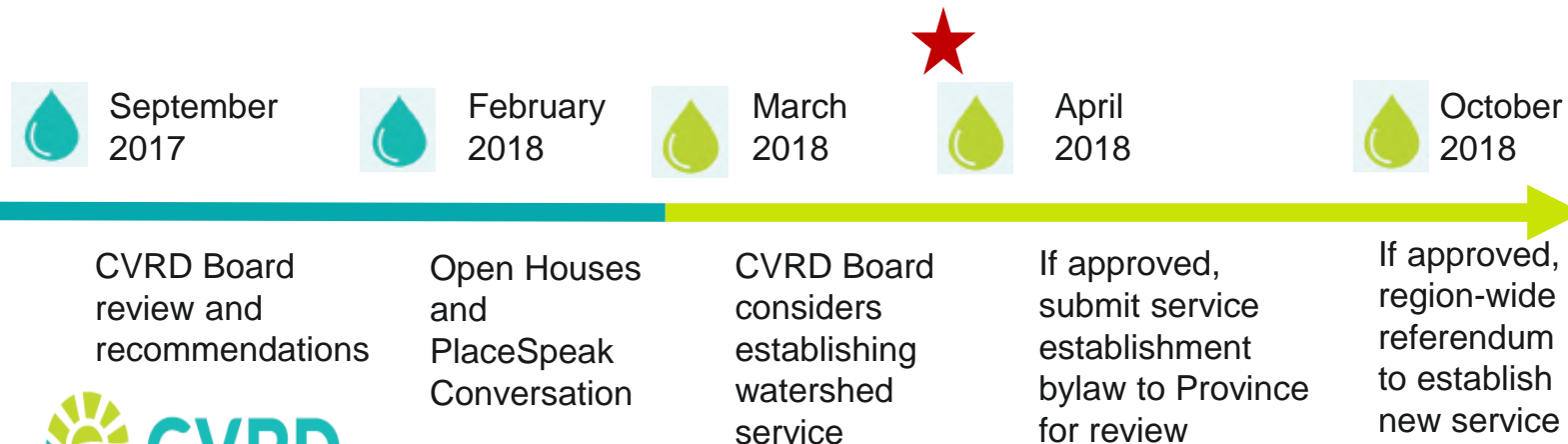
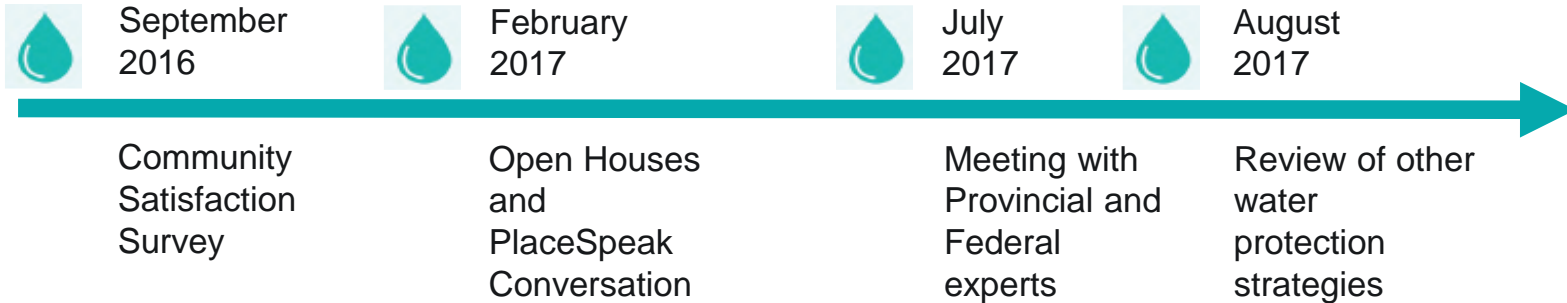
A-made-for-Cowichan solution



Here's what we know:

- The region is growing rapidly
- Water issues are complex, fast-changing
- Climate change is and will affect the regions water resources - substantially
- Water quality and quantity are at risk in many areas
- Current, fragmented water protection is not good enough
- Region-wide approach is more cost-effective

Reaching out to community – Our Roadmap



Public Feedback

Here's what we've heard:



- The public is busy and assumes some level of oversight is happening
 - Regional District legal structures not understood by public
 - Assumption that individual water utilities services includes watershed protection.
 - Focus on action and implementation, not just plans and strategies.
 - Land use decisions need to balance growth and development with the capacity to provide water now and into the future.
 - Concerns with lack of provincial oversight but also downloading and the financial impact on property owners.
 - Water is vital to the future of the region and measures need to be taken to protect the resource.
-
- *138 people attended the public open houses,*
 - *22 people shared their thoughts on PlaceSpeak through 79 comments*
 - *Presentations to all Local Government Mayors and Councils*
 - *Presentations to Cowichan Watershed Board and Cowichan Stewardship Roundtable*

Costs

Option 1

- Maximum annual requisition based on full program implementation- \$12.60 per \$100,000 of residential property taxation

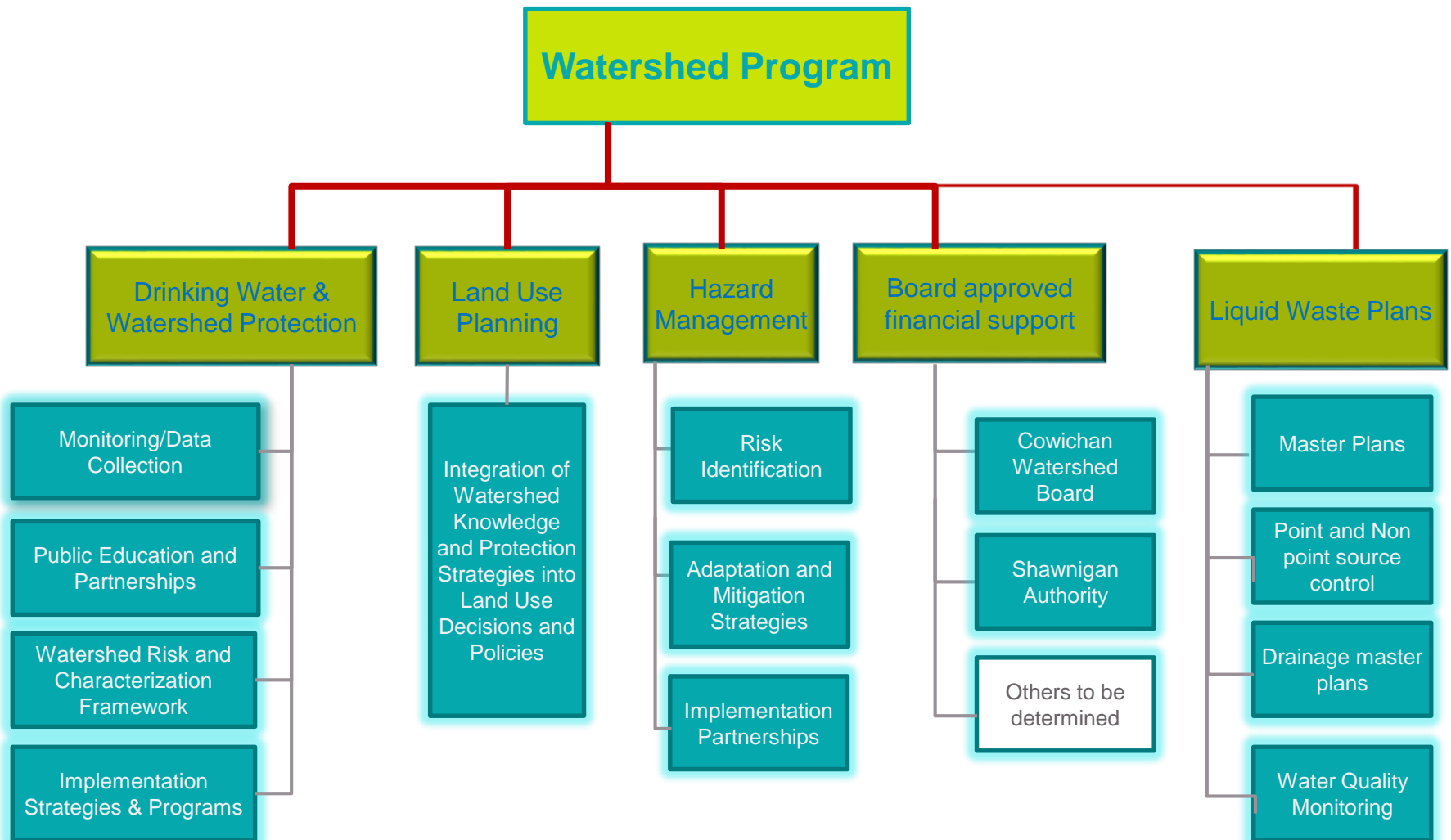
Option 2

- Maximum annual based on full program build out - \$7.06 per \$100,000 of residential property taxation

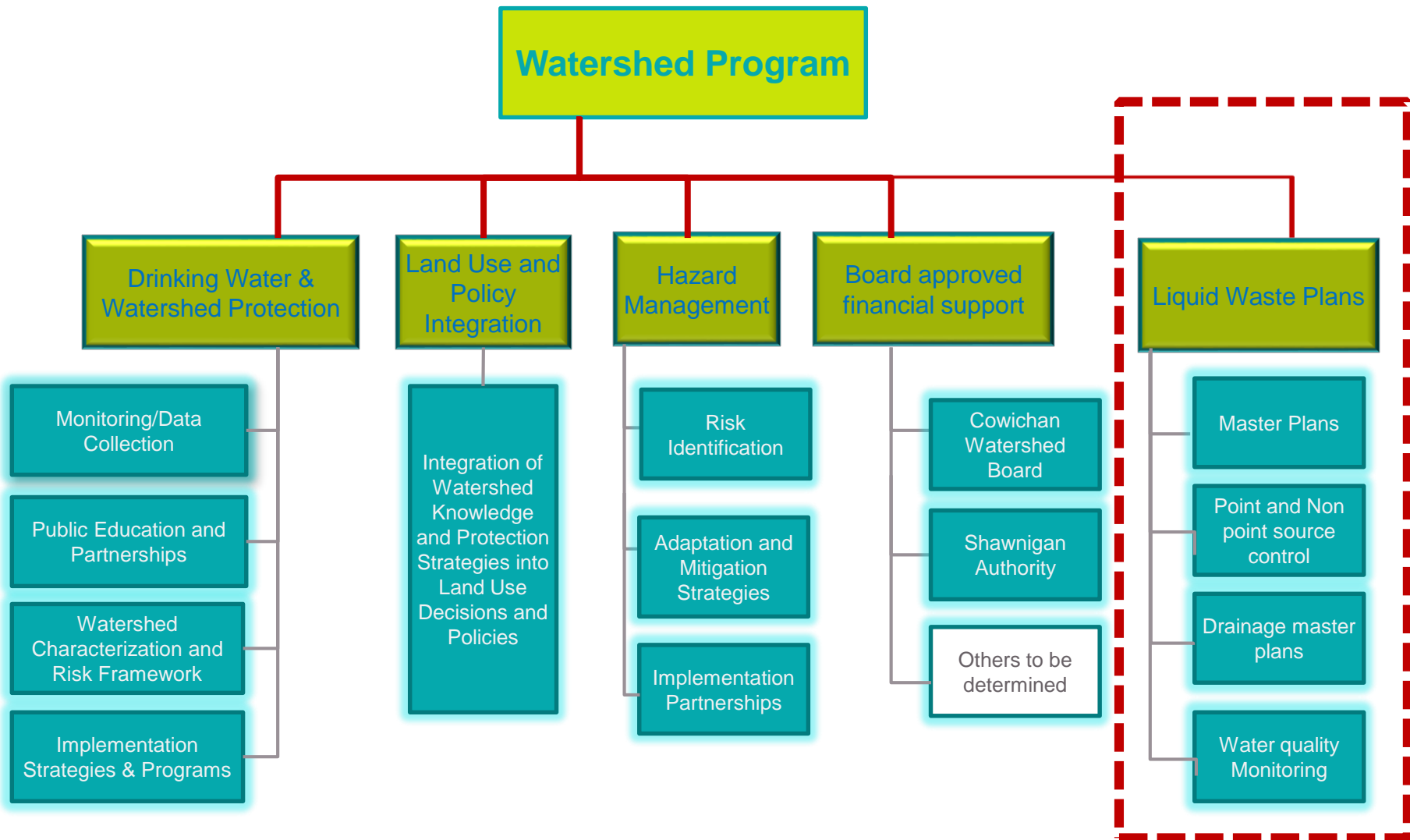
Option 3

- Status quo. Maximum annual max requisition - \$3.97 per \$100,000 of residential property taxation

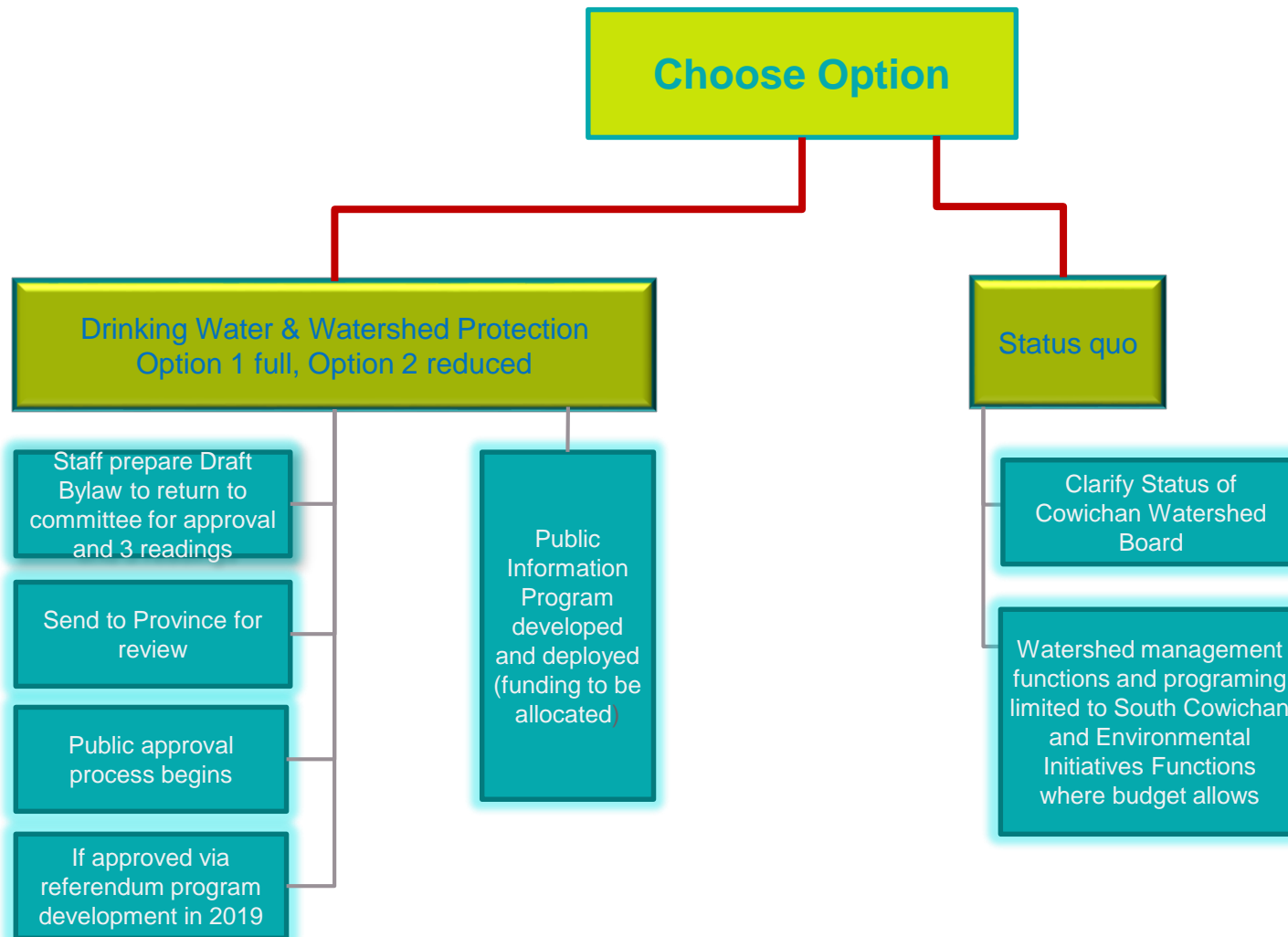
Option 1 – Full Program



Option 2 – Focused Program



Next steps



Next steps – Draft bylaw

DRAFT

SERVICE BEING ESTABLISHED

The service being established under the authority of this bylaw is a service for the purpose of protecting drinking water and watersheds by:

- a) Increasing the level of knowledge regarding drinking water sources to support the long term sustainability of the water resource;
- b) Coordinating the efforts of provincial and local governments and non-governmental organizations with respect to drinking water source protection;
- c) Increasing the level of public awareness regarding drinking water and watershed protection requirements and strategies;
- ~~d) Obtaining and holding water licenses;~~
- e) Promoting and undertaking water conservation initiatives and programs;
- f) Developing and implementing water management plans;
- g) Entering into agreements as needed to accomplish the objectives of this service;
- h) Assessing needs and planning for infrastructure and natural system improvements to maintain or enhance water quality or water supply; and,
- i) Providing grants and financial support to entities approved by the Board for the purpose of water and watershed protection.

Questions?



Wetland Mapping in the Regional District of Nanaimo

Presented by: Ashley Van Acken



United Nations
Educational, Scientific and
Cultural Organization



**MOUNT
ARROWSMITH**
BIOSPHERE REGION

MA**RRRI**



**VANCOUVER ISLAND
UNIVERSITY**

Outline

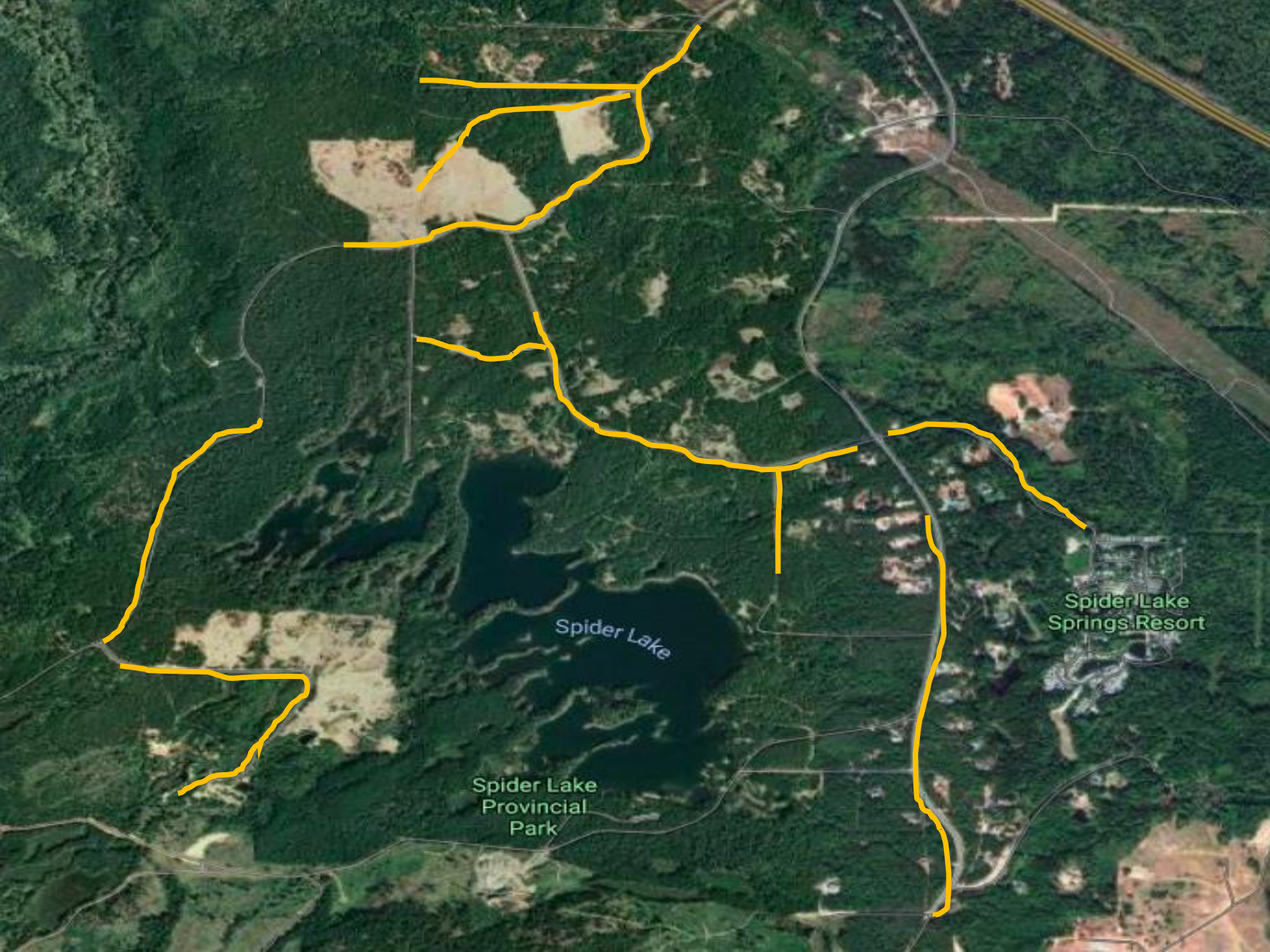
- What we have done
- What we are currently doing
- Next steps
- Conclusion



What have we done?

- Total of **31 wetlands mapped** including:
 - Big Qualicum water region **(4)**
 - Little Qualicum water region **(10)**
 - French Creek water region **(6)**
 - Englishman River water region **(5)**
 - South Wellington water region **(6)**
- Developed three Wetland Classification and Geologic Assessment reports.
- Ground-Penetrating Radar near Horne Lake, Spider Lake, and Illusion Lakes.

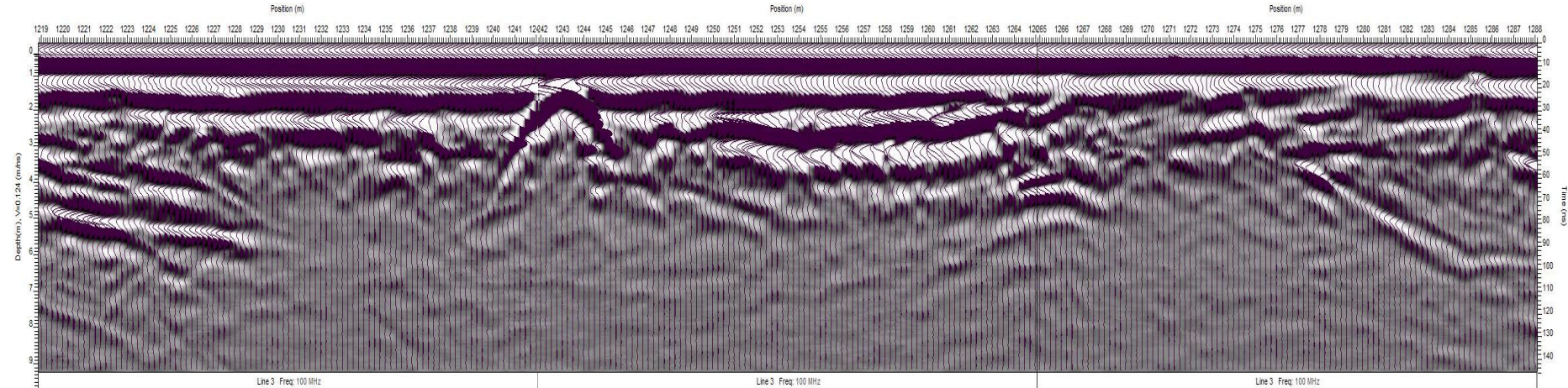
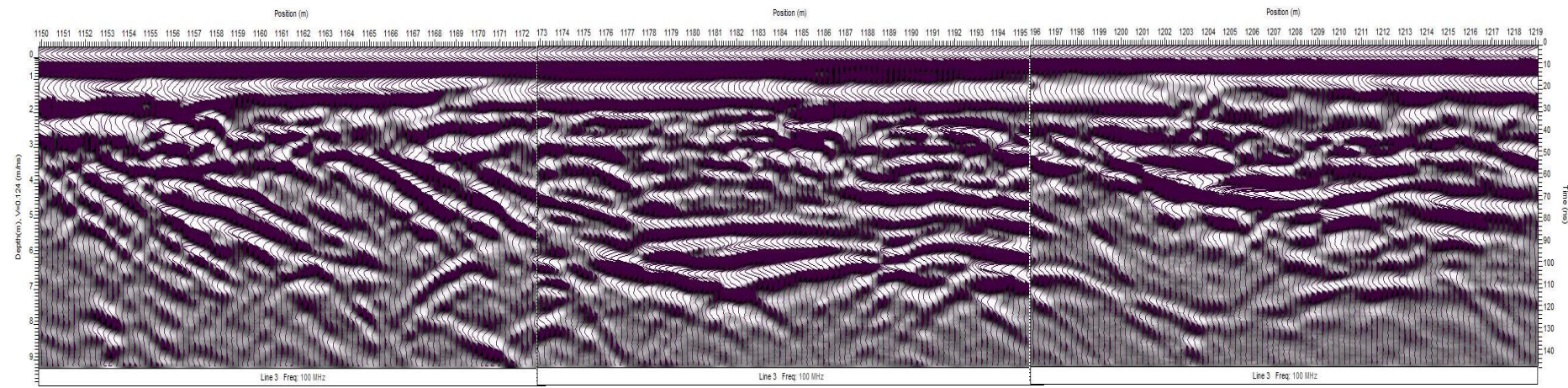
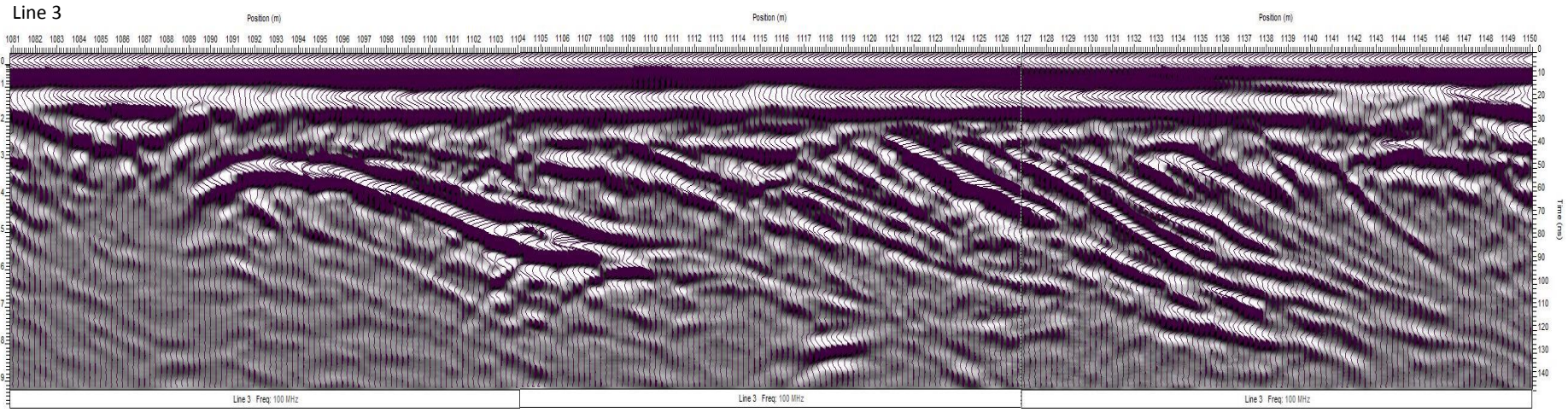




Spider Lake

Spider Lake
Provincial
Park

Spider Lake
Springs Resort



What are we currently doing?

- Currently preparing for the 2018 research season.
 - Identifying study sites in the Big Qualicum, Englishman River and Cedar-Yellow Point water regions.
 - Conducting preliminary desktop analysis of study sites.
- Developing a public platform on the RDN's Get Involved Page.



RDN Wetland Mapping

The *Wetland Mapping and Monitoring project* is a five-year research agreement that was created through a collaborative partnership with the Regional District of Nanaimo's (RDN) Drinking Water and Watershed protection (DWWP) program and Vancouver Island University (VIU). The project started in 2015 and was developed from recognition that there continues to be a lack of baseline data on wetlands in the region. Furthermore, there is limited data regarding where wetlands are situated, how they are classified, and what connection they have to groundwater recharge. This information is important for informing land use decisions in the region. Overall, research aims to inform policy and planning around wetlands in the region in order to better protect these important ecosystems.

Student researchers follow the modified methods of the BC Wildlife Federation Wetlandkeepers program for mapping and classifying wetlands. Students also collect additional data relating to aquifers, geology, and land use. Students dominantly map wetlands during the summer and early fall field season. The data that students collect when in the field consists of: basic hydrological data (pH, turbidity, temperature), soil data, vegetation surveying, wetland perimeter and dimensions using a GPS, dominant and invasive species observations. Wetlands are further evaluated based on their overall wetland function while also considering influences from surrounding land uses, and visible physical features. Project guidance is provided from other partners, including: VIU faculty members from the Geography and Earth Science departments, and executive members of the Mid Vancouver Island Habitat Enhancement Society (MVIHES).

If you'd like to get involved with this research project or if you have a wetland on your property that you would like to volunteer to be mapped, feel free to pinpoint your wetland on the "*Want to Volunteer your Wetland?*" interactive map. For more information, we invite you to use the Q & A tab on this page or contact either Ashley Van Acken or Kayla Harris at the addresses listed at the bottom of this web page.

- DID YOU KNOW?**
- GUESTBOOK**
- Q & A**
- WANT TO VOLUNTEE...**

Wetland Mapping Researchers and Geophysics Class at Vancouver Island University Use Ground-Penetrating Radar at Spider Lake

4 days ago



Did you know that Spider Lake is directly connected to its underlying aquifer?

Spider Lakes unique geologic environment was formed during the last glaciation period and is among one of the dynamic areas our research team has visited. On Friday, April 6th, our project lead and students from the VIU Earth Science department ran geophysical survey lines along Spider Lake. This part of the project was supported by VIU's Regional Initiative Fund which provided funding to Earth Science professor, Jerome-Etienne Lesemann, to investigate groundwater flow in

partnership with our wetland mapping team.
The purpose of using ground penetrating radar is...
[Continue reading](#)

Get involved today! [Register now](#)


Upcoming Events


Earth Day Booth at Qualicum Beach Interpretive Centre
April 22 2018


BC Wildlife Federation Wetlandkeepers Workshop, Vancouver
May 25 → May 27 2018


BC Wildlife Federation Wetlandkeepers Workshop, Nanaimo
May 04 → May 06 2018


Document Library

 Wetlands of British Columbia: A Guide to Identification (4.03 MB) (pdf)

 MABRRI modified long form field survey (97.1 KB) (docx)

 South Wellington-Nanoose Water Region (2.34 MB) (pdf)

 French Creek Water Region (2.87 MB) (pdf)

 Little Qualicum Water Region (3.67 MB) (pdf)

[more..](#)

FAQ

[Why is wetland mapping important?](#)

[Where can the public view work completed to date?](#)

[What is a wetland?](#)

[What is the difference between groundwater and surface water?](#)

[Why are wetlands important?](#)

[more..](#)

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Uplands of Englishman River watershed

[more..](#)



Next Steps

- Interpreting GPR data and running lines again during the summer.
- Complete mapping in the Big Qualicum, Englishman River and Cedar-Yellow Point Water Regions.
- Identify representative wetlands for seasonal monitoring.
- Continue to find funding for future project development for instrumentation and long-term monitoring.



Conclusion

- In total, we have mapped 31 wetlands across five water regions.
- Researchers will focus on mapping in the Big Qualicum, Englishman River and Cedar-Yellow Point Water Regions during summer.
- VIU will launch the public “Get Involved” platform to engage a greater audience in the Regional District of Nanaimo.



Questions?



United Nations
Educational, Scientific and
Cultural Organization



**MOUNT
ARROWSMITH**
BIOSPHERE REGION

MAORRI



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Team WaterSmart Activities



Water to Earth Month 2018

Nanaimo & District Celebrates



For more details on the listed events & to register:

getinvolved.rdn.ca/team-watersmart

#water2earth



250.756.5200



Drinking Water & Watershed
Protection Program
250.390.6560



250.714.1990



Schedule of Events

** Please register in advance*

2018 Water Day "Nature for Water"

Exploring nature-based solutions to the water challenges in the 21st century.

Saturday, March 10:

- Nile Creek Streamwalk

Thursday, March 22:

- Nanaimo River Watershed & Water Treatment Plant Tour *
- Everyone Welcome Swim (Ravensong Pool)

Saturday, March 24:

- WaterSmart Workshop Day (Qualicum) *
- Earth Hour Starlight Skate (Nanaimo Ice Centre)

Tuesday, March 27:

- Englishman River Watershed Family Field Trip *

Wednesday, March 28:

- Dive-In Theatre "Sponge Bob" (Nanaimo Aquatic Centre)

Thursday, April 5:

- VIU Water Film Night

Wednesday/Thursday, April 11/12:

- Nanaimo Water Stewardship Symposium

Saturday, April 14:

- Nanaimo Rafting: River (am) & Estuary (pm) *

Tuesday, April 17:

- Native Plant Walk *

Saturday/Sunday, April 21 & 22:

- Streamkeepers Course (NALT)

Saturday, April 21:

- Earth Day Community Celebration (John Barsby Community School)

2018 Earth Day

"What is the BUZZ about Cross Pollination?"

- 2nd Annual Water to Earth Month series of events.
- Promotes water conservation, environmental education, RDN programs, and community stewardship.
- Over 13 individual events over a 1 month period.
- Many partners throughout the regional district.

Watershed Field Trips Spring 2018

- Nanaimo and Englishman River Watersheds
 - 3 trips for SD68; 3 trips for SD69
 - Fun and curriculum-connected
 - Where does our drinking water come from? Why conserve?



Team WaterSmart Events

- Over 25 community events visited annually
- Engage with residents in rural and urban communities
- Offer expertise and interactive educational material
- Promote conservation and awareness

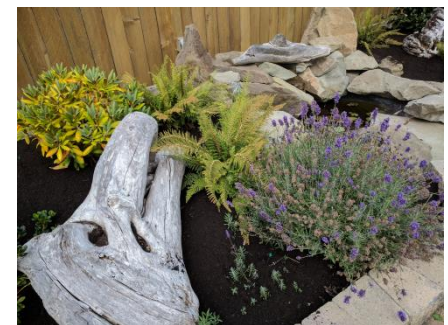


City of Nanaimo Public Works Day	Family Fishing Day	QB Family Day	Cedar Farmers Market
KidFest	Bowser Summer Market	Rivers Day	Gabriola Oceans Day
Nanaimo Canada Day	VIU Sustainability Fair	Nanoose Teddy Bear PicNic	Craig Street Market
Second Sunday Market	Islands Trust Well Owner Workshop	Coombs Fair	Gabriola Farmer's Market
Errington Farmers Market	QB Farmer's Market	Lantzville Mine Town Day	Lighthouse Country Fall Fair
Lantzville Farmers Market	Fairwinds Garden Tour	Qualicum Beach Garden Club	+ more!

Rebate Programs

DWWP offers 4 region-wide rebate programs:

- Rainwater Harvesting
 - Wellhead Upgrades
 - Well Water Testing
 - Irrigation Upgrades & Soil Improvements
- Available to all residential landowners
 - Goal: watershed protection and water conservation



2017 Rebate Summary

	Well Water Testing	Wellhead Upgrades	Rainwater Harvesting	WaterSmart Garden	
Number of Rebates Available	88*	6.2*	55*	14.8*	
Total Funds Available	\$ 11,000.00	\$ 4,000.00	\$ 41,250.00	\$ 10,000.00	
Number of Complete Applications/Vouchers	120	11	39	11	
Total Funds Spent	\$ 11,890.36	\$ 3,239.42	\$ 28,835.80	\$ 2,849.42	
Area Breakdown	A	5	1	6	1
	B	24	5	29	1
	C	12	1	1	1
	E	11	0	1	3
	F	24	0	2	0
	G	7	1	1	0
	H	7	0	0	0
	Nanaimo	0	0	0	1
	Lantzville	30	3	0	0
	Parksville	0	0	0	4
Qualicum	0	0	1	0	

**Number of rebates available is based on the maximum rebate amount*

Rebate Category Breakdown

Wellhead Upgrades		WaterSmart Garden (Irrigation & Soil)	
Well Cap	10	Soil Improvements	11
Casing Extension	9	Irrigation: Controller	3
Surface Seal	3	Irrigation: Sensor	2
Well Closure	0	Irrigation: Drip Emitter	4
		Irrigation: MP Rotors	1
		Bonus	5

2018 Rebates – to date

	Well Water Testing	Wellhead Upgrades	Rainwater Harvesting	WaterSmart Garden
Number of Rebates Available	66.7*	3.1*	30*	11.9*
Total Funds Available	\$ 10,000.00	\$ 2,000.00	\$ 22,500.00	\$ 8,000.00
Number of Rebates Allocated	14	2	8	10
Total Funds Allocated	\$ 2,100.00	\$ 800.00	\$ 6,750.00	\$ 2,850.00
Number of Rebates Completed	22	0	1	0
Total Funds Spent to Date (April 18, 2018)	\$ 2,221.60	\$ 0	\$ 750.00	\$ 0

**Number of rebates available is based on the maximum rebate amount*

Rebates Completed & Allocated to Date (April 18, 2018)

Area Breakdown	A	B	C	E	F	G	H	Nanaimo	Lantzville	Parksville	Qualicum
	2	12	6	3	7	1	1	0	4	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	1	0	2	1
	0	0	0	0	0	1	1	7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

- Administrative updates completed to streamline process
- Promotion: social media, print advertising, flyers, events/workshops



Ministry of **Forests, Lands, Natural Resource Operations**
and **Rural Development**

Aquifer Water Quality Data Consolidation Project

Water Management Branch

Graeme Henderson

Groundwater Technician



Outline

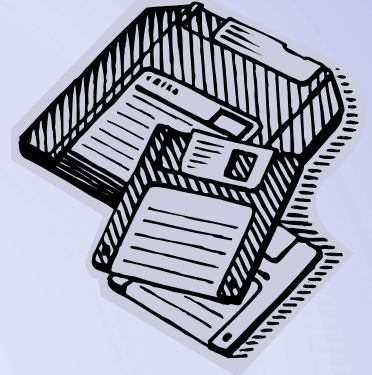
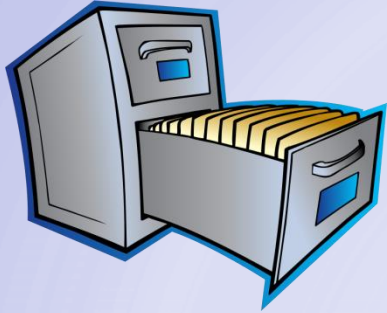
- Background
- Archived data
- New data
- Partners
- Benefits
- Challenges
- Conclusions





Background

- Spatial distribution of groundwater quality data is important for understanding aquifers
- Data are currently stored in multiple disconnected sources
- Stakeholders would benefit from sharing information between sources





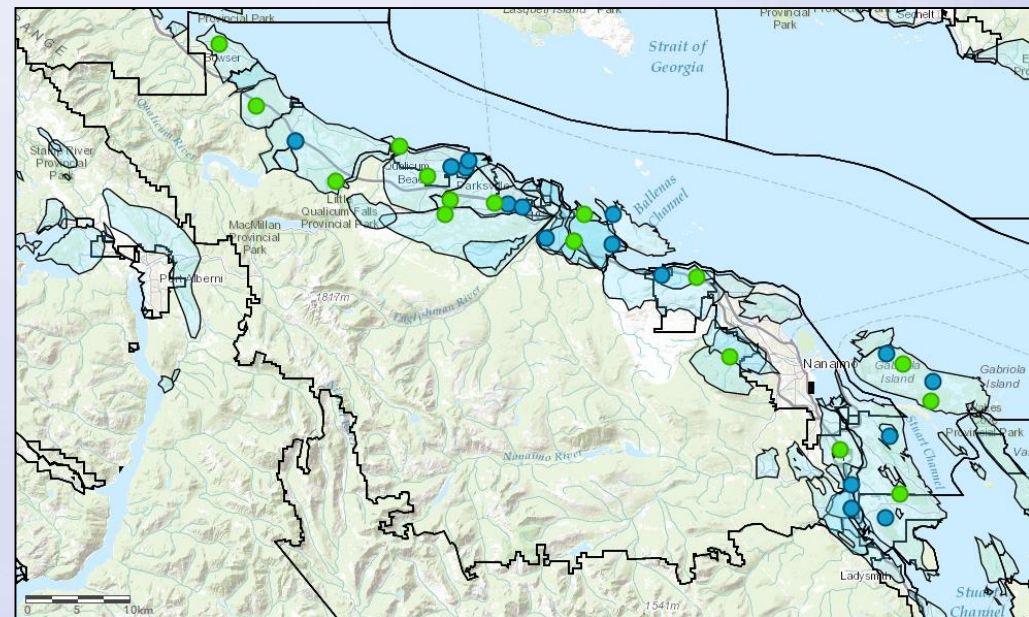
Background

- 2011-12 source water quality pilot project
- Assessed how to consolidate data into one central and accessible repository.
- 55 results from 4 water systems (\$725 budget)
- Environmental Monitoring System (EMS)
- Restricted by short time frame and small budget
- Challenges: staff time and ongoing budgets



Archived water quality data

- There are 228 systems in the RDN
- There are 35 mapped aquifers
- Goal: 3 sites per aquifer with source data in EMS
- Current: 4 aquifers with 3 sites, 18 with no data
- Requires 75 sites to meet project target





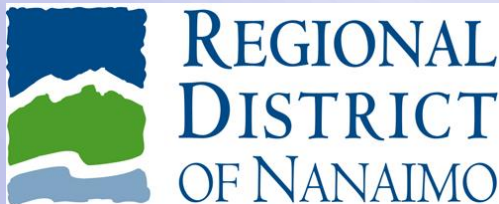
New water quality data

- Work with 10 community water system operators
- Upload data to EMS on an ongoing basis
- Operator submits samples to lab with EMS ID (not microbiological samples)
- Include First Nations water systems
- Track trends in water quality over time
- Spatial distribution is important for state of the aquifer reporting



Partners

- Regional District of Nanaimo
- Vancouver Island Health Authority
- First Nations Health Authority
- BC Environment and Climate Change Strategy
- Maxxam Analytics laboratory
- ALS Environmental



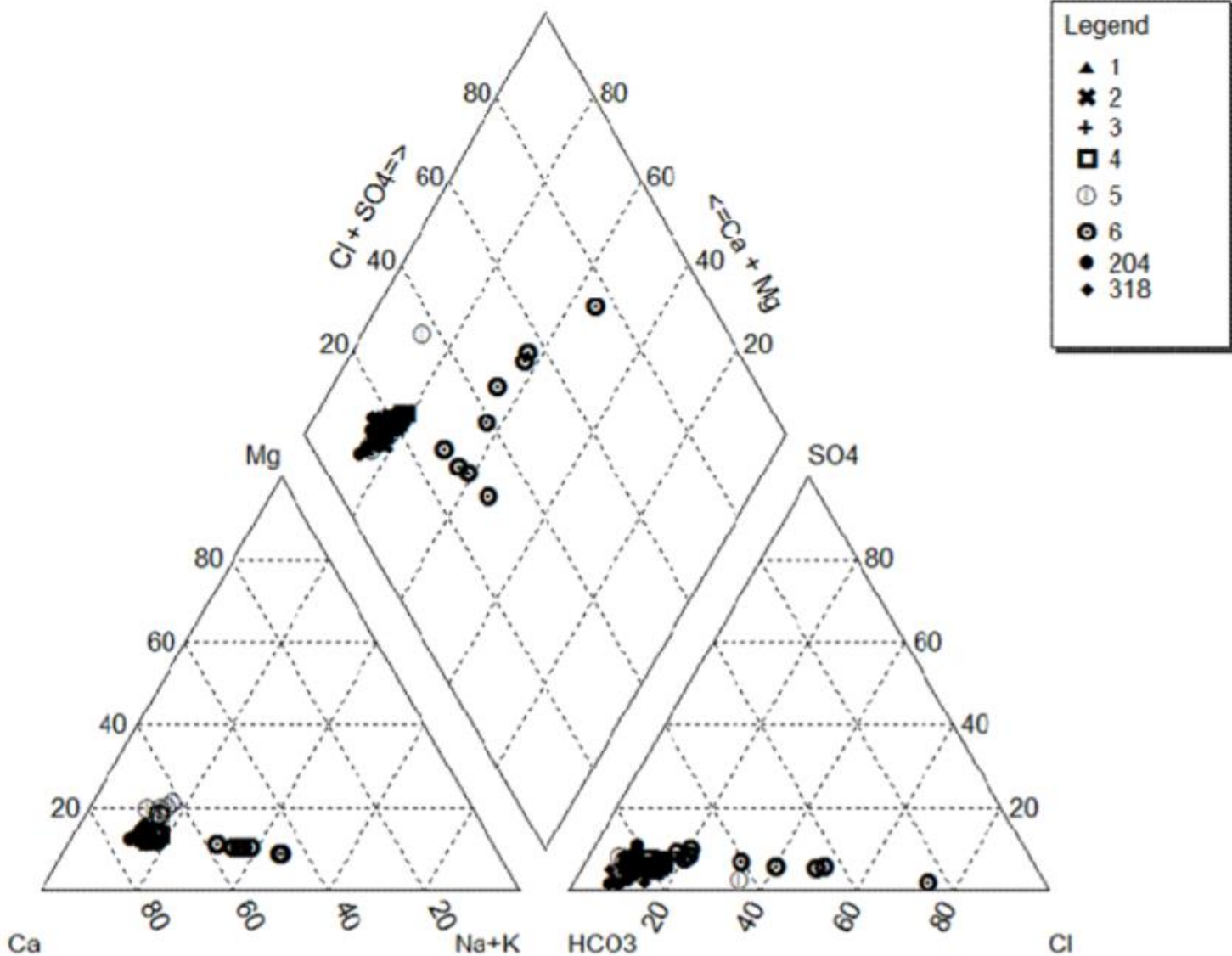


Benefits

- Increases data availability for analytical projects by creating a central hub for data access
- Leverages existing data collection
- Promotes consistency in parameter selection
- Promotes best practices for water sampling
- Provides data for water management decisions
- Builds relationships between groundwater stakeholders
- Best use of available staff and budget resources



Ministry of Forests, Lands, Natural Resource Operations and Rural Development





Challenges

- Ongoing budget costs
- Ongoing administrative burdens
- Quality control and quality assurance
 - Unknown data formats
- Turnover in staff – training and retraining
- Buy-in from stakeholders

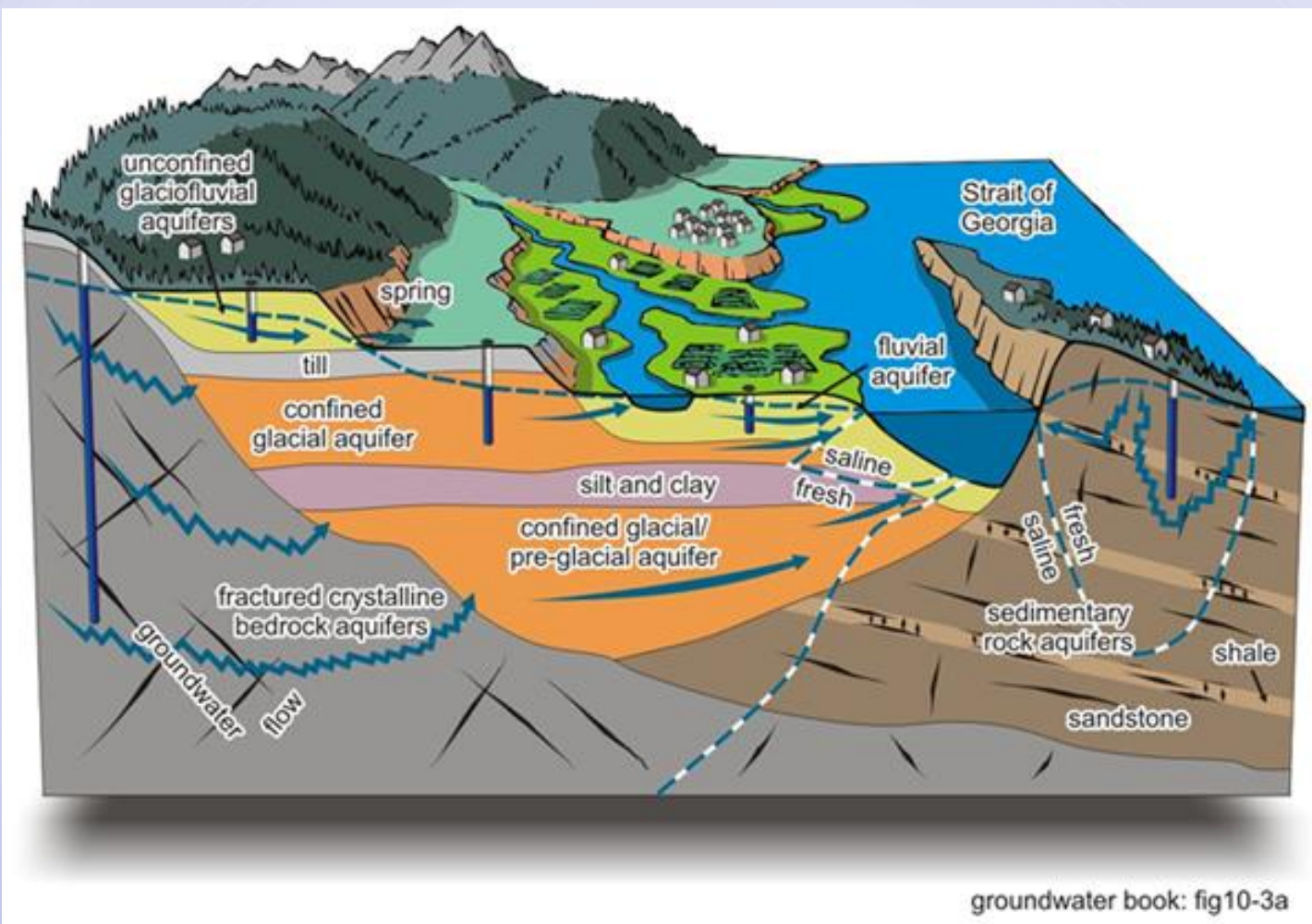


Conclusions

- Valuable project for consolidating existing data to create 'one-stop' access to water quality information from specific aquifers.
- Provincial databases are the logical location to house water quality data from multiple agencies and water users.
- Data consolidation is the best use of available staff time and resources.
- Creates a framework to follow for expanding the project into other regions.



Questions?



GROUNDWATER RECHARGE POTENTIAL IN THE ENGLISHMAN RIVER WATERSHED

GRAEME HENDERSON

GEOLOGY 491 INDEPENDENT RESEARCH PROJECT

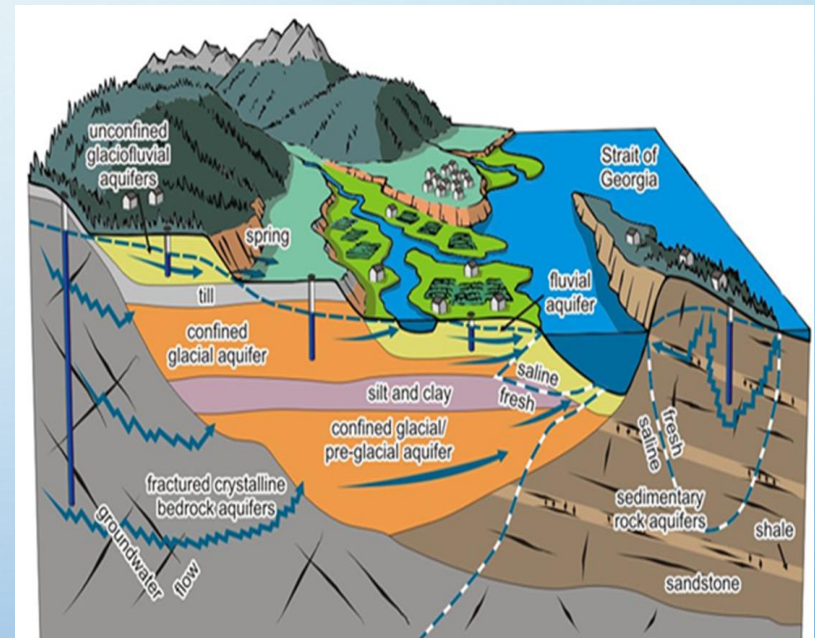


OUTLINE

- INTRODUCTION
- METHODS
- RESULTS
- CONCLUSIONS
- RECOMMENDATIONS
- QUESTIONS?

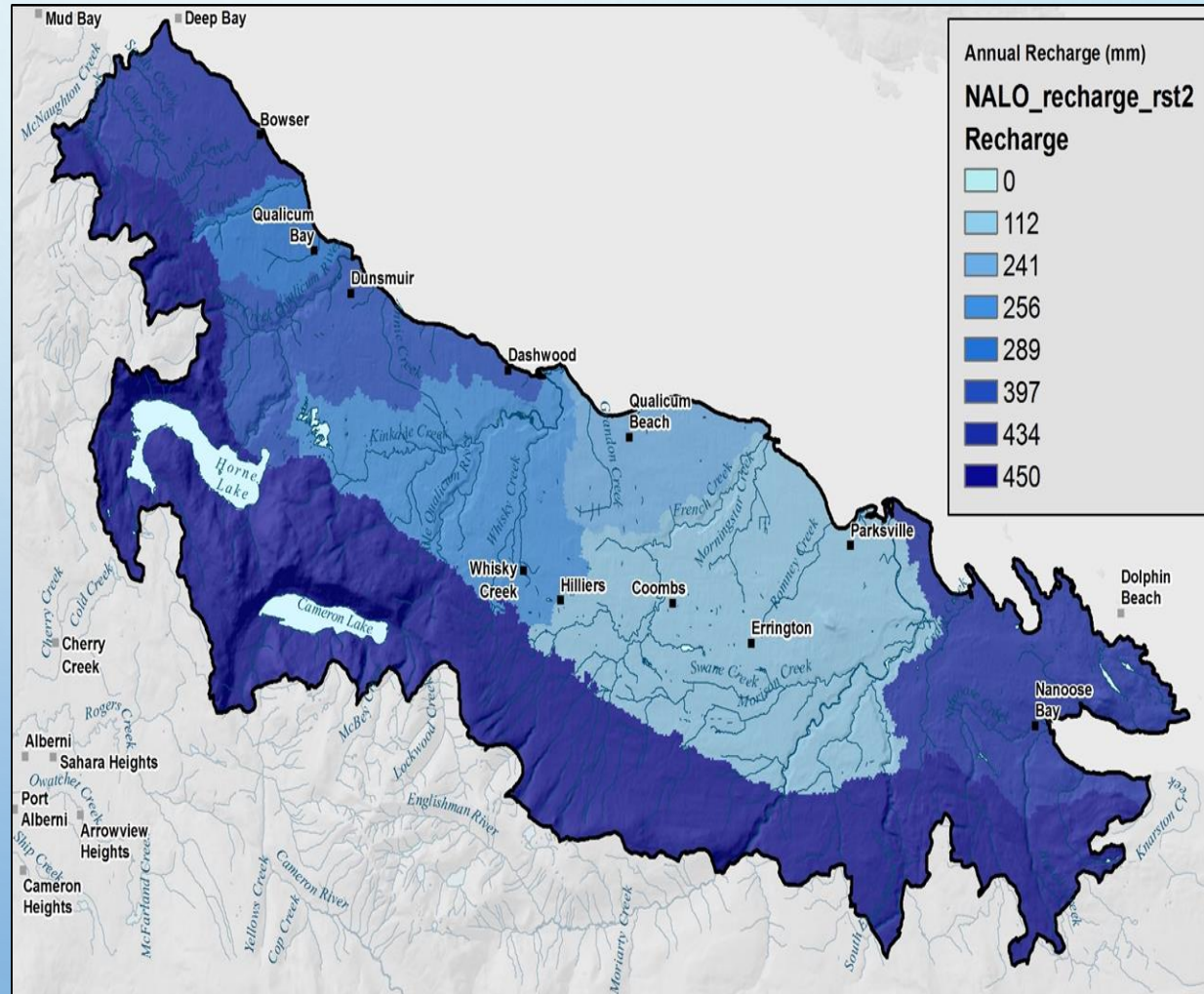
INTRODUCTION

- GROUNDWATER RECHARGE IS THE PROCESS OF WATER PASSING THROUGH THE UNSATURATED ZONE INTO THE SATURATED LAYER BELOW THE WATER TABLE.
- MAPPING RECHARGE POTENTIAL IS IMPORTANT FOR PROTECTING AND PROPERLY MANAGING GROUNDWATER RESOURCES.
- SEVERAL METHODS EXIST FOR ESTIMATING GROUNDWATER RECHARGE
- REMOTE SENSING AND PHYSICAL DATA WERE FED INTO GIS SOFTWARE FOR THIS PROJECT
- THE METHODS WERE A SYNTHESIS OF SEVERAL PEER-REVIEWED PUBLISHED STUDIES



INTRODUCTION

- NANAIMO LOWLANDS GROUNDWATER STUDY
- THE GEOLOGICAL SURVEY OF CANADA USED HYDROGRAPH SEPARATION METHODS TO ESTIMATE RECHARGE RATES
- EXTRACTING THE GROUNDWATER COMPONENT FROM STREAM FLOW RECORDS

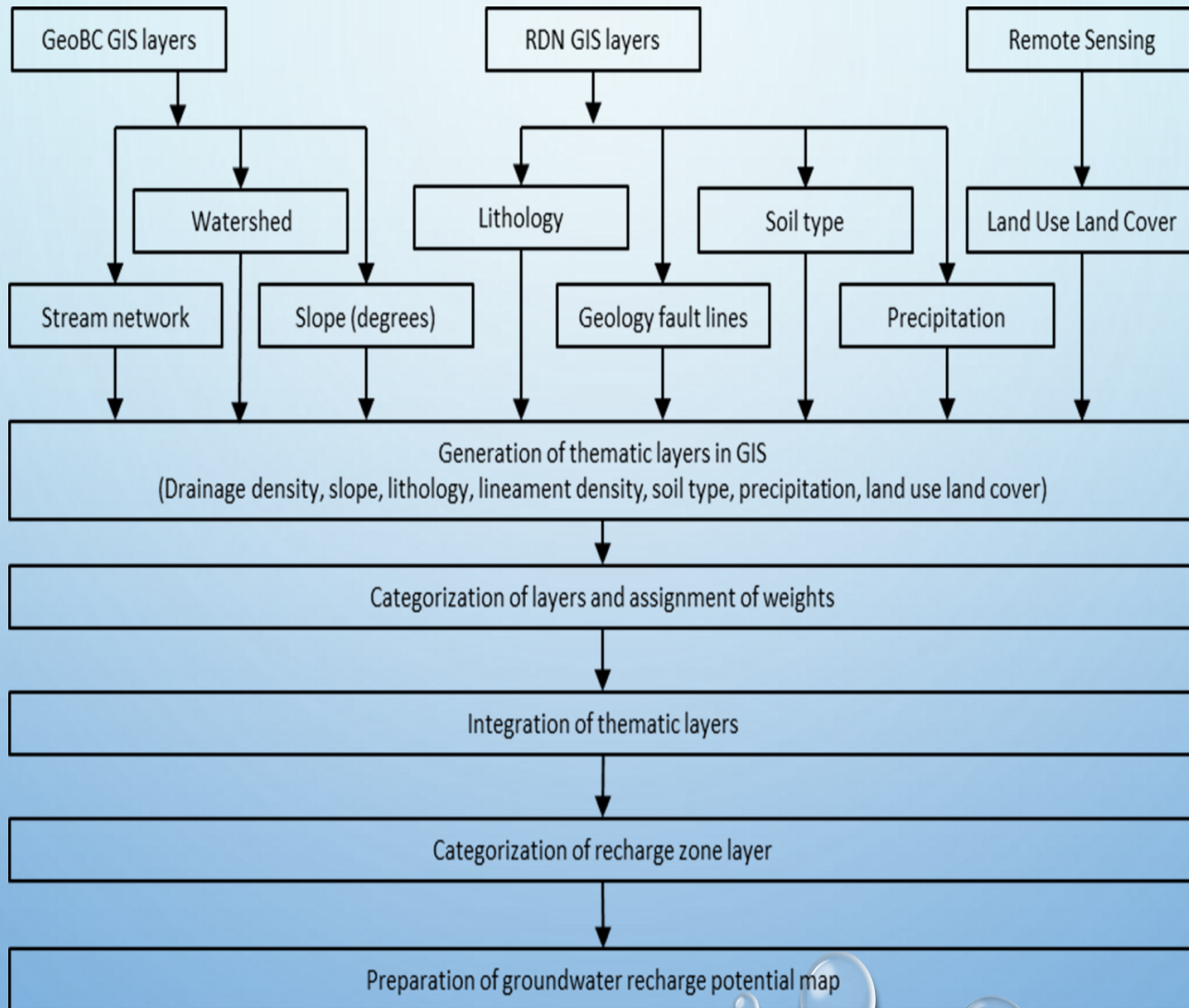


INTRODUCTION

- ENGLISHMAN RIVER WATERSHED
- AREA: 319 KM²
- SEA LEVEL TO 1,819 M ELEVATION AT THE TOP OF MOUNT ARROWSMITH
- MOST OF THE WATERSHED IS PRIVATELY MANAGED FOREST LANDS

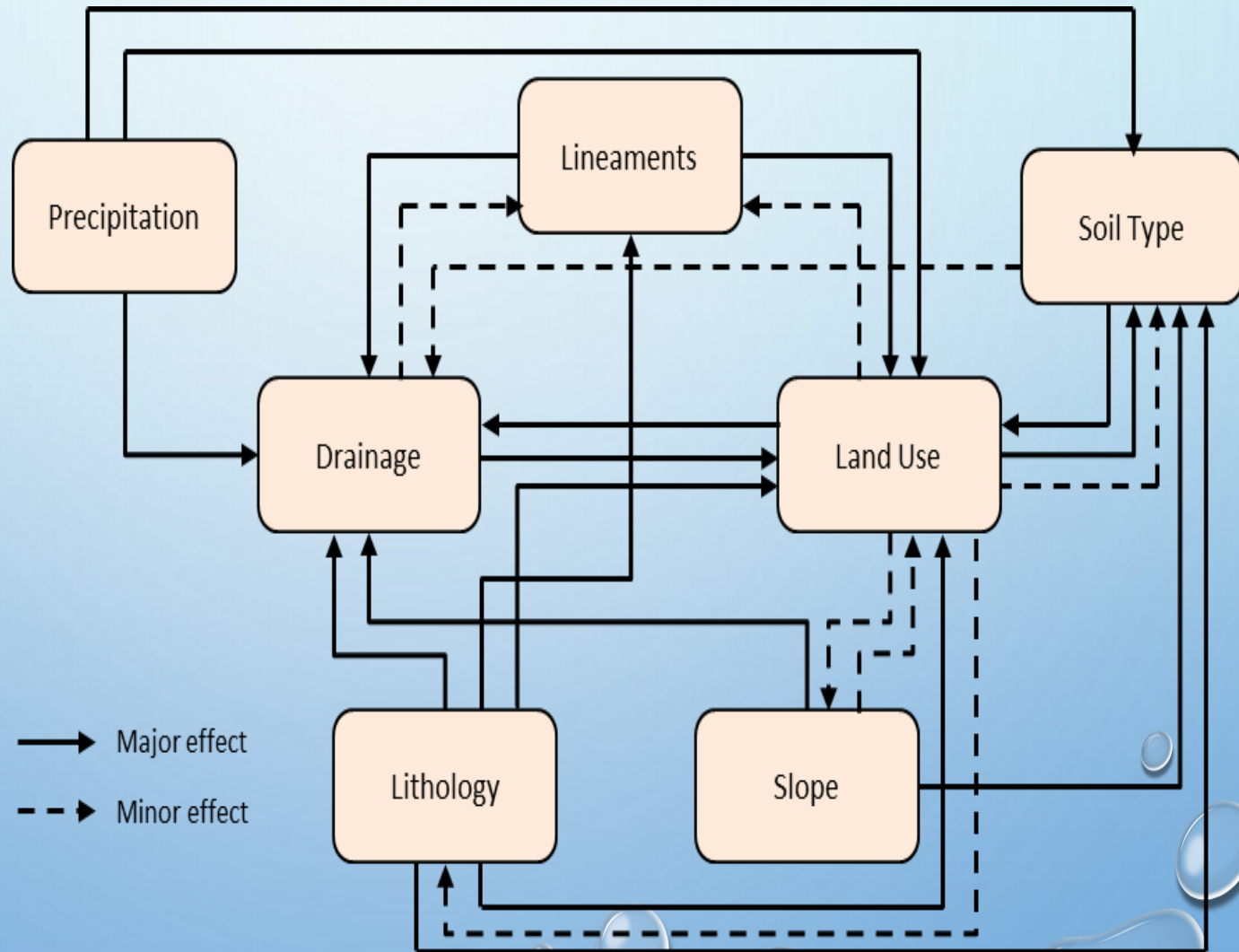


METHODS - PROJECT WORKFLOW



METHODS - INTERRELATIONSHIPS BETWEEN FACTORS

- THE DEGREE OF INFLUENCE THAT EACH FACTOR HAS ON THE OTHER FACTORS.
- BASED ON PREVIOUS STUDIES, LITERATURE RESEARCH AND LOCAL KNOWLEDGE.
- MAJOR EFFECTS WERE GIVEN A VALUE OF 1.0.
- MINOR EFFECTS WERE GIVEN A VALUE OF 0.5.



METHODS – PROPOSED RELATIVE RATES

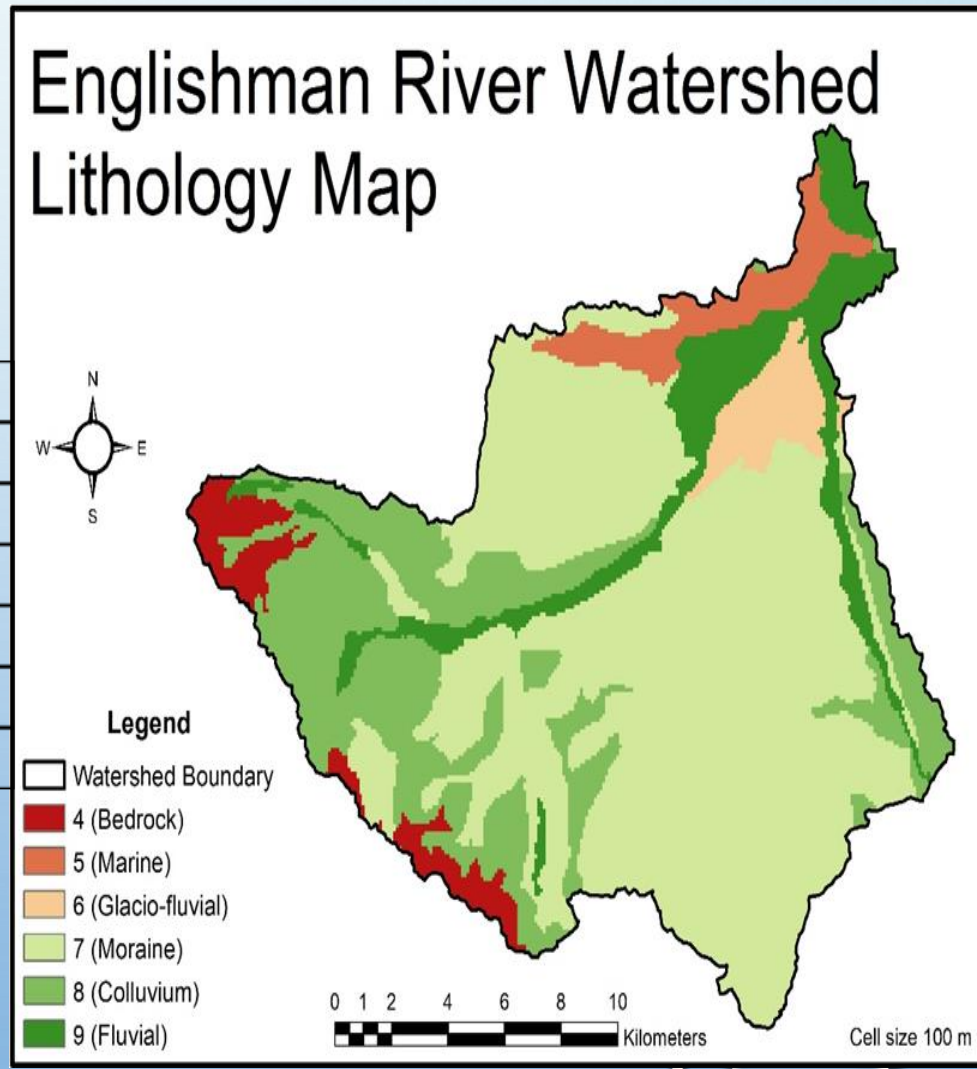
- NUMBER OF INTERRELATIONSHIPS MULTIPLIED BY THE FACTORS (MAJOR + MINOR)
- LITHOLOGY HAS THE GREATEST INFLUENCE ON RECHARGE POTENTIAL

Factor	Calculation process	Proposed relative rate
Lithology	$4 \times 1.0 = 4.0$	4.0
Land use land cover	$2 \times 1.0 + 3 \times 0.5 = 3.5$	3.5
Precipitation	$3 \times 1.0 = 3.0$	3.0
Slope	$2 \times 1.0 + 1 \times 0.5 = 2.5$	2.5
Lineament Density	$2 \times 1.0 = 2.0$	2.0
Soil type	$1 \times 1.0 + 1 \times 0.5 = 1.5$	1.5
Drainage Density	$1 \times 1.0 = 1.0$	1.0

RESULTS – LITHOLOGY

- LITHOLOGY CONTROLS PERCOLATION OF WATER INTO THE SUBSURFACE.

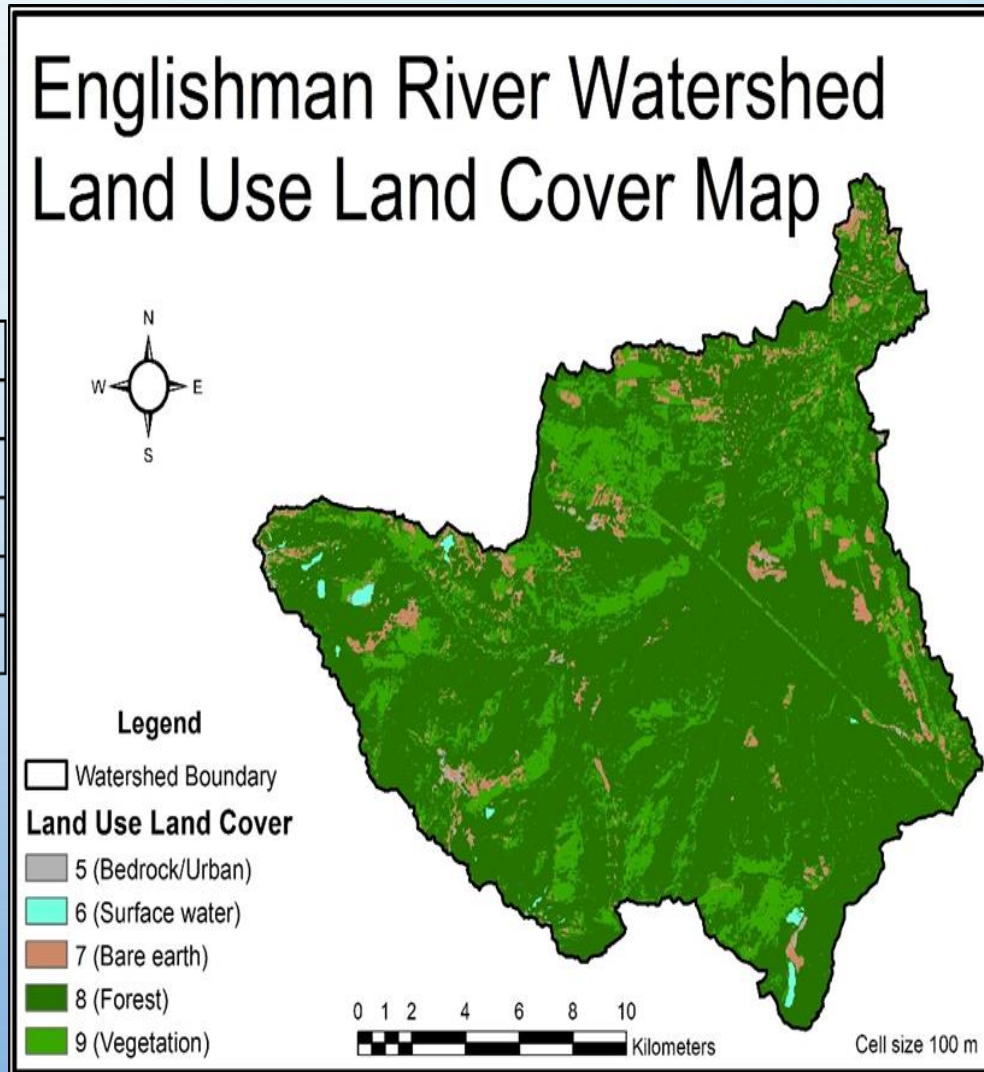
Lithology	Recharge potential	% of watershed
Bedrock	Extremely poor	4.0%
Marine	Very poor	4.3%
Glacio-fluvial	Poor	3.2%
Moraine	Moderate	56.6%
Colluvium	Good	22.2%
Fluvial	Very good	9.8%



RESULTS – LAND USE LAND COVER

- LAND USE CONTROLS INFILTRATION, RUNOFF AND EVAPORATION RATES.

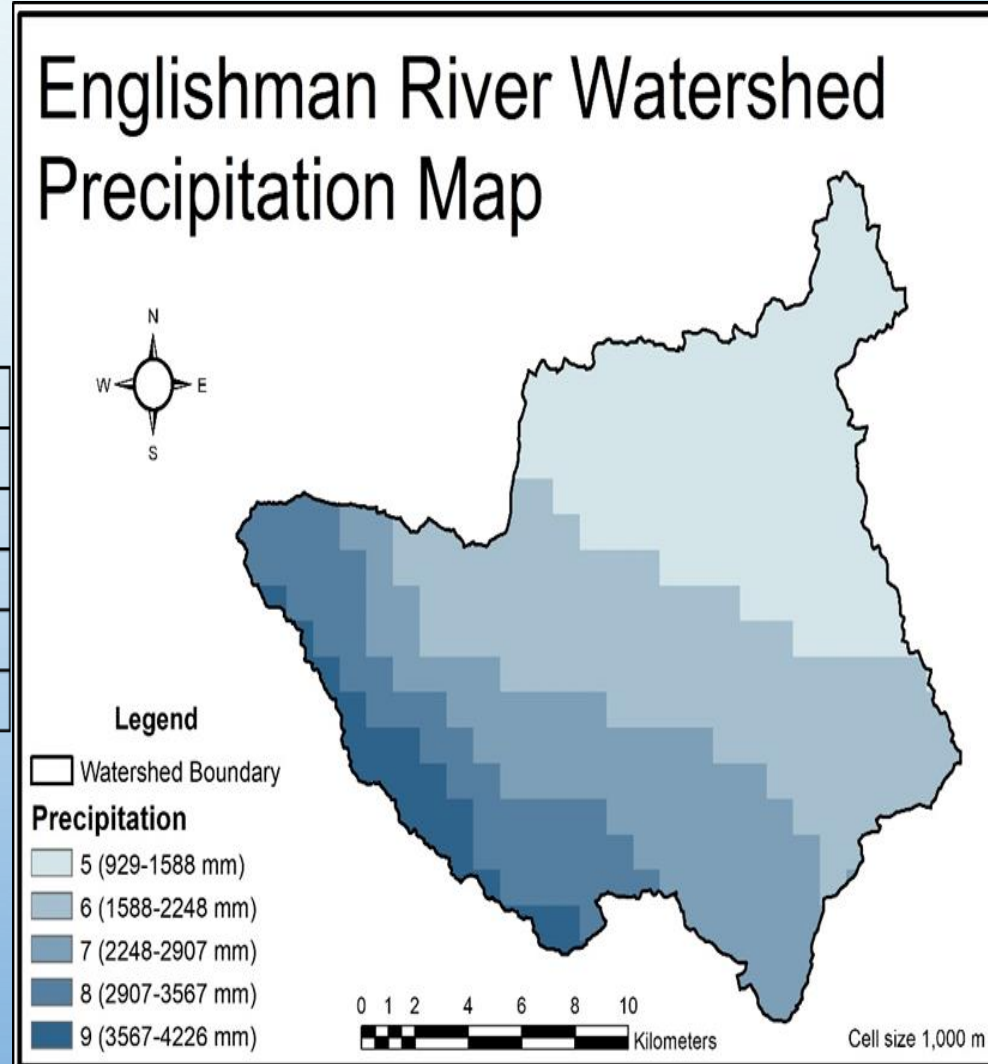
Land Use class	Recharge potential	% of watershed
Bedrock/Urban	Very poor	0.6%
Surface Water	Poor	0.5%
Bare Earth	Moderate	5.2%
Forest	Good	75.1%
Vegetation	Very good	18.6%



RESULTS – PRECIPITATION

- PRECIPITATION CONTROLS AVAILABLE WATER.

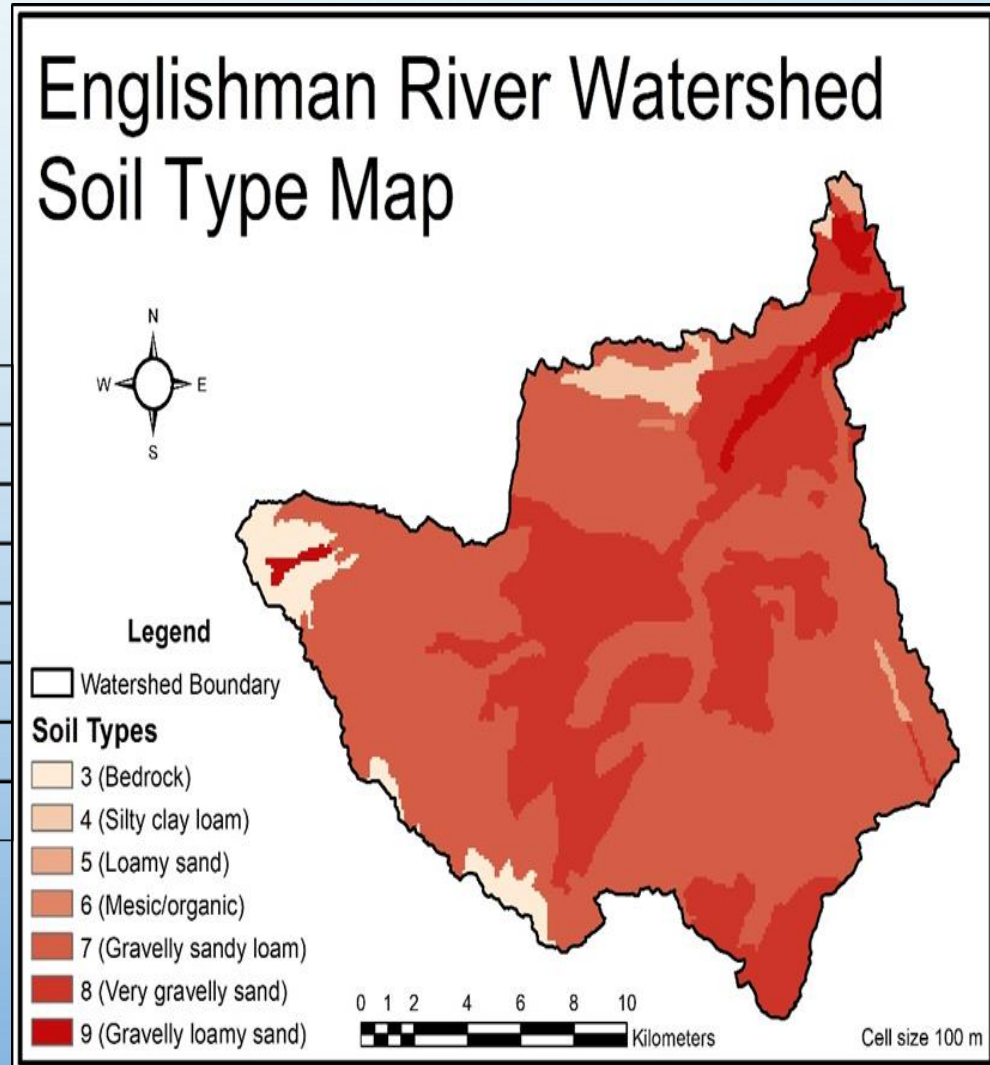
Precipitation class	Recharge potential	% of watershed
929-1588 mm	Very poor	31.9%
1588-2248 mm	Poor	29.3%
2248-2907 mm	Moderate	21.0%
2907-3567 mm	Good	12.8%
3567-4226 mm	Very good	5.1%



RESULTS – SOIL TYPE

- SOIL TYPE CONTROLS INFILTRATION RATES AT SURFACE.

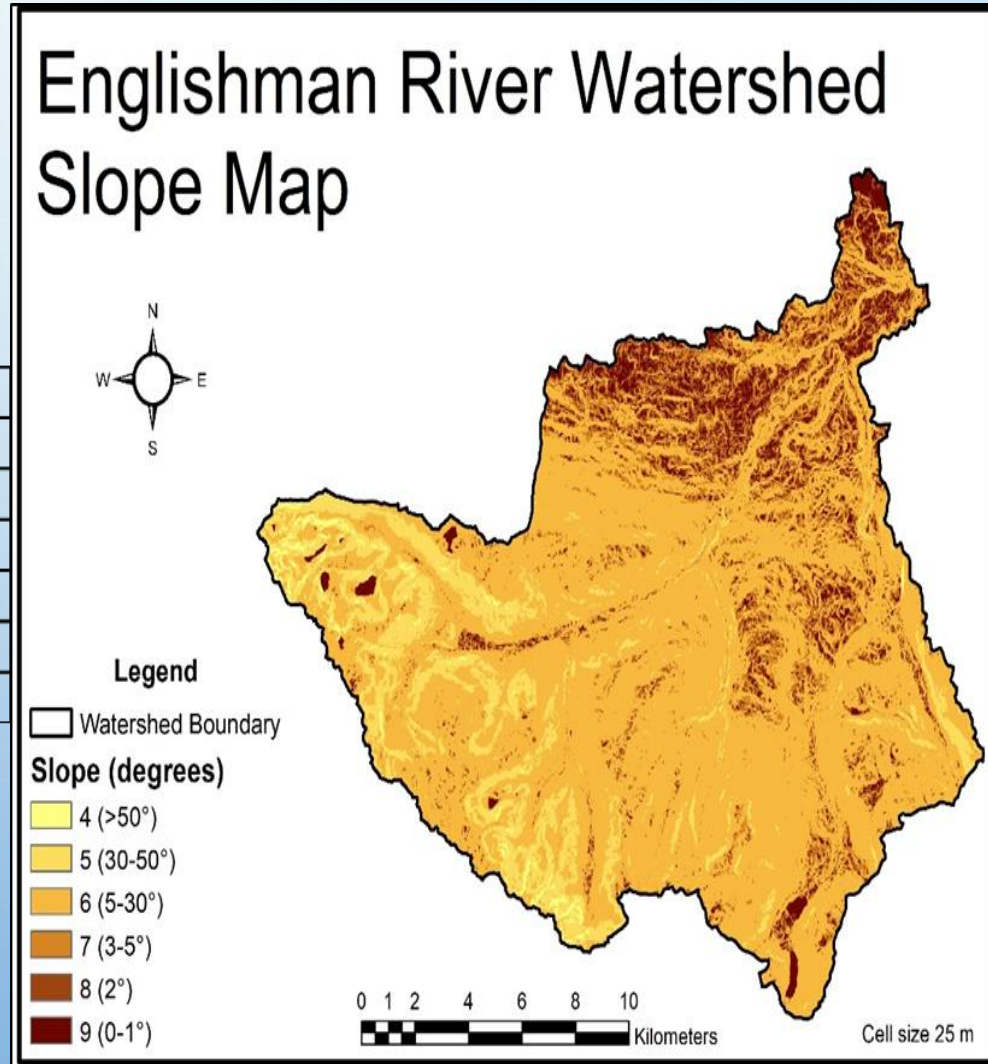
Soil type class	Recharge potential	% of watershed
Bedrock	Extremely poor	3.6%
Silty clay loam	Very poor	1.8%
Loamy sand	Poor	0.5%
Mesic (organic)	Moderate	0.1%
Gravelly sandy loam	Good	61.9%
Very gravelly sand	Very good	29.4%
Gravelly loamy sand	Extremely good	2.7%



RESULTS – SLOPE

- SLOPE CONTROLS INFILTRATION AND RUNOFF RATES.

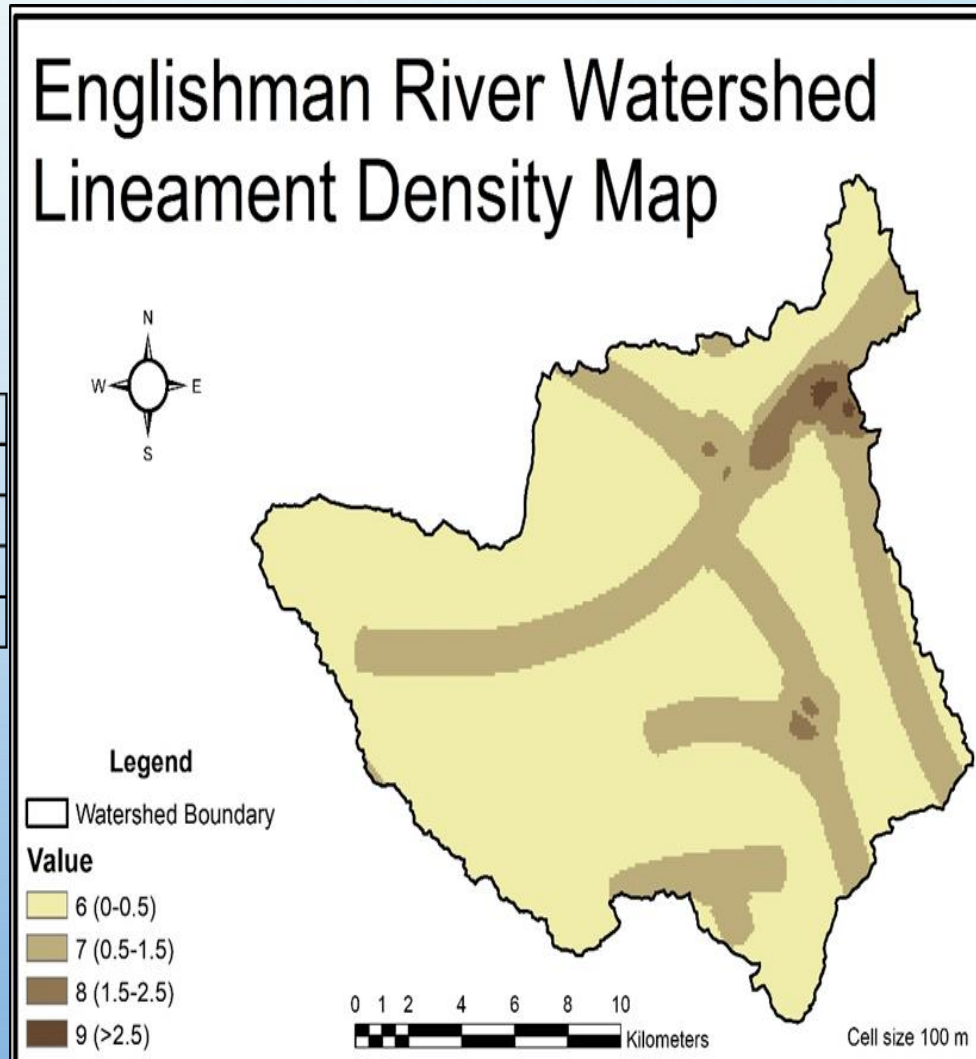
Slope class	Recharge potential	% of watershed
0-1°	Very good	5.4%
2°	Good	5.2%
3-5°	Moderate	11.2%
5-30°	Poor	65.9%
30-50°	Very poor	11.4%
>50°	Extremely poor	0.9%



RESULTS – LINEAMENT DENSITY (MAJOR FAULTS)

- LINEAMENT DENSITY CONTROLS BEDROCK POROSITY AND INFERS SECONDARY POROSITY

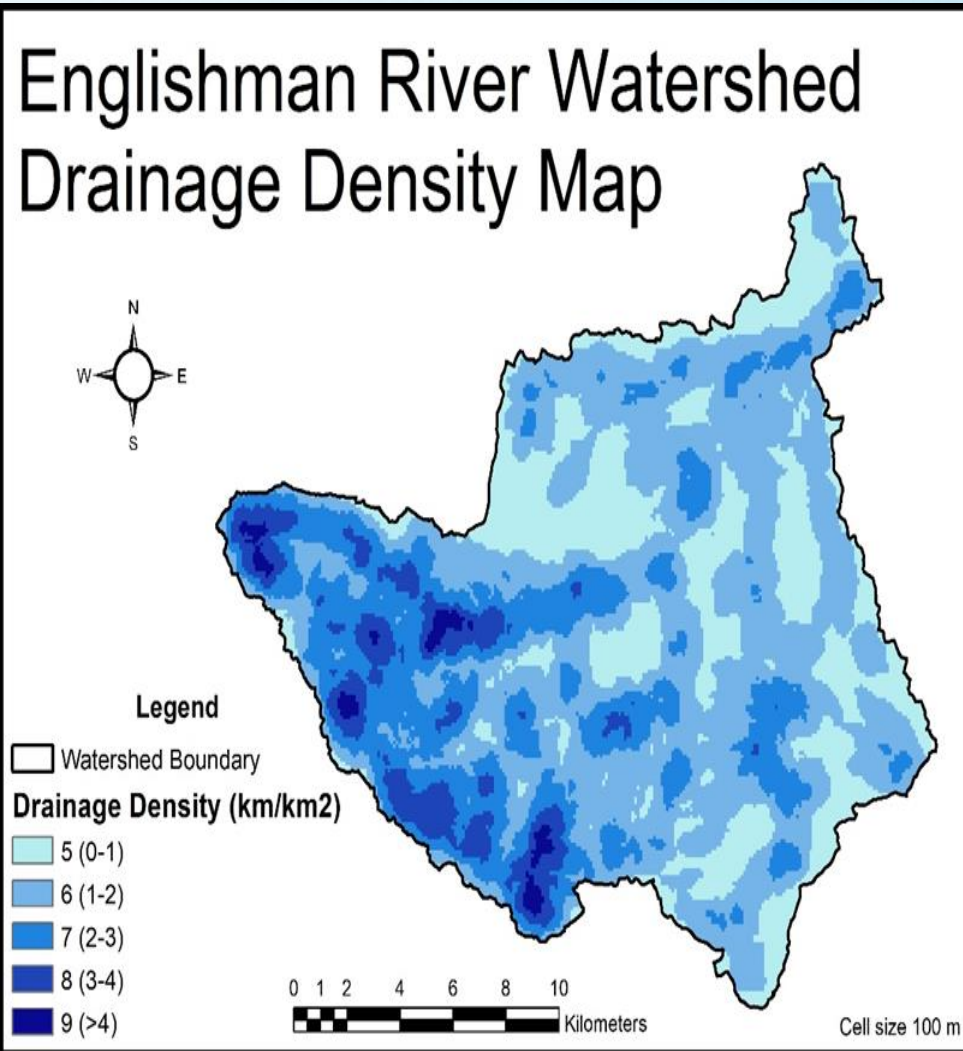
Lineament class	Recharge potential	% of watershed
0-0.5	Poor	70.5%
0.5-1.5	Moderate	27.1%
1.5-2.5	Good	2.2%
>2.5	Very good	0.2%



RESULTS – DRAINAGE DENSITY

DRAINAGE DENSITY CONTROLS
GROUNDWATER – SURFACE
WATER INTERACTION

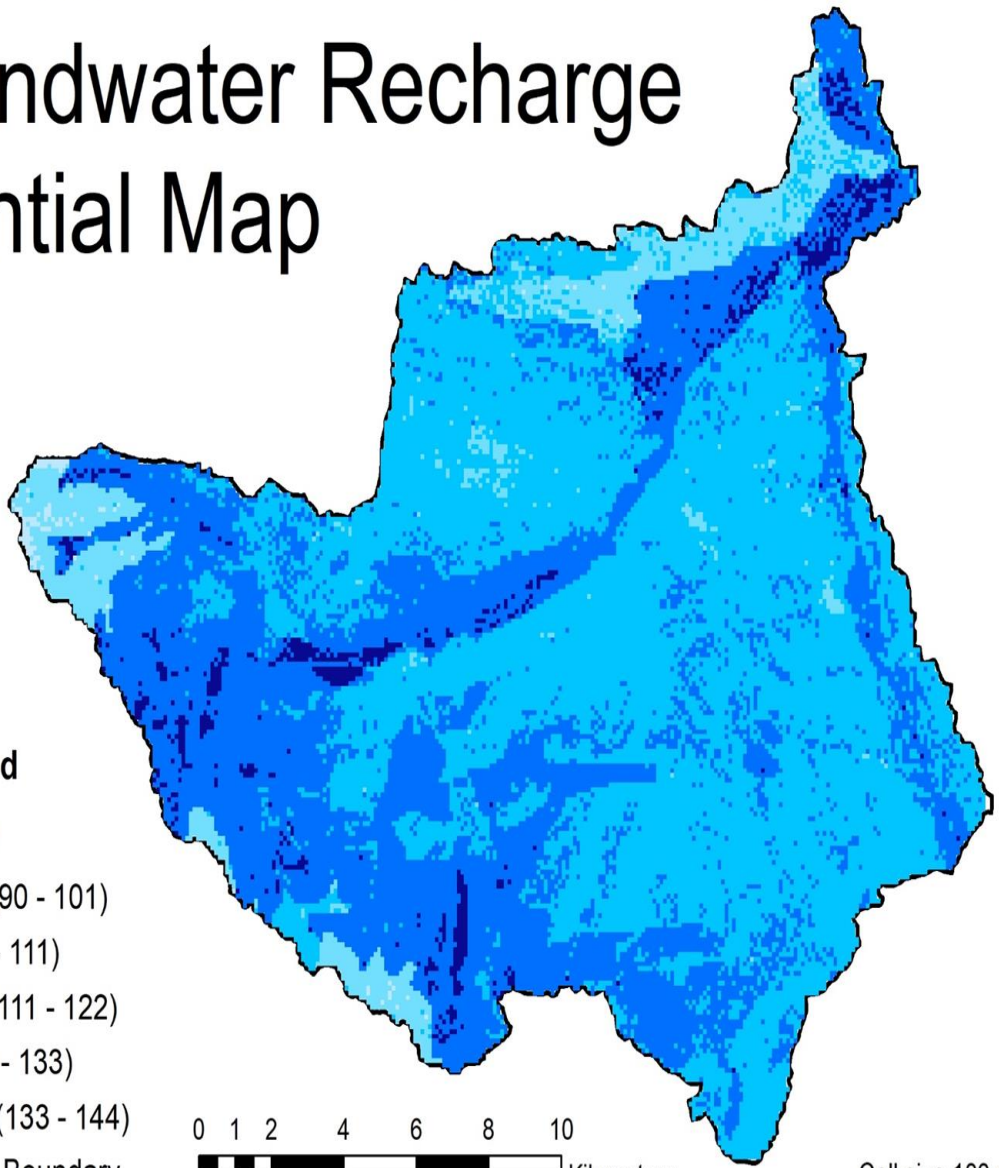
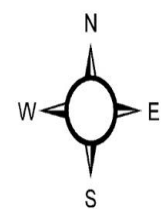
Drainage class	Recharge potential	% of watershed
0-1	Very poor	24.5%
1-2	Poor	45.0%
2-3	Moderate	22.7%
3-4	Good	6.7%
>4	Very good	1.1%



RESULTS - GROUNDWATER RECHARGE INDEX

Englishman River Watershed Groundwater Recharge Potential Map

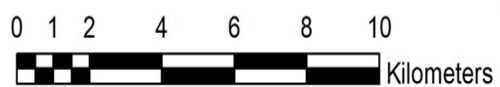
GWRI class	% of watershed
Very poor	0.2%
Poor	3.9%
Moderate	30.4%
Good	57.1%
Very good	8.4%



Legend

Class (Total)

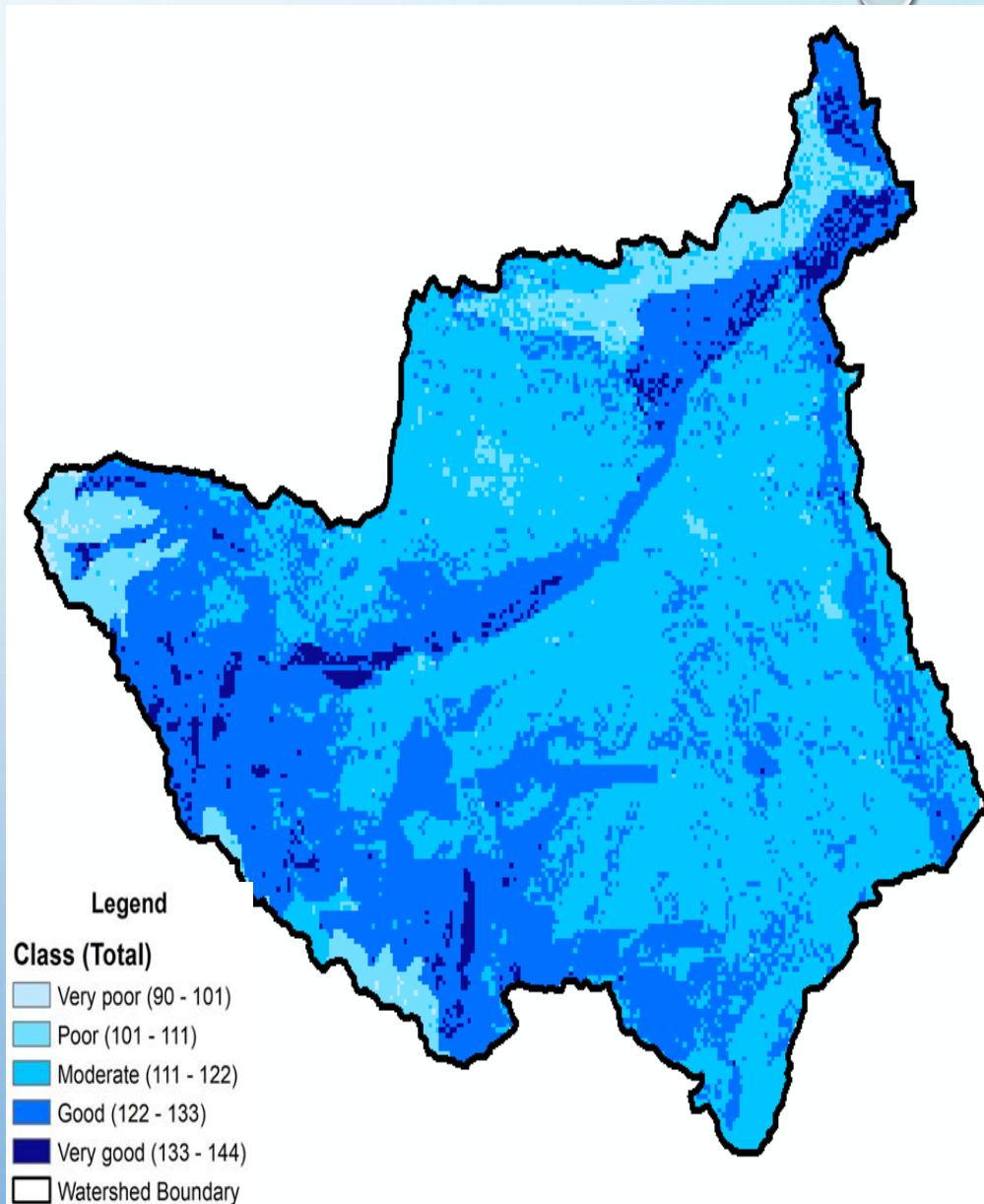
- Very poor (90 - 101)
- Poor (101 - 111)
- Moderate (111 - 122)
- Good (122 - 133)
- Very good (133 - 144)
- Watershed Boundary



Cell size 100 m

CONCLUSIONS

- HIGHEST POTENTIAL WAS ALONG THE MAIN STEM OF THE ENGLISHMAN RIVER AND AT HIGHER ELEVATIONS.
- BEDROCK AND CLAY-HEAVY AREAS WERE THE LOWEST POTENTIAL.
- LOGGING AND FOREST REGENERATION HAVE AN IMPACT ON RECHARGE POTENTIAL.
- THE VALLEY BOTTOMS PROVIDED SOME OF THE BEST RECHARGE POTENTIAL.
- HIGHER ELEVATION RECHARGE CAN CONTRIBUTE TO REGIONAL FLOW SYSTEMS THAT DISCHARGE IN AQUIFERS AT LOWER ELEVATIONS (E.G., MOUNTAIN BLOCK RECHARGE).

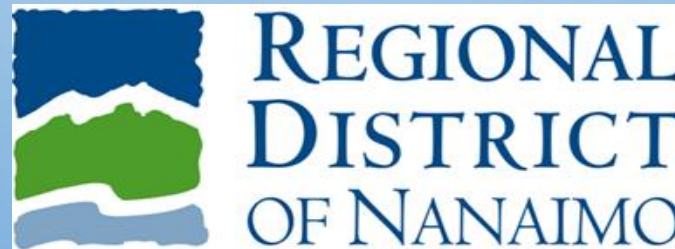


RECOMMENDATIONS

- AN IN-DEPTH PROJECT FOCUSED ON AN AQUIFER WITH MORE AVAILABLE DATA WOULD BE BENEFICIAL FOR ASSESSING GROUNDWATER RECHARGE IN THREE DIMENSIONS.
- THE RESULTS OF THIS STUDY MAY BE USEFUL FOR LOCATING AREAS IN THE WATERSHED SUITED FOR PROTECTING GROUNDWATER RECHARGE ZONES.
- THE PROTECTION OF RECHARGE ZONES CAN BE ACCOMPLISHED THROUGH LAND MANAGEMENT AND ZONING PRACTICES THAT CREATE THE BEST OPPORTUNITIES FOR PRECIPITATION TO INFILTRATE INTO THE SUBSURFACE AND RECHARGE THE GROUNDWATER TABLE.

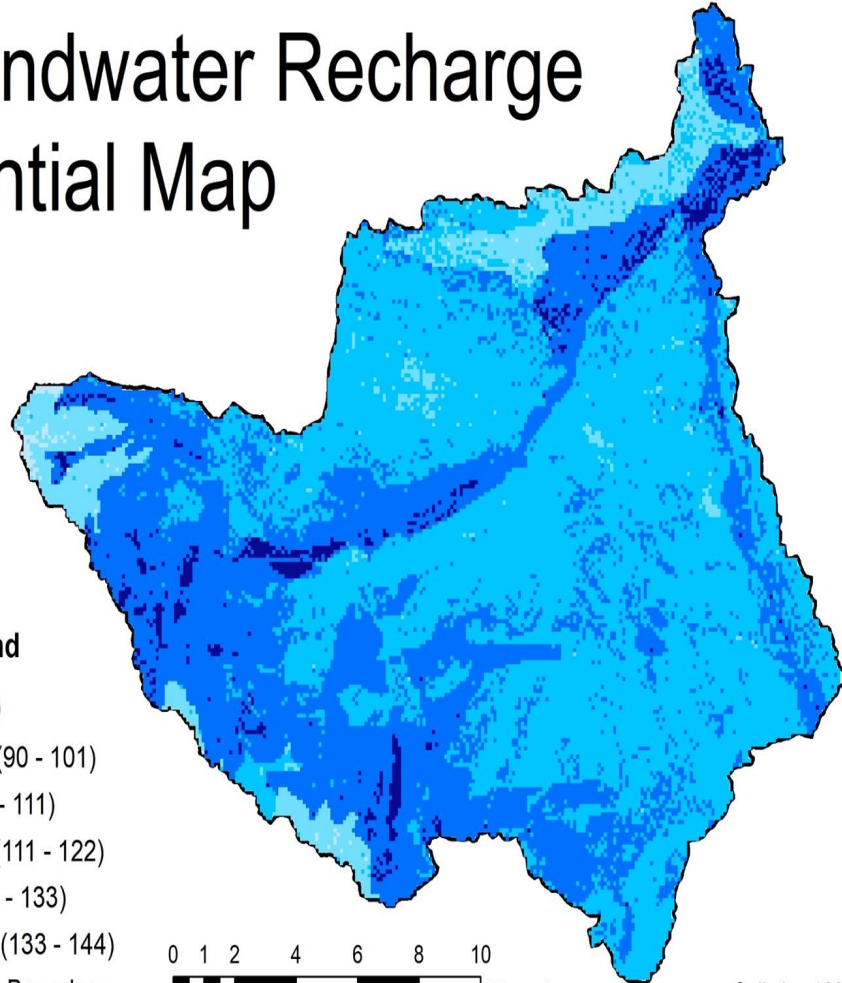
ACKNOWLEDGMENTS

- VANCOUVER ISLAND UNIVERSITY: ALAN GILCHRIST AND JEROME LESEMAN
- REGIONAL DISTRICT OF NANAIMO: JULIE PISANI AND STUART BARKER
- PROVINCE OF BC: SYLVIA BARROSO, PAT LAPCEVIC AND RAJIV LALLA









QUESTIONS?

Englishman River Watershed Groundwater Recharge Potential Map



Legend

Class (Total)

-  Very poor (90 - 101)
-  Poor (101 - 111)
-  Moderate (111 - 122)
-  Good (122 - 133)
-  Very good (133 - 144)
-  Watershed Boundary

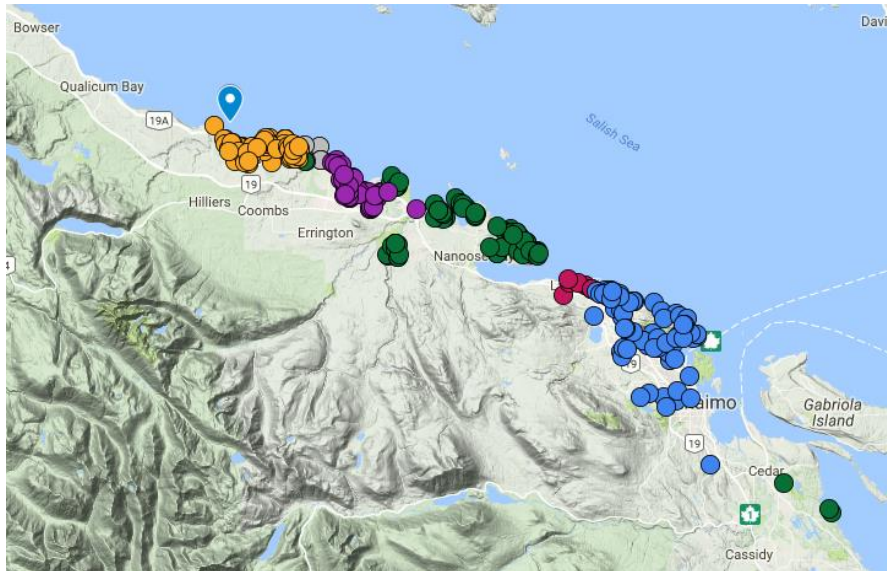


Cell size 100 m

Unfinished Business

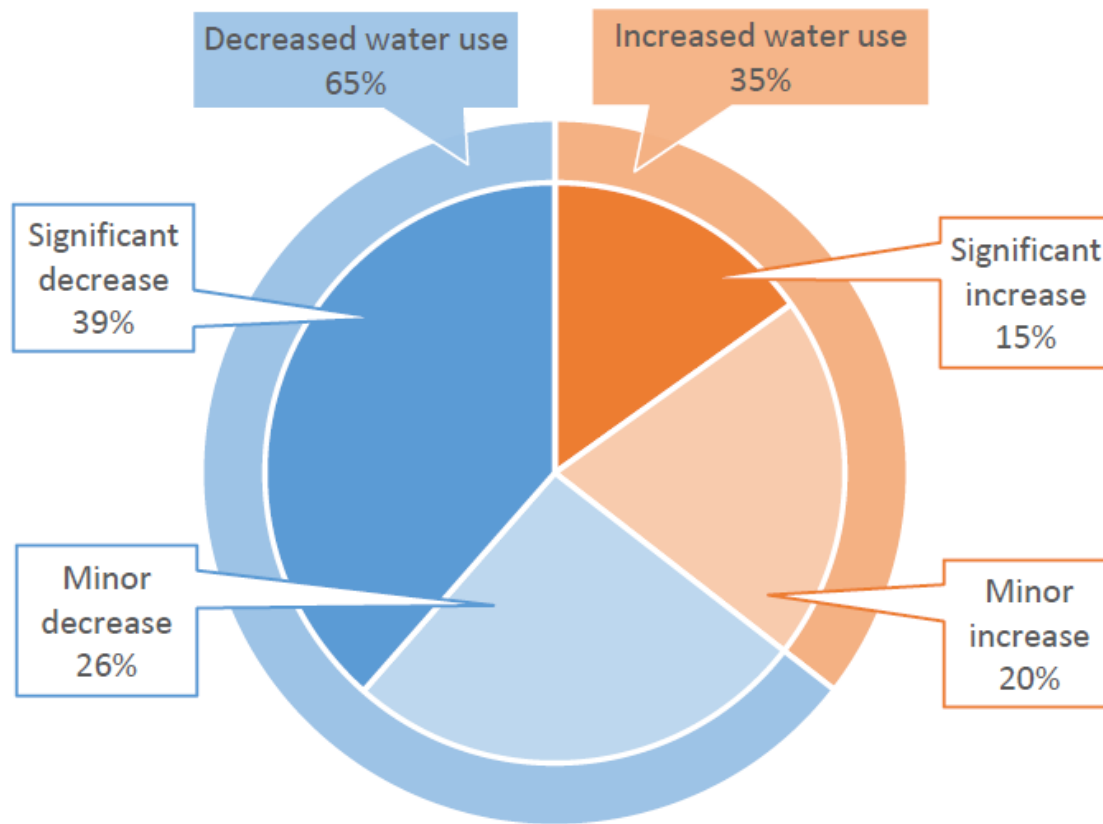
Reports

Irrigation Check-up Program Evaluation Report

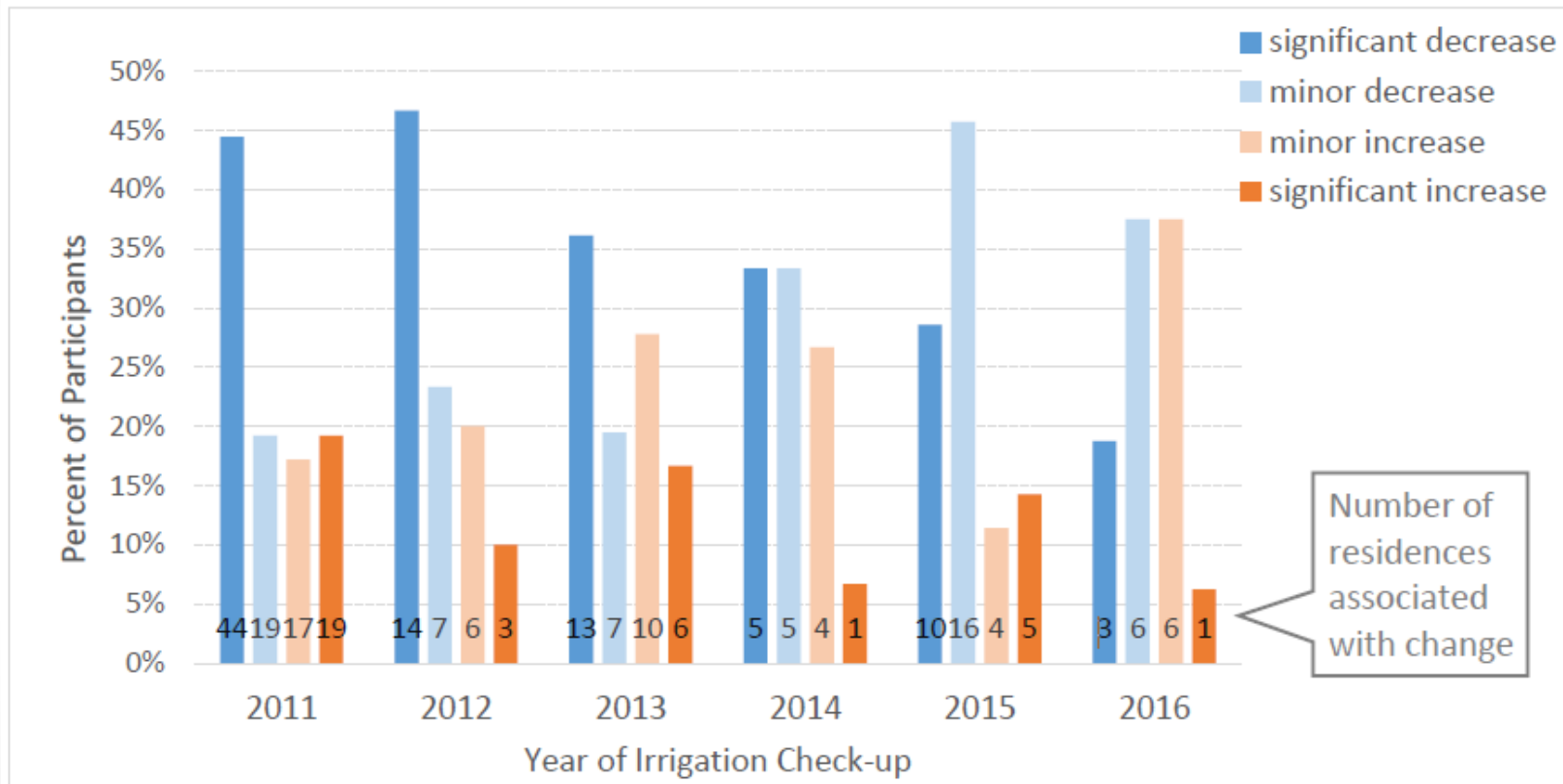


Water Service Area	TWS-IC Completed	Insufficient Data	analyzed	Data Analyzed
Qualicum Beach	69	10	59	86%
Parksville	45	17	28	62%
Lantzville	10	2	8	80%
Nanaimo	81	20	61	75%
RDN	88	14	75	85%
EPCOR	6	6	0	0%
Regional Totals	299	69	231	77%

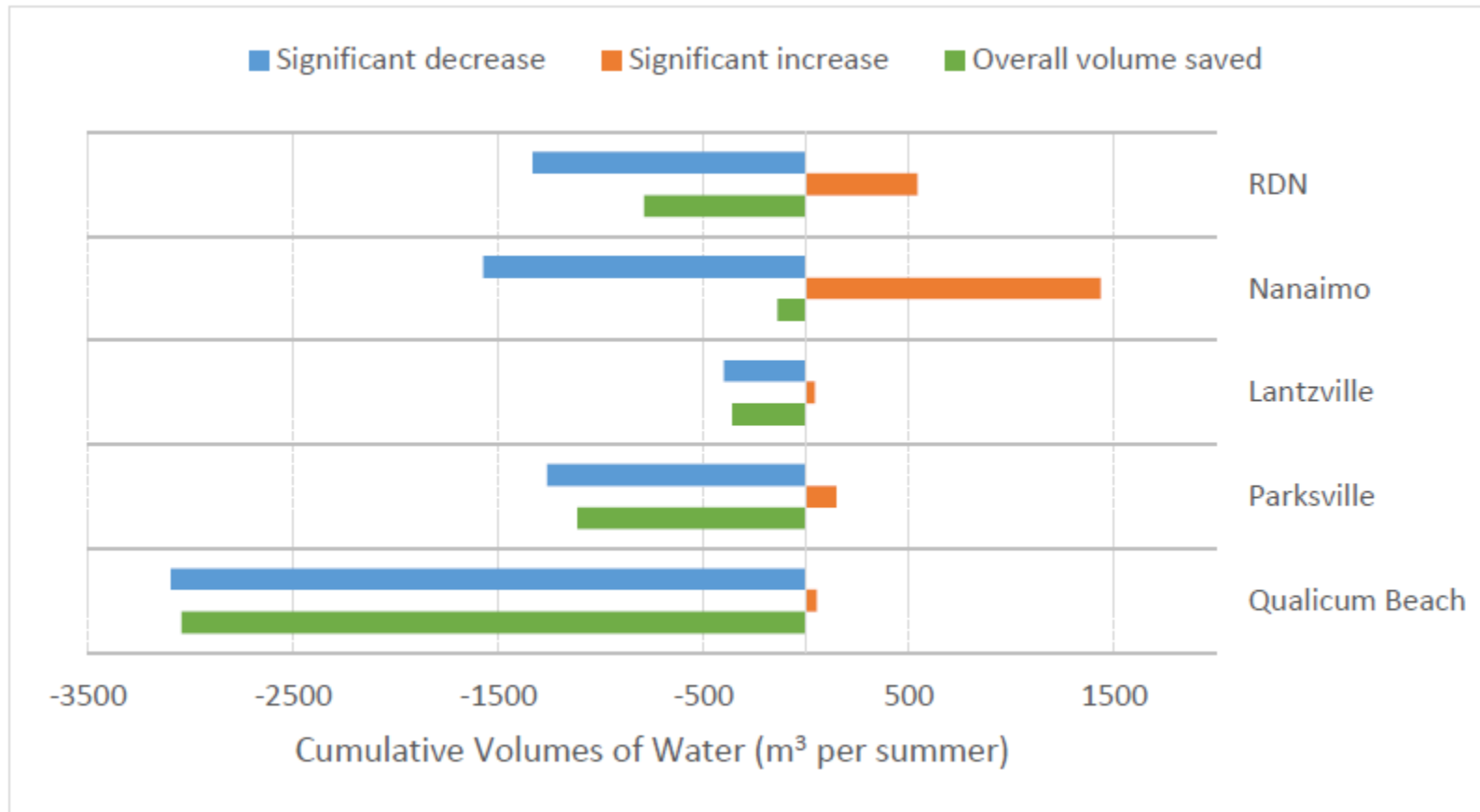
Irrigation Check-up Program Evaluation Report



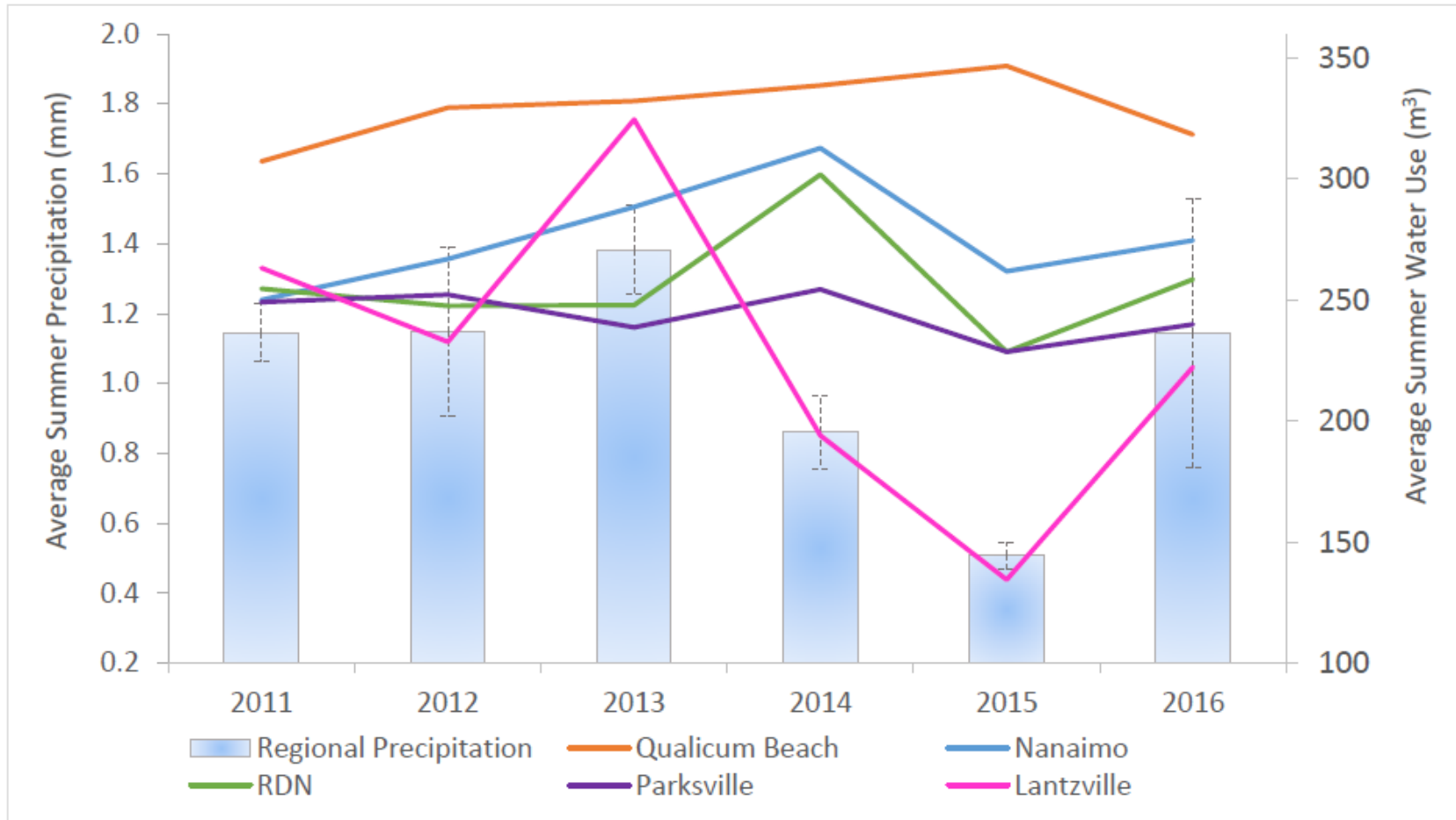
Irrigation Check-up Program Evaluation Report



Irrigation Check-up Program Evaluation Report



Irrigation Check-up Program Evaluation Report



Irrigation Check-up Program Evaluation Report

Team WaterSmart Free Irrigation Check-up Service:
Conservation Program Impact Evaluation

Prepared for Team WaterSmart, Drinking Water & Watershed Protection Program

Regional District of Nanaimo

By Hannah McSorley

March 2018

Full report in agenda and posted
online at:

www.rdn.bc.ca/dwwpreports

under “Region-Wide Reports”

Comments / Questions?

RDN Water Conservation Plan

Targets, Trends, Trajectory

Target 1: Reduce average annual residential water use by 33% between 2004 & 2018

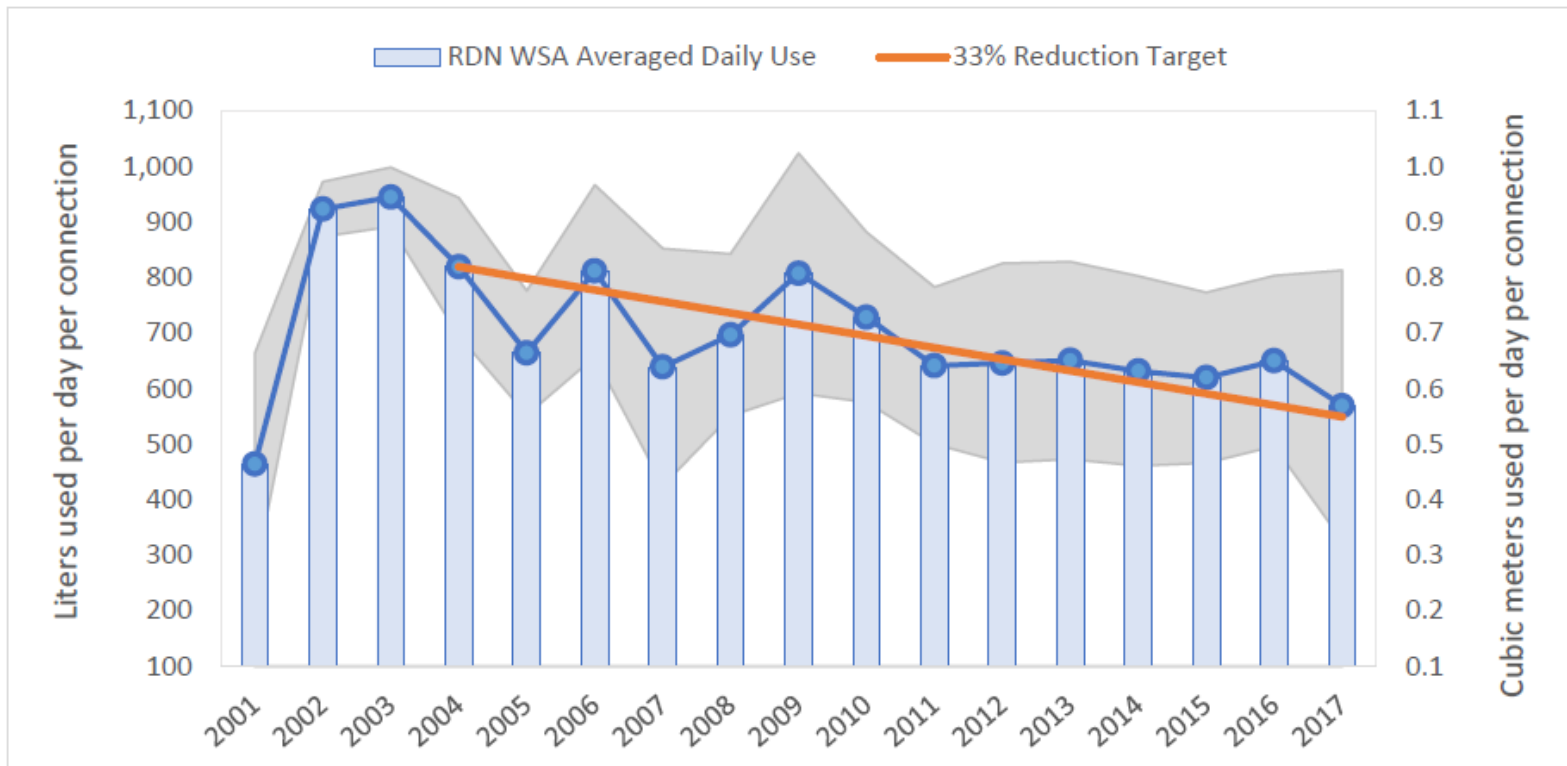


Figure 1: Average annualized daily water use (average volume used per single-family residential connection per day) across all RDN water service areas, relative to the thirty-three percent reduction target set in *Innovative Options and Opportunities for Sustainable Water Use (2008)*. The shaded area shows the range of average daily water-use across the nine RDN water service areas.

RDN Water Conservation Plan

Targets, Trends, Trajectory

Target 2: Maintain max. month water production at or below 2004 production levels until 2018

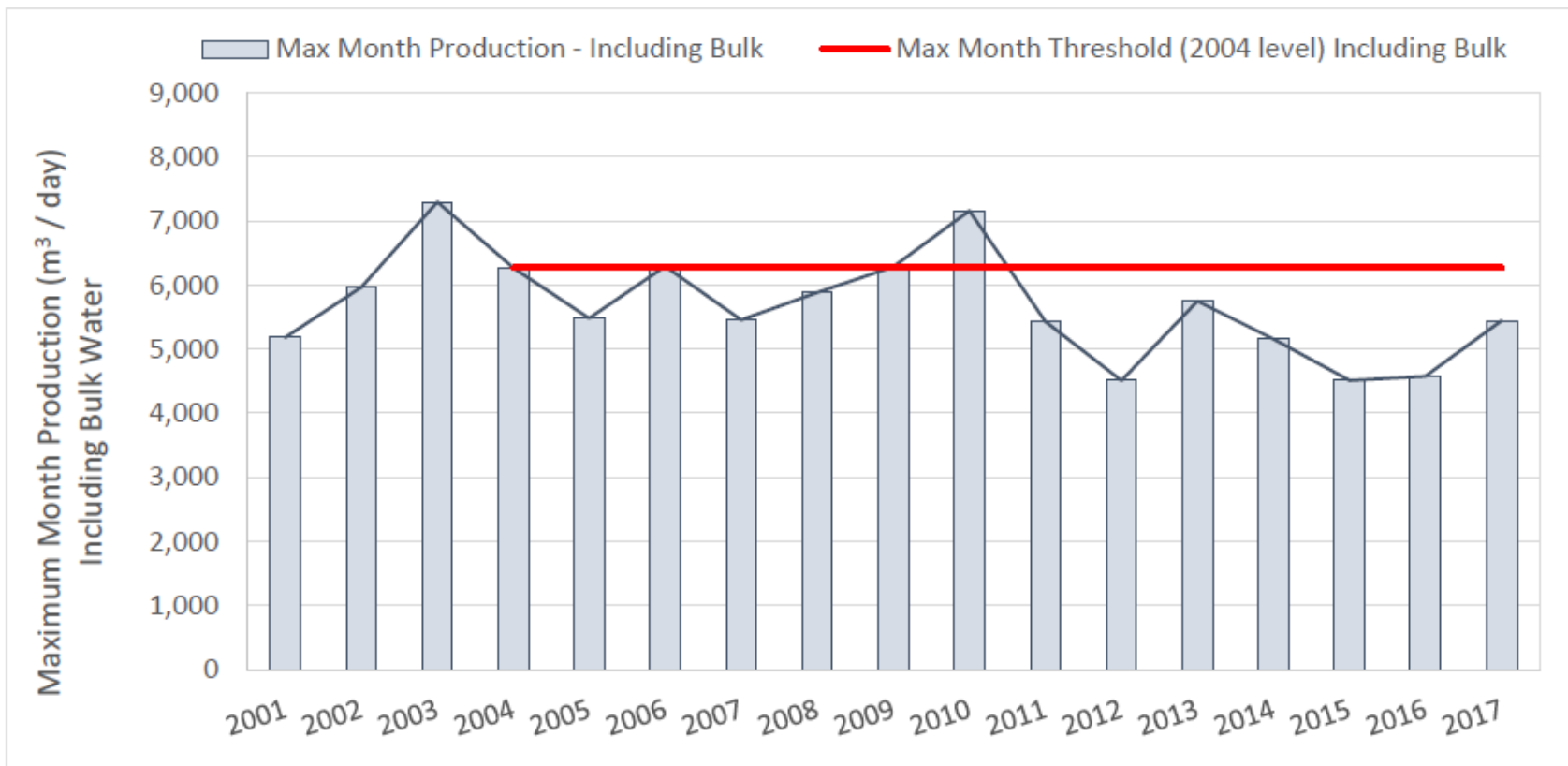


Figure 2: Maximum month production each year based on cumulative RDN WSA production including bulk water imports, the red line indicates Target 2 (Water Conservation Plan, 2013): to maintain maximum month production at or below 2004 level.

RDN Water Conservation Plan

Targets, Trends, Trajectory

Target 2: Maintain max. month water production at or below 2004 production levels until 2018

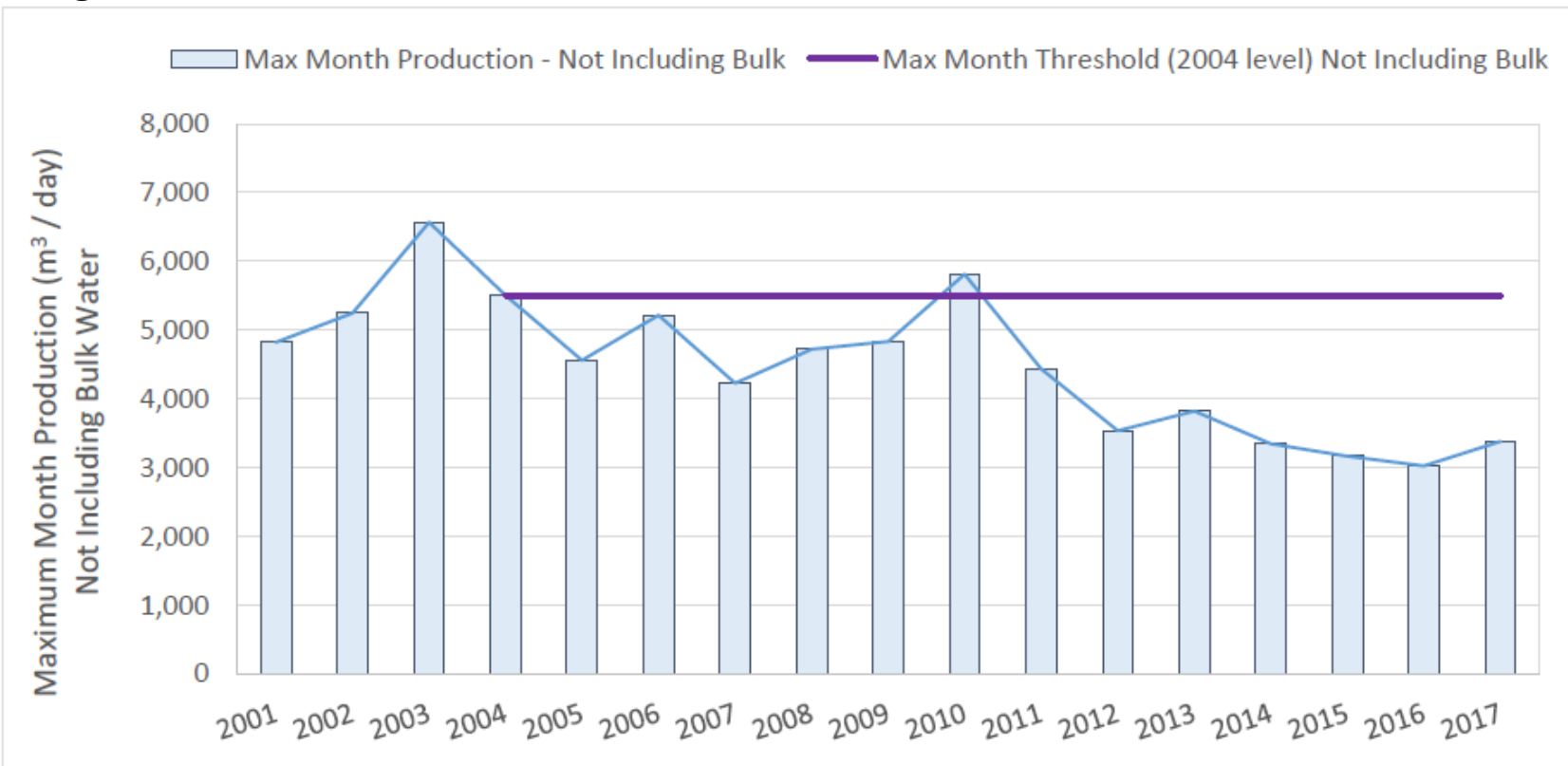


Figure 3: Maximum month production each year based on cumulative RDN water service area production excluding bulk water imported from the Englishman River. The horizontal line indicates the Target level of 2004 maximum month production not including bulk water.

RDN Water Conservation Plan

Targets, Trends, Trajectory

Target 2.1: *Maintain summer water production at or below 2004 levels until 2018 (cumulative water production for all RDN WSAs during the period of May to August)*

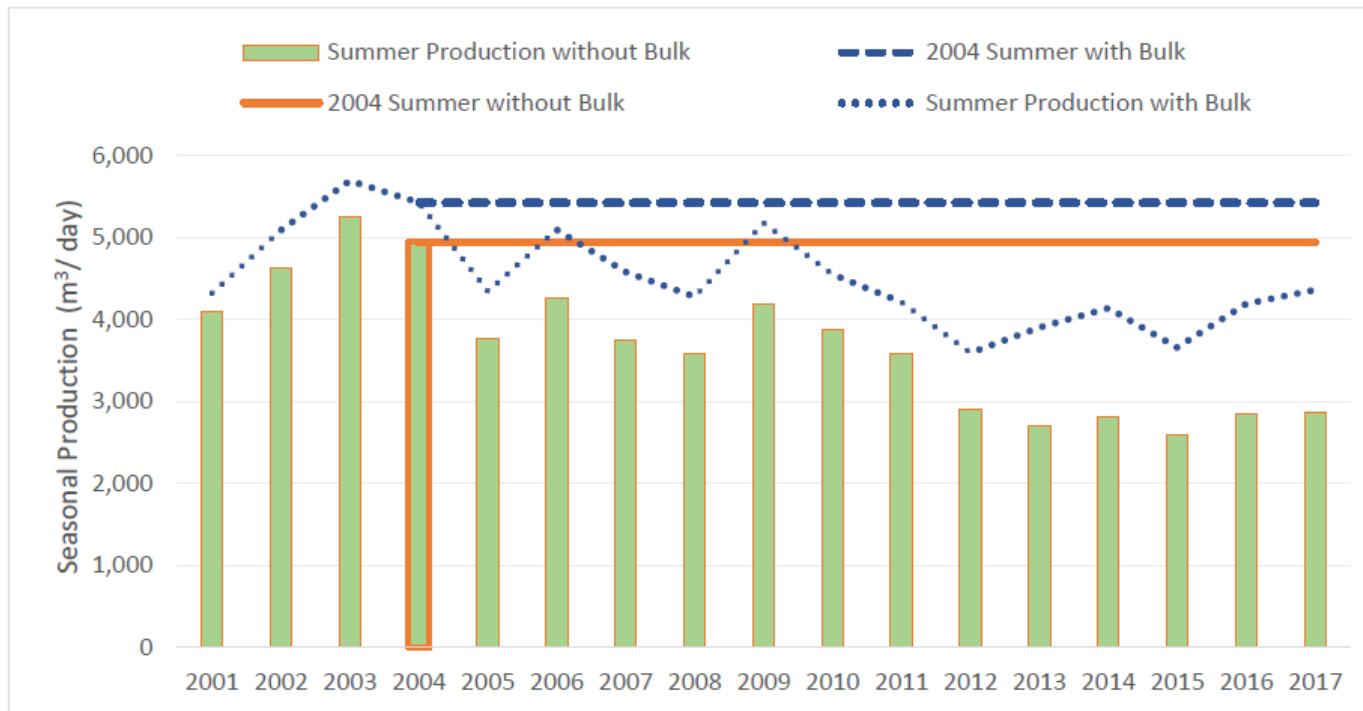


Figure 4: Cumulative summer production (May 1 – Aug 31) for all RDN water service areas, relative to Target 2.1 (maintaining total summer production below 2004 summer production levels). The green columns and orange line are associated with cumulative summer production that does not include bulk water, and the blue dashed lines represent the cumulative summer production including bulk water imported from the Englishman River.

RDN Water Conservation Plan

Targets, Trends, Trajectory

Trends are summarized per Water Service Area in the report.

Still to come:

- Overview of Conservation Measures

- Team WaterSmart Activities
- Watershed Friendly Yard Campaign
- Outdoor Water Efficiency Rebate
- Enhanced Water Billing Information
- Greywater Guidelines

- Future Considerations.....

TAC feedback → what type of conservation measures should we pursue / maintain? Ideas? Suggestions?

Final report forthcoming in May. Will send to TAC members & post on website once complete.

Thank you!



DRINKING WATER
WATERSHED
PROTECTION

