

RDN Drinking Water & Watershed Protection
Technical Advisory Committee
October 25th, 2018

AGENDA

ROUNDTABLE UPDATES

Monitoring station update

WaterTrax update– groundwater quality data

Rebate program update

Team Water Smart activities update

DWWP Action Plan 10-Year Implementation Review by Econics – verbal report

Surface Water Quality Trend Analysis by Ecoscape – report

New Business – 2019 Projects

All Committee Members

J. Pisani

L. Fegan

C. Brugge

C. Brugge

J. Pisani

J. Pisani

J. Pisani

MONITORING STATION UPDATE

Upper Nanoose Creek watershed climate station (GOES network)

Partnership with Island Timberlands

- Measures air temp,
- wind speed / direction,
- precipitation
- humidity



MONITORING STATION UPDATE

French Creek hydrometric station

Partnership with RDN Parks,
MFLNRO and DFO

- Measures stream level, temperature, rainfall, flow
- Data available at

<http://www.pacfish.ca/wcviweather/Content%20Pages/FrenchCreek/WaterLevel.aspx>




WATERTRAX UPDATE

Groundwater Quality Data Management

- Data collected via Well Water Testing Rebate

- One-off groundwater quality samples
- Full spectrum analysis: bacteria, pH, TDS, Hardness, Nitrate, Nitrite, Sulphate, Fluoride, Chloride & 32 element metals scan
- 430 results shared 2014 – 2018

Well Water Testing Voucher 
For residents with wells in the Regional District of Nanaimo ONLY

50% off Well Water Test*

**Applies to testing done by a provincially accredited lab that at minimum covers: Total Coliform and E. coli, pH, TDS, Hardness, Nitrate, Nitrite, Sulphate, Fluoride, Chloride, and 32 element metals scan*

Redeemable at time of purchase at Maxxam Analytics or MB Labs

Full Name: _____
Address (location of well): _____
Contact phone or email: _____
Well ID Plate # or Well Tag #: _____
Water treatment in place: _____
Sample was taken: pre-treatment (raw water) OR post-treatment (treated water)

Sharing your test results with the Regional District of Nanaimo (RDN) Drinking Water & Watershed Protection program will enhance the understanding of water quality in our region. In addition, RDN staff can offer suggestions if your test results exceed guidelines in one or more parameters.


I agree to share my water quality test results with the RDN Drinking Water & Watershed Protection program. Information shared is protected under the Freedom of Information and Protection of Privacy Act.

I also agree that the RDN may disclose my water quality test results to the Province of BC for groundwater research purposes and consent to my results becoming public via the Open Government License.

Signature: _____ Date Signed: _____

If the applicant is not the landowner of this property (location of well) indicated above, the landowner must give consent by signing below.

Full Name: _____ Signature: _____
Contact phone or email: _____ Date signed: _____

 **DRINKING WATER WATERSHED PROTECTION**

Limit one (1) voucher per well for the lifetime of the program.
Submit Voucher with well water sample for in-lab discount.
Valid only while funds last. Not redeemable for cash.

WATERTRAX UPDATE

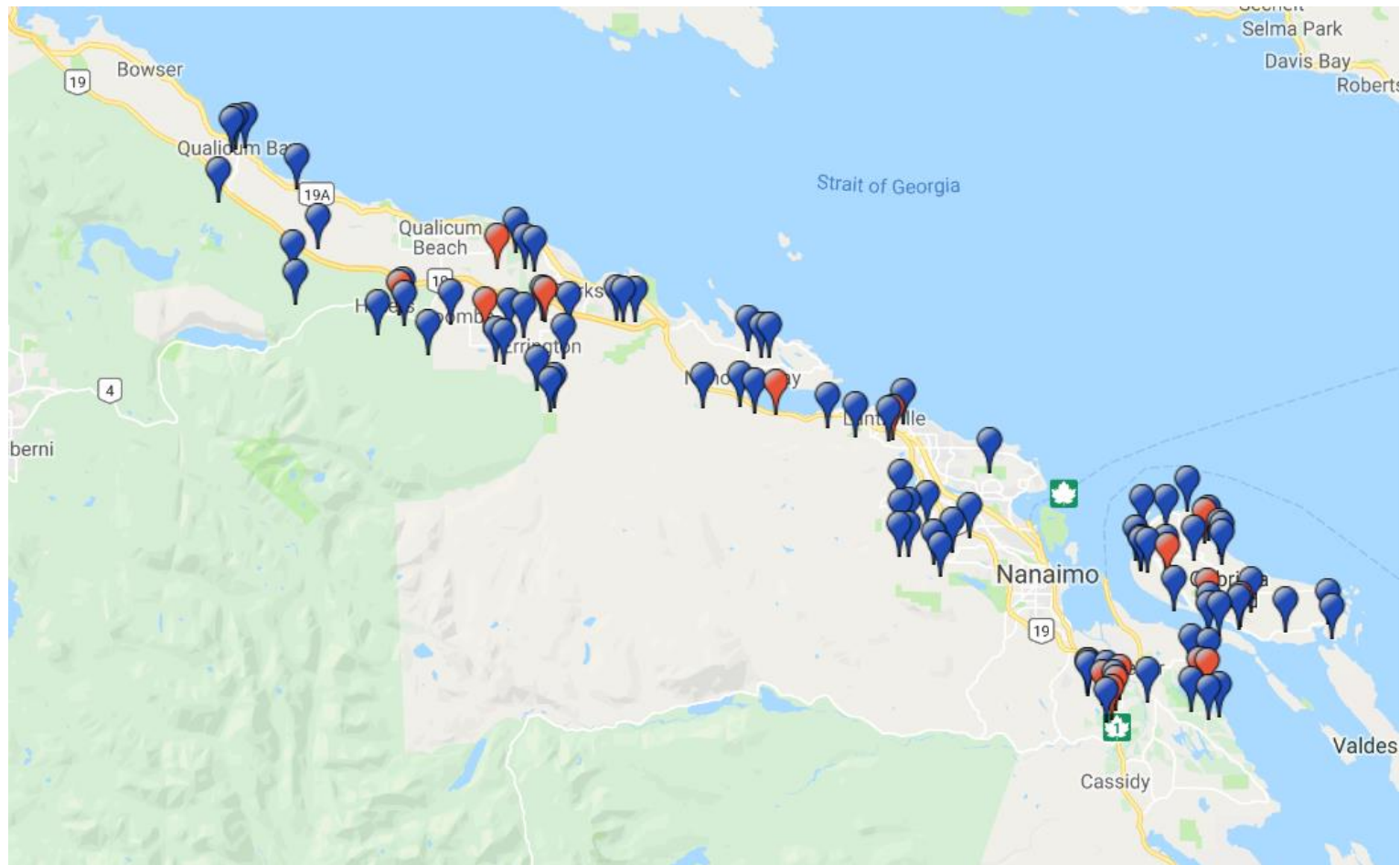
- Data previously managed in Excel
 - Each year of data in its own spreadsheet
 - Time consuming to extract data
 - Common query requests for results by electoral area, water region, aquifer & analyte exceedance



-  WaterTrax platform
 - Test results uploaded by lab
 - Allows easier query of data
 - Mapping feature
 - Ability to add other RDN data: Utilities & VOW



WATERTRAX UPDATE - DEMO



REBATE PROGRAM UPDATE



RAINWATER HARVESTING

- Rebate of up to \$750 for a minimum of 1000 imperial gallon cistern and other eligible costs
- Rebate is now **closed** for 2018 as of September 11th with claim submission deadline by December 14th

2018	Total Allocated	Total Issued	# Applications	# Issued
	\$27,000	\$12,545	36	17

Area A	Area B	Area C	Area E	Area F	Area G	Area H	Nan	Lantz	Parks	QB
1	10	1	1	0	1	1	0	0	2	0



IRRIGATION UPGRADES & SOIL IMPROVEMENTS

- Rebate of up to \$675 for irrigation upgrades and/or the addition of compost, top soil, or mulch
- Rebate is now **closed** for 2018 as of September 11th with claim submission deadline of December 14th 2018

2018	Total Allocated	Total Issued	# Applications	# Issued
	\$7,575	\$6,155.75	30	28

Area A	Area B	Area C	Area E	Area F	Area G	Area H	Nan	Lantz	Parks	QB
1	0	0	2	0	4	1	13	0	2	5



WELLHEAD UPGRADES

- Rebate of up to \$650 for secure well cap, well casing stick-up and surface seal upgrades. \$500 for well closure.
- Rebate still **open** and accepting applications. Claim submission deadline is December 14th, 2018

2018	Total Allocated	Total Issued	# Applications	# Issued
	\$4,100	\$1,483.45	11	6

Area A	Area B	Area C	Area E	Area F	Area G	Area H	Nan	Lantz	Parks	QB
1	3	0	0	0	1	0	0	1	0	0



WELL WATER TESTING REBATE

- Voucher for 50% off of a full spectrum analysis from an accredited lab
- Rebate still **open** and accepting applications for 2018



2018	Total Issued	# Applications	# Issued
	\$9,581.30	120	118

Area A	Area B	Area C	Area E	Area F	Area G	Area H	Nan	Lantz	Parks	QB
27	24	14	5	27	4	3	2	13	0	0

TEAM WATERSMART ACTIVITIES UPDATE



TEAM WATERSMART EVENTS

- 23 events across the Region from April to September
- Mix of environmental events, festivals & community markets
- Opportunity to engage the public and promote water conservation and awareness

City of Nanaimo Public Works Day	Family Fishing Day	QB Family Day	Cedar Farmers Market
Nanaimo Earth Day Celebration	Bowser Summer Market	Rivers Day	Gabriola Oceans Day
Parksville Canada Day	VIU Sustainability Fair	Nanoose Teddy Bear Picnic	Craig Street Market
Second Sunday Market	The River Never Sleeps	Coombs Fair	City of Nanaimo Family Fun Night
Errington Farmers Market	QB Farmer's Market	Lantzville Mine Town Day	Lighthouse Country Fall Fair
Gabriola Farmers Market	VIU Sustainability Fair	River's Edge Community Market	+ more!



2018 WATER SAVER CONTEST

- “What do you do to save water in the summer?”
- Enter draw for a 50 gallon rain barrel
- Opportunity to take yard sign & send in photo to showcase water smart practices



- ✓ Over 200 entries!
- ✓ Glimpse of regional water saving trends

2018 IRRIGATION CHECKUP SERVICE

- Performed 12 free irrigation audits to residents with high summer water bills
- Identified major line breaks, broken emitters, & inefficient systems
- Comprehensive report to educate, outline issues, & suggest improvements



Participant Count By Region

Nanaimo	San Pariel	Nanoose	Lantzville	Parksville	Qualicum Beach	Total
4	1	4	1	1	1	12

2018 WATERSHED FIELD TRIPS

- Nanaimo River & Englishman River Watershed Field trips designed for grades 4 – 5
- Where does our drinking water come from? Why conserve it?

Spring Field Trips:

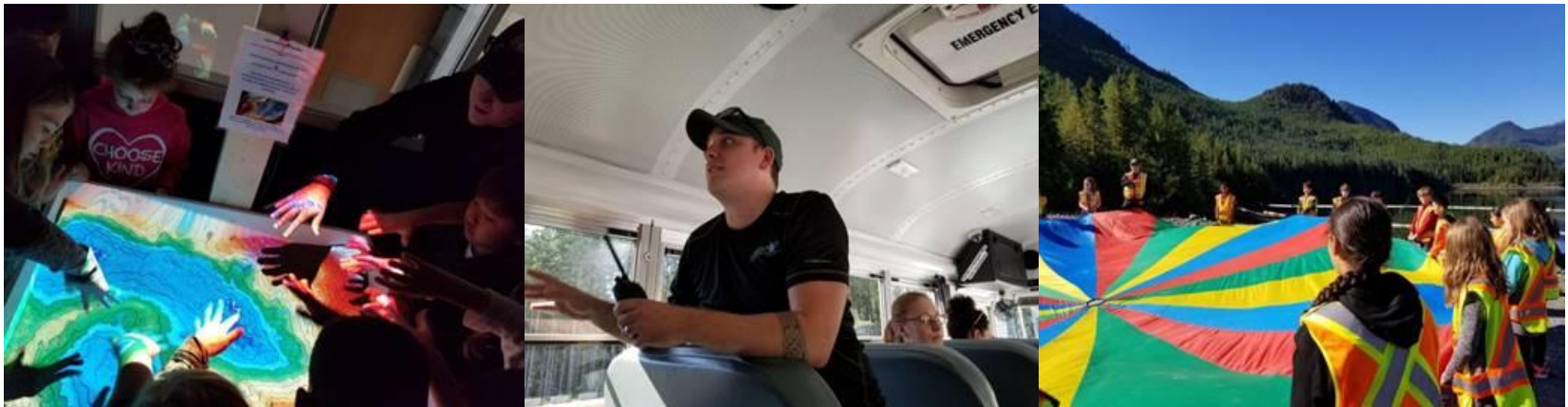
3 trips for SD68

3 trips for SD69

Fall Field Trips:

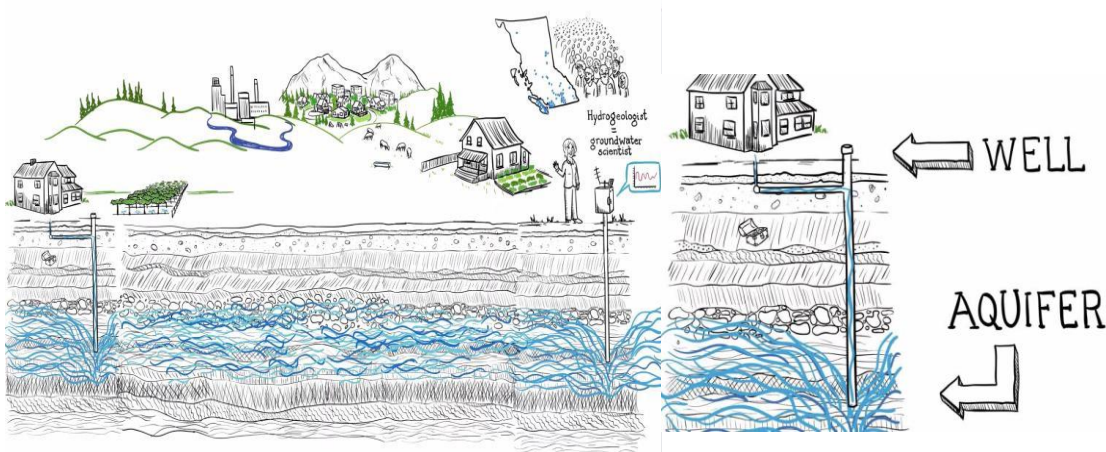
2 trips for SD68

3 trips for SD69



2018 WELLSMART WORKSHOPS

- Educational workshop designed to provide private well owners with the resources to understand and protect drinking water quality and supply through proper well maintenance
- Key message: Groundwater is a shared resource worth protecting for you and your family, neighbours and community, and the environment
- Presentations from RDN, FLNRO and Island Health
- 2 workshops: **Oct. 3rd in Cedar** and **Oct. 10th in Errington**






DWWP ACTION PLAN 10-YEAR IMPLEMENTATION REVIEW

Final Report will go to Board November 20th



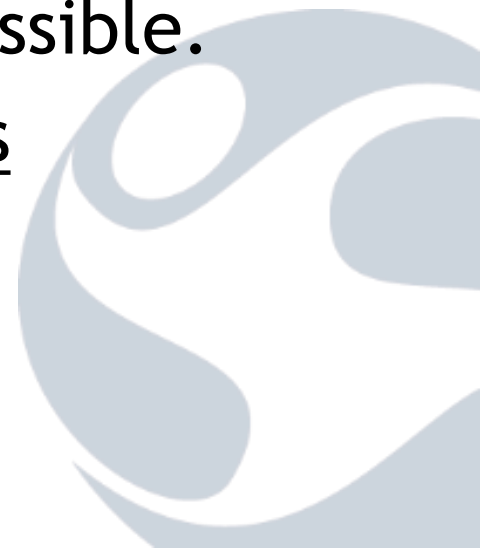
Drinking Water and Watershed Protection
Program Review
Summary Presentation
September 2018

Project Background

- ◆ Drinking Water and Watershed Protection (DWWP) Action Plan completed in 2007
 - ◆ Program implementation commenced in 2009
 - ◆ Ten year anniversary is nearly upon us
 - ◆ Update to Action Plan for the next operational period to commence in 2019
 - ◆ Econics selected to complete program review between July and September 2018
 - ◆ Review will inform the Action Plan update
- 

Project Scope

- Review and summarize DWWP program implementation thus far
 - Identify what has been completed
 - Identify what has not been completed
 - Identify what partnerships and resources have made this implementation possible.
 - Identify key gaps and opportunities



Methodology

- ◆ Meetings with program staff
- ◆ Literature review
- ◆ Stakeholder interviews (x13)
- ◆ Workshops (x2)
 - Staff
 - Technical Advisory Committee
- Data gathering completed in Aug/Sept 2018



Results

Categorized under three themes:

1. water science: data collection & monitoring
2. water education & outreach
3. water policy advocacy & planning support



Water Science: Data Collection & Monitoring

Major **accomplishments** over the past decade:

- ✓ Many data gaps have been filled
- ✓ Vulnerable water sources and systems have been prioritized
- ✓ Data has been acquired and interpreted robustly and resourcefully



Water Science: Data Collection & Monitoring

Key **challenges** going forward:

- ◆ There are opportunities to improve data management
- ◆ In the future, further attention will need to be devoted to operationalizing data for purposes of informing land use planning and policy decisions



Water Science: Data Collection & Monitoring

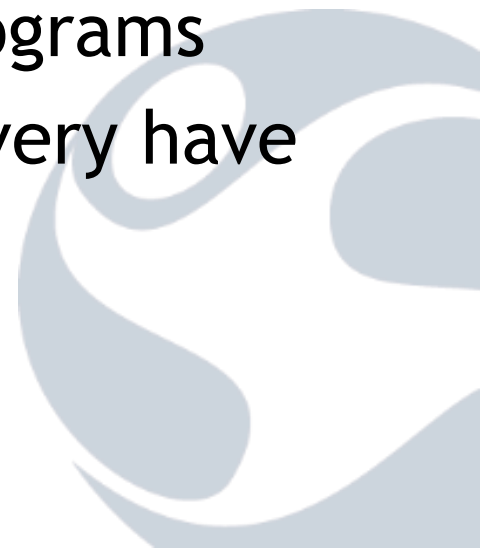
Our investigation left us with little doubt that, directly as a result of the program's work, there is already a much better understanding of aquifers and streams in the region than elsewhere on Vancouver Island or much of the province.

(Final Report, p. 15)



Water Education & Outreach

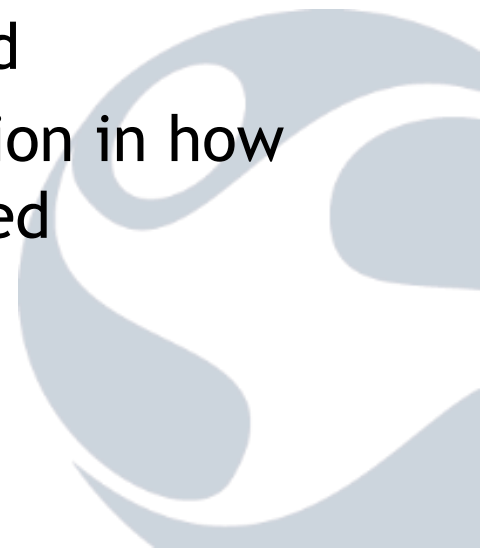
Major **accomplishments** over the past decade:

- ✓ The program has created and disseminated an impressive array of water conservation and sustainability resources
 - ✓ There has been innovation in developing unique and regionally relevant education programs
 - ✓ Partnerships for regional service delivery have been highly successful
- 

Water Education & Outreach

Key **challenges** going forward:

- ◆ Outreach campaigns are often highly information intensive
- ◆ It may be time for a review of program branding and collateral
- ◆ New effort in market research with residents and further program evaluation is recommended
- ◆ There are opportunities for further innovation in how demand management programs are delivered



Water Education & Outreach

...based on our experience working on similar initiatives with many other similar Canadian communities, [RDN's water education and outreach] work can only be characterized as exemplary.

(Final Report, p. 16)



Water Policy Advocacy & Planning Support

Major **accomplishments** over the past decade:

- ✓ A foundation has been laid for future success
- ✓ There have been a number of specific successes in land use planning and informing policy



Water Policy Advocacy & Planning Support

Key **challenges** going forward:

- ◆ Land use and watershed planning objectives set out in the *2007 Action Plan* have not yet been fully realized



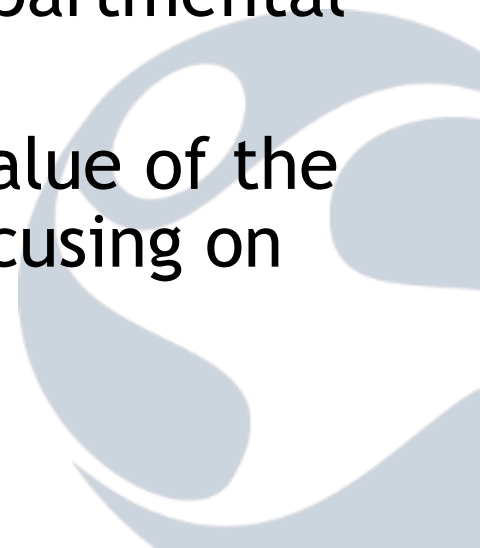
Water Policy Advocacy & Planning Support

The science-based approach of the program, the fact that it brings together multiple agencies, and the foundation built on data and information and public support lead us to believe that the true potential of the program in this area is yet to be seen.

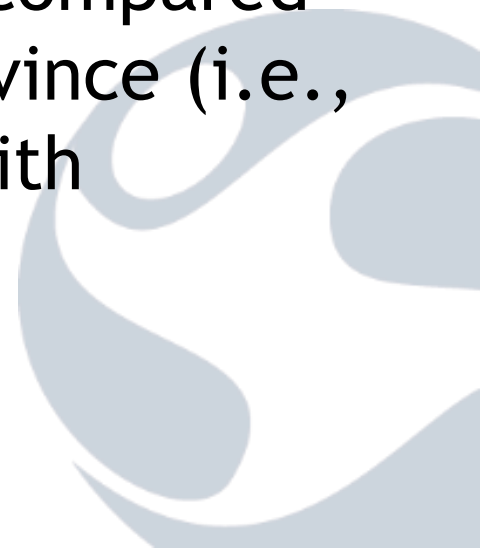
(Final Report, p. iv)



Other Observations

- ◆ RDN should make it a priority to more actively engage with First Nations on a government-to-government basis on DWWP implementation
 - ◆ Recognize key integrations with other RDN programs including Liquid Waste Management Plan implementation and Emergency Services
 - ◆ Investigate options to improve interdepartmental coordination on watershed protection
 - ◆ Increase efforts to communicate the value of the program and watershed protection, focusing on the “why”.
- 

Key Factors in Success To Date

1. Partnerships with other agencies, industry and the not-for-profit sector
 2. A sustainable funding model for watershed protection, in the form of RDN's annual parcel tax
 3. The unique nature of this initiative compared to similar ones elsewhere in the Province (i.e., watershed protection as a service with supporting taxation authority).
- 

There is clear and strong support for this initiative both inside and outside the organization, support that has been well maintained for a decade... The foundation is laid for a very bright future in the next operational period.

(Final Report, p. 34)





Contact Us

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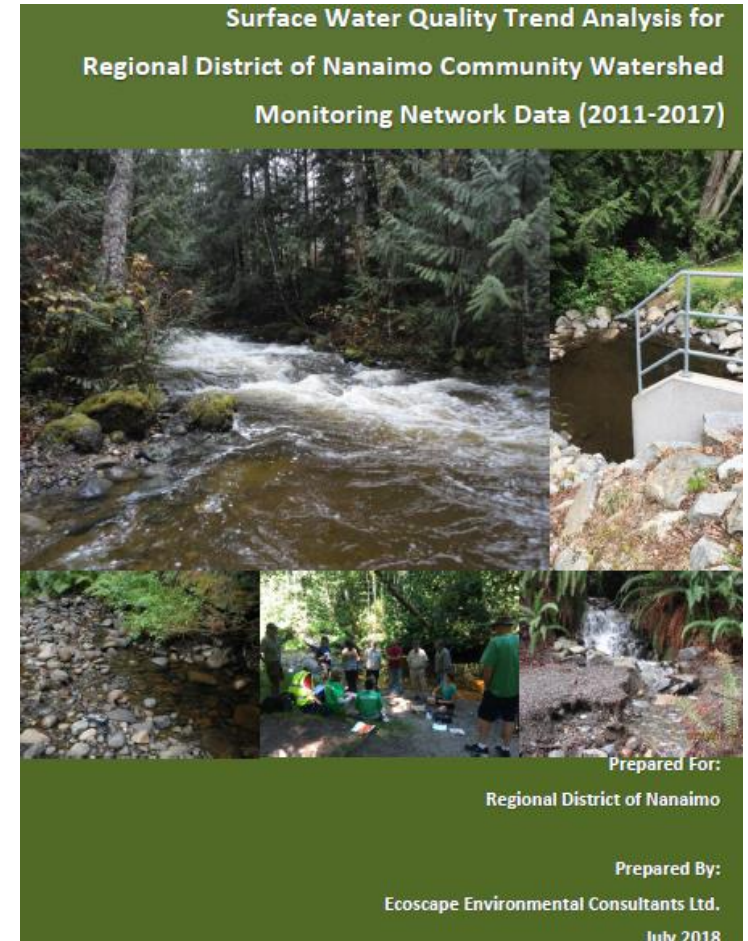
+1 250 590 8143

 @EconicsWater

SURFACE WATER QUALITY TREND ANALYSIS BY ECOSCAPE

RDN Community Watershed Monitoring Network Data

- Dissolved oxygen, temperature, conductivity and turbidity
- 2011- 2017
- 62 active sites, 13 stewardship groups



SURFACE WATER QUALITY TREND ANALYSIS



Ecoscape analyzed the 2011-2017 data using:

- Comparison to BC water quality guidelines and objectives to identify sites of concern
- Trend analysis using seasonal Mann-Kendall to detect changes in water quality over time (run on 34 sites that had at least 6 years of data)
- Statistical modelling using Random Forest to determine if watershed characteristics and land uses affect water temperature, dissolved oxygen, conductivity and turbidity

SURFACE WATER QUALITY TREND ANALYSIS

Findings...

Changes in water quality over time:

27/34 sites had stable water quality and changes over time were not observed

5 sites experienced increases in mean summer and fall turbidity from 2011-2017

Cat Stream experienced an increase in conductivity from 2012-2017

Beach Creek had decreasing conductivity from 2011-2017

SURFACE WATER QUALITY TREND ANALYSIS

Findings

- **Frequent exceedances of water quality objectives or guidelines:**
 - 12 sites of concern
 - 7/12 have high agricultural use within the watershed
 - 2/12 have upstream stormwater outfalls
 - 3/12 not well understood – likely related to annual differences in rainfall and temp

SURFACE WATER QUALITY TREND ANALYSIS

Findings:

■ **Statistical modelling**

- Land use types associated with human disturbance were important
- Watersheds <60% forested, associated with changes in turbidity and conductivity
- Watersheds with >20% agricultural use, associated with higher turbidity and lower dissolved oxygen
- Watersheds with paved road densities $>0.002\text{m}/\text{m}^2$ associated with increased conductivity, higher water temperatures

SURFACE WATER QUALITY TREND ANALYSIS

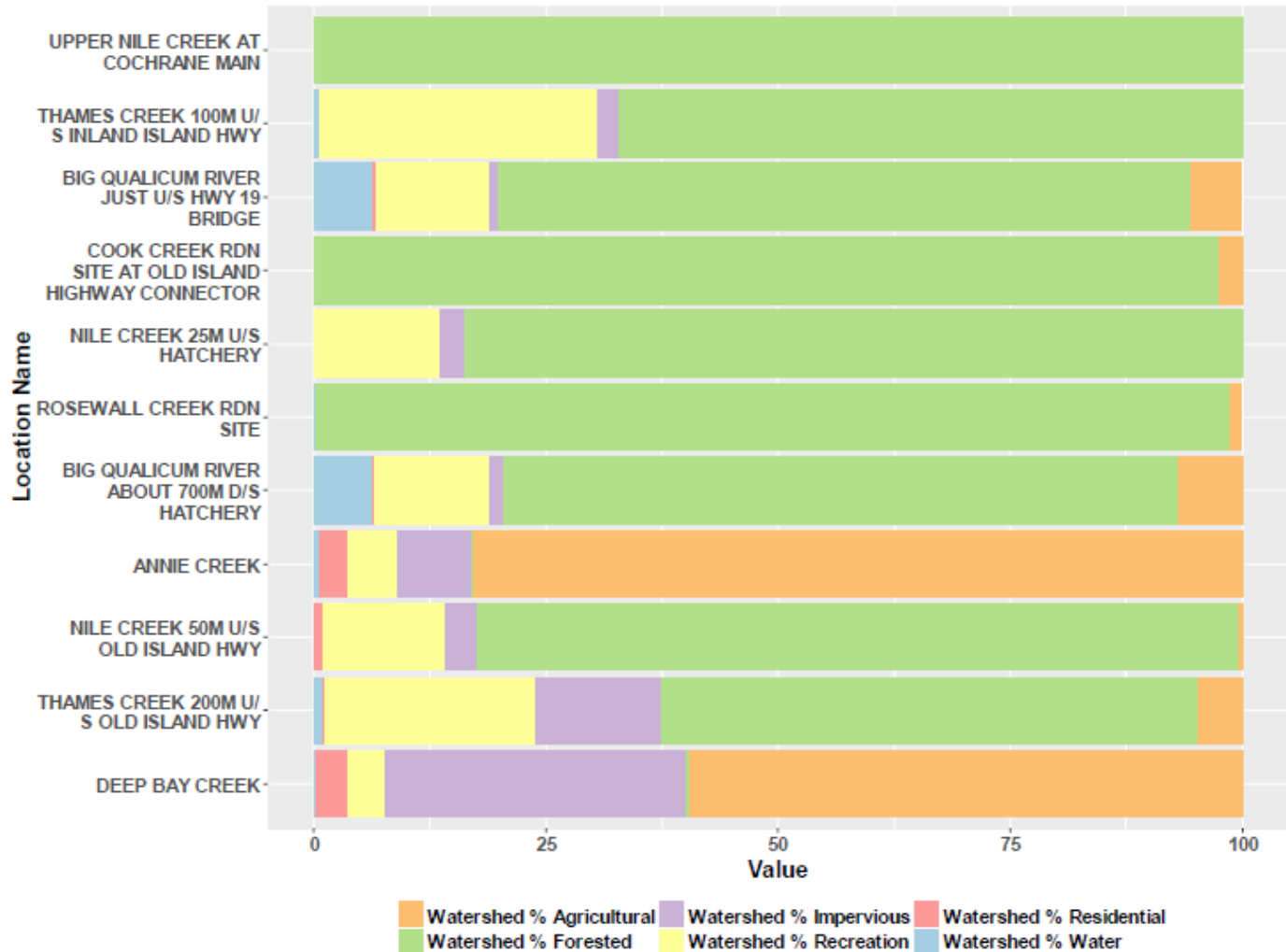


Figure 3-1: Percent land use composition for CWMN site watersheds of Water Region 1 (Big Qualicum River).

SURFACE WATER QUALITY TREND ANALYSIS

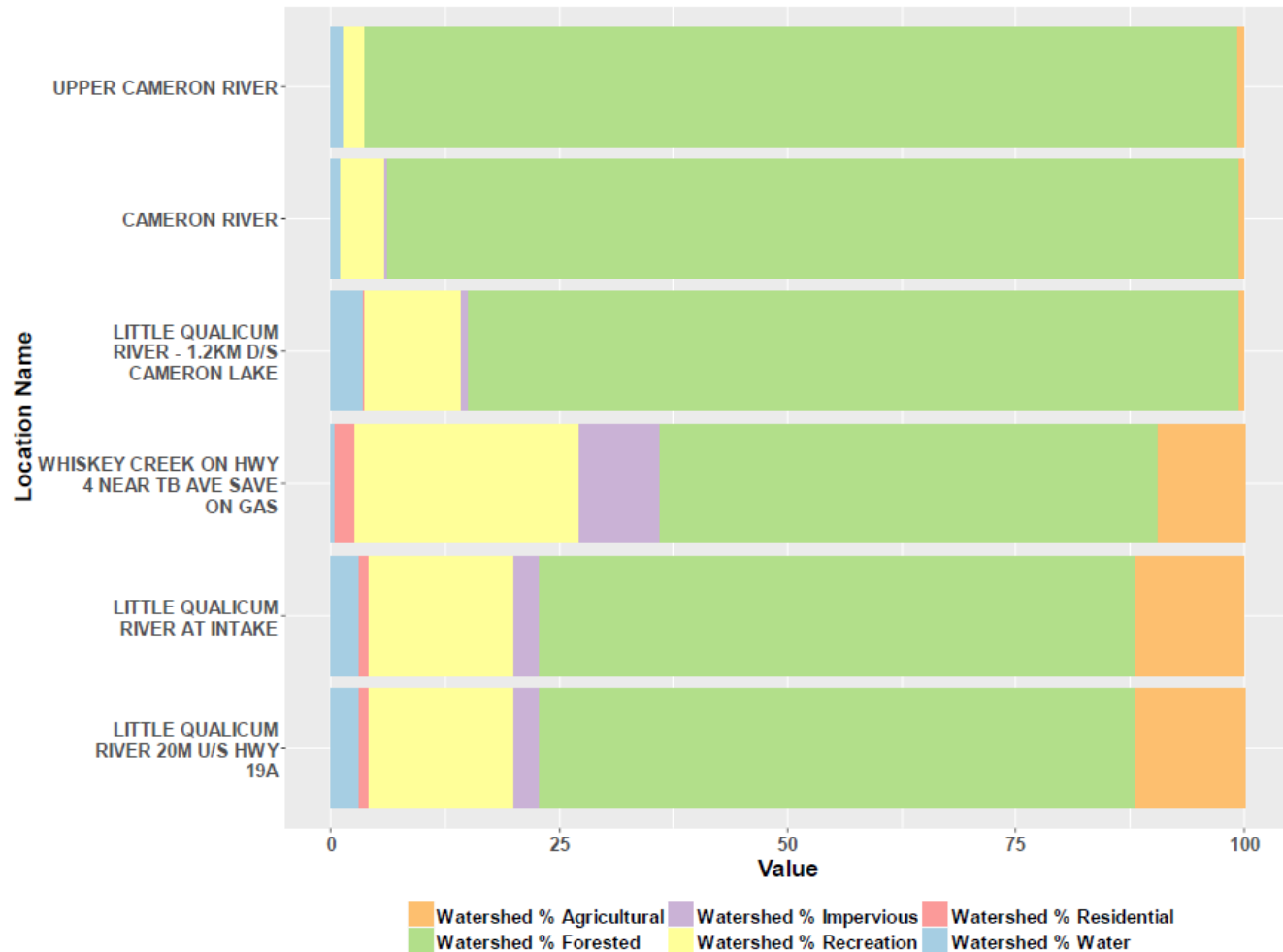


Figure 3-2: Percent land use composition for CWMN site watersheds of Water Region 2 (Little Qualicum River).

SURFACE WATER QUALITY TREND ANALYSIS

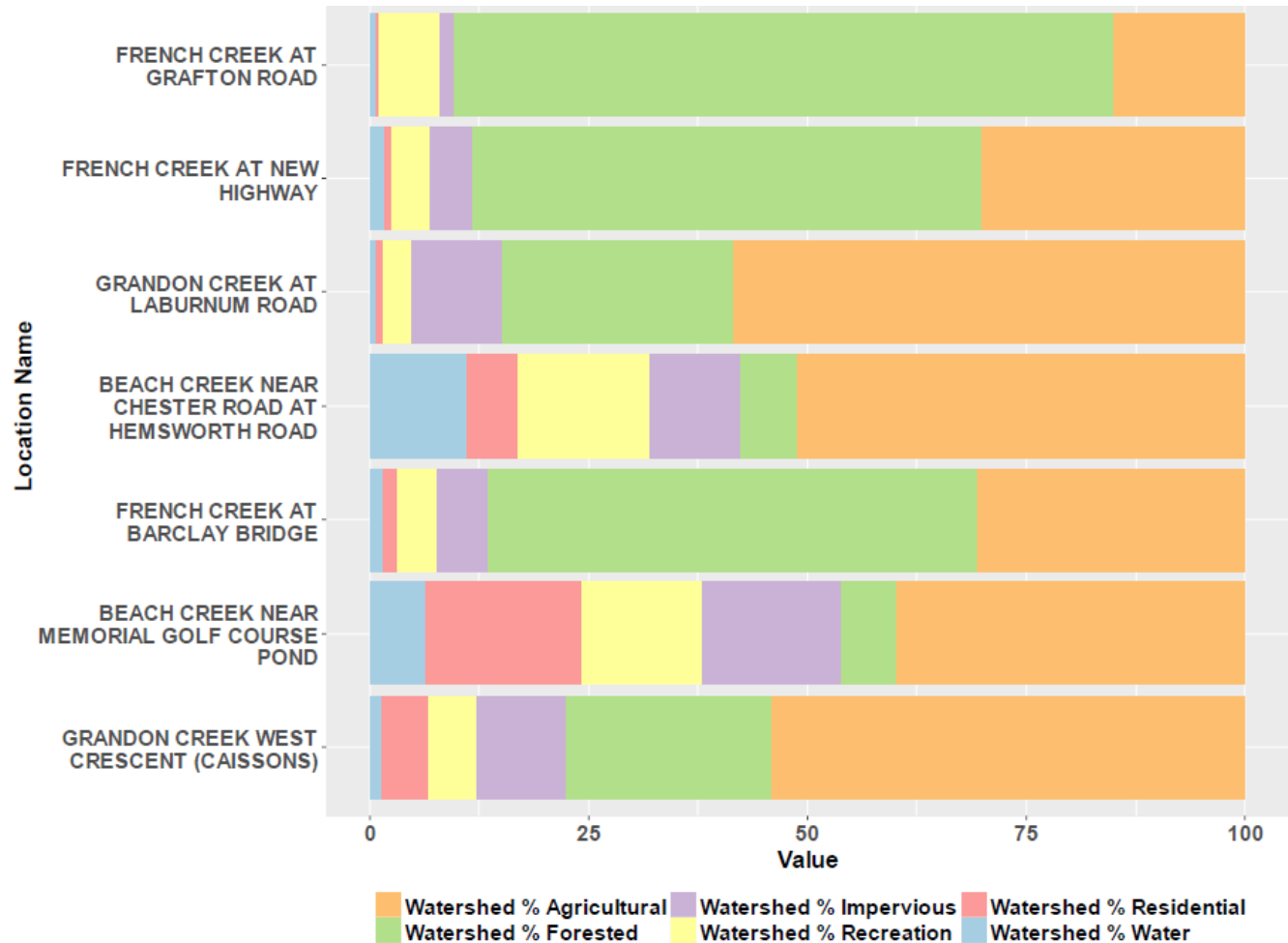


Figure 3-3: Percent land use composition for CWMN site watersheds of Water Region 3 (French Creek).

SURFACE WATER QUALITY TREND ANALYSIS

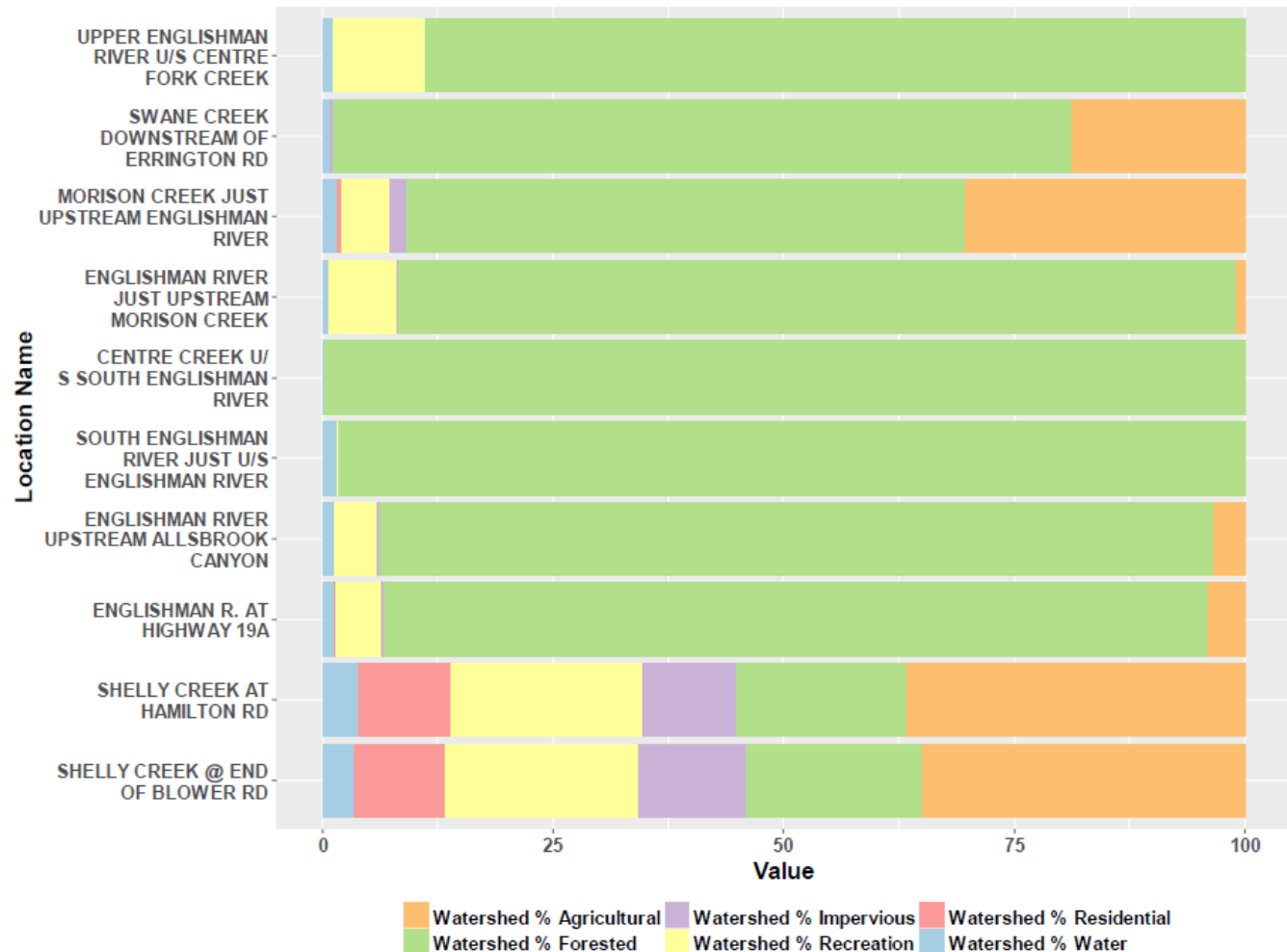


Figure 3-4: Percent land use composition for CWMN site watersheds of Water Region 4 (Englishman River).

SURFACE WATER QUALITY TREND ANALYSIS

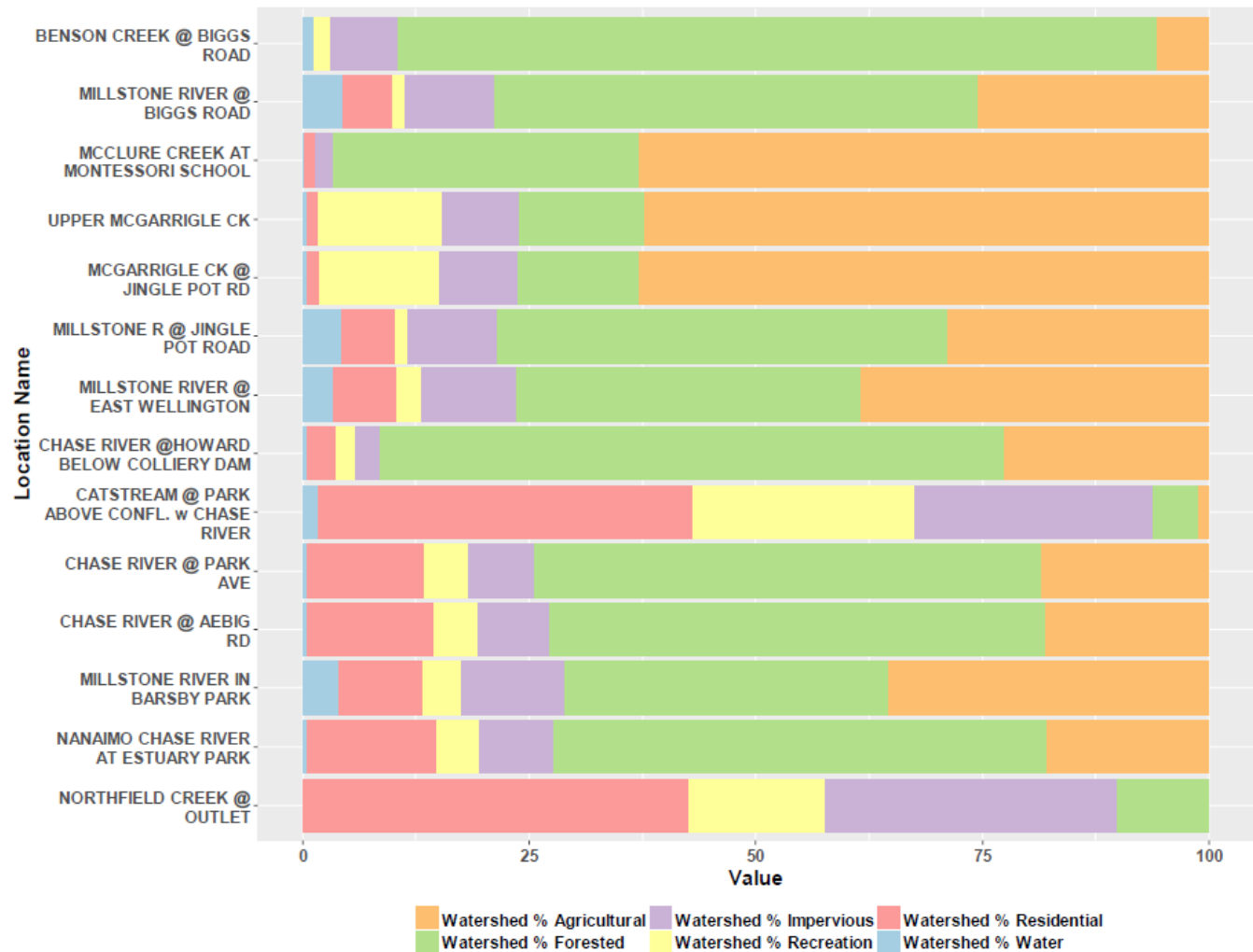


Figure 3-5: Percent land use composition for CWMN site watersheds of Water Region 5-2 (South Wellington to Nanoose).

SURFACE WATER QUALITY TREND ANALYSIS

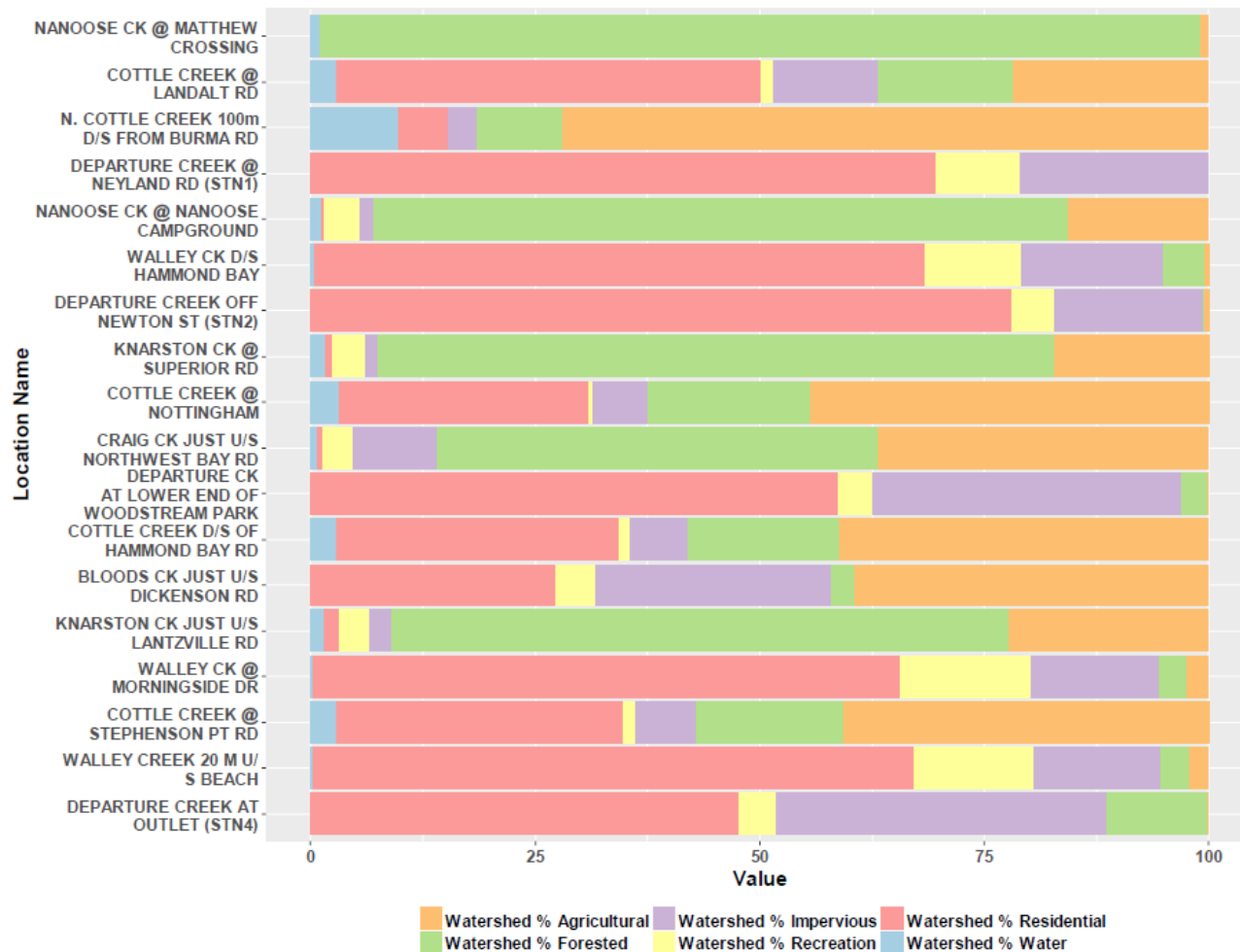


Figure 3-6: Percent land use composition for CWMN site watersheds of Water Region 5-1 (South Wellington to Nanoose).

SURFACE WATER QUALITY TREND ANALYSIS

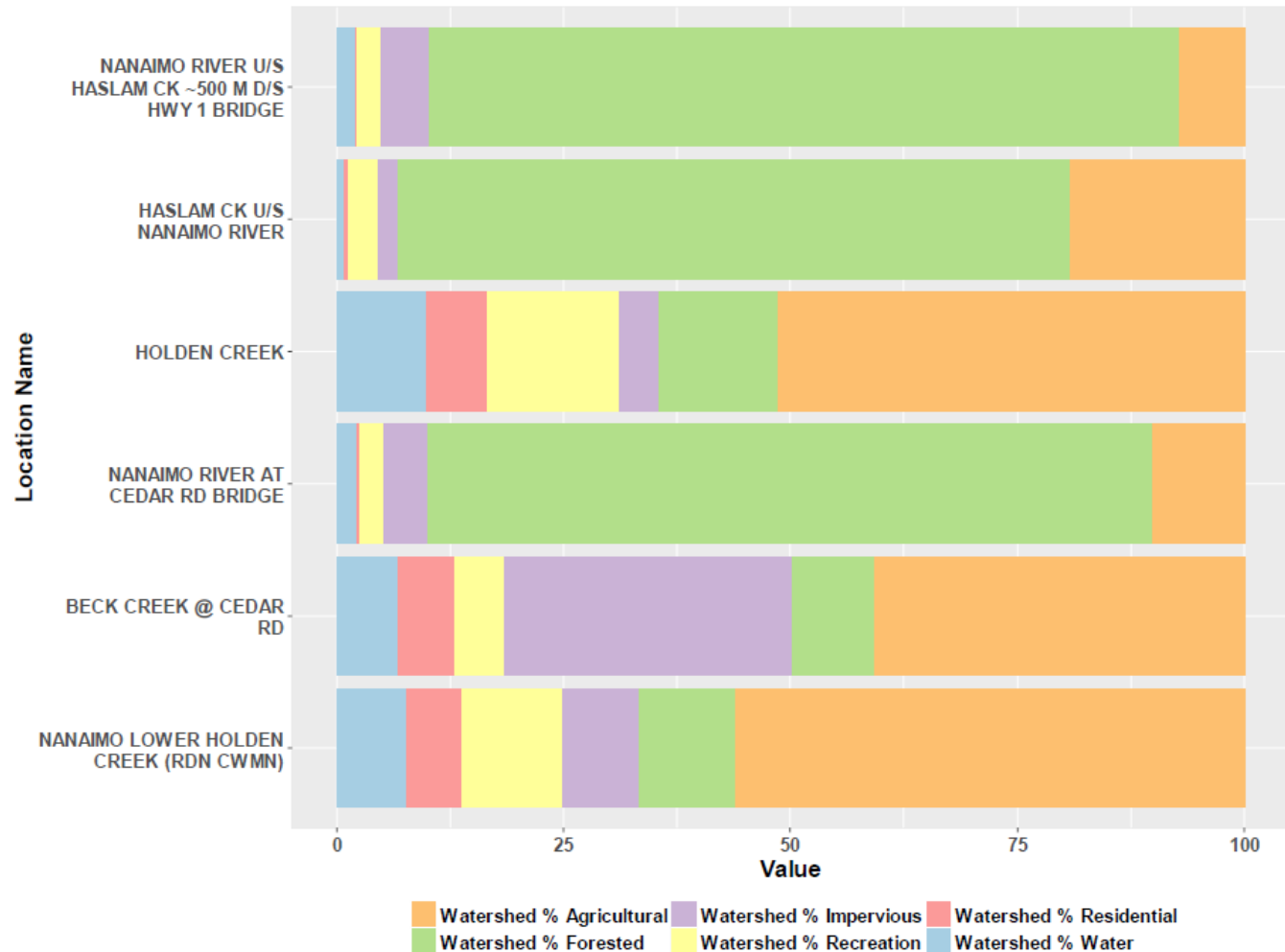


Figure 3-7: Percent land use composition for CWMN site watersheds of Water Region 6 (Nanaimo River).

SURFACE WATER QUALITY TREND ANALYSIS

Random Forest Statistical Models

Consider multiple criteria – both human caused and natural - that may affect water quality simultaneously

Identified the top 10 predictors – typically the top two or three are the most reliable factors

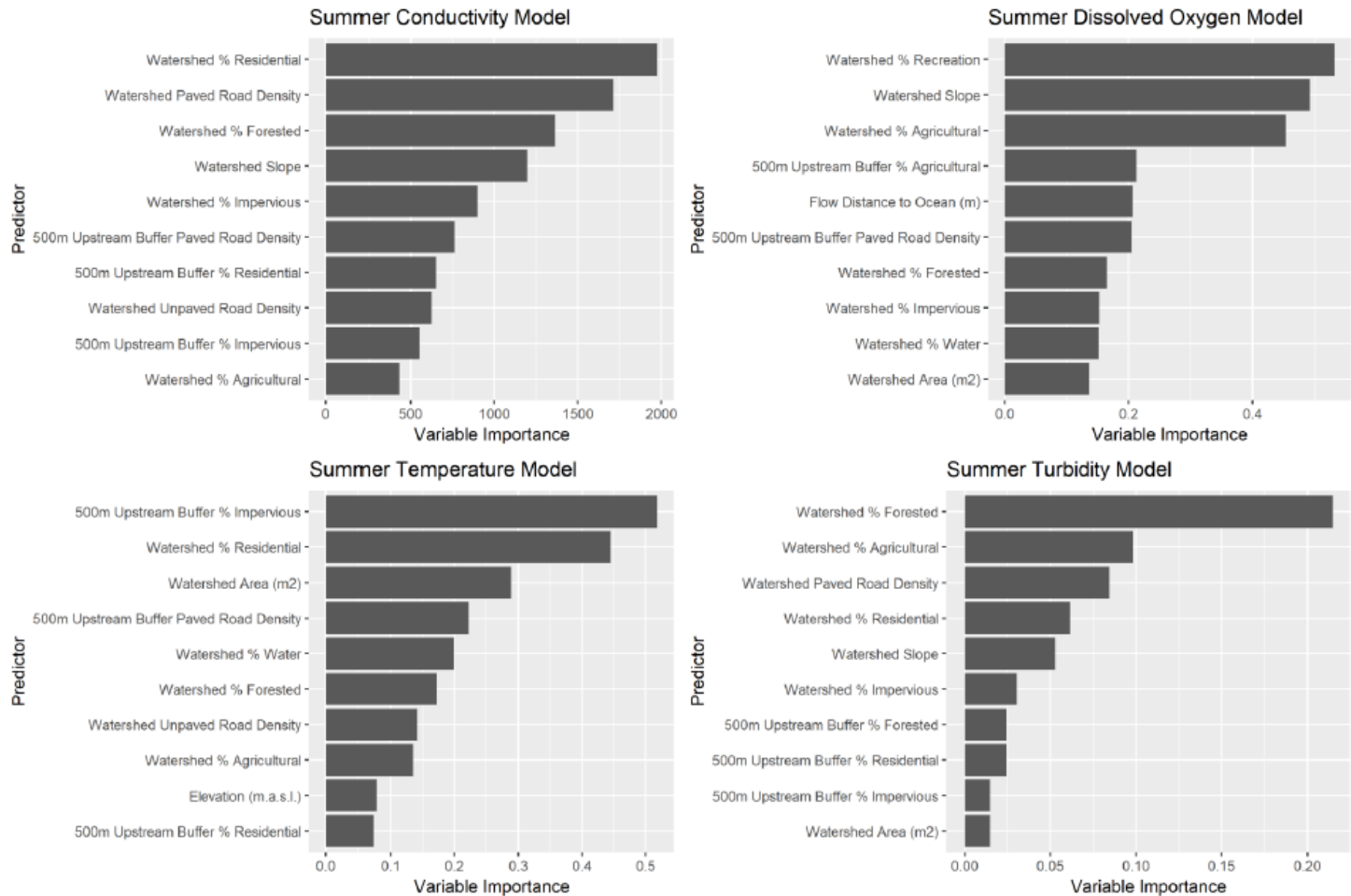


Figure 3-9: Variable importance plots for summer water quality models.

SURFACE WATER QUALITY TREND ANALYSIS

Random Forest Statistical Models

Consider multiple criteria – both human caused and natural - that may affect water quality simultaneously

Identified the top 10 predictors – typically the top two or three are the most reliable factors

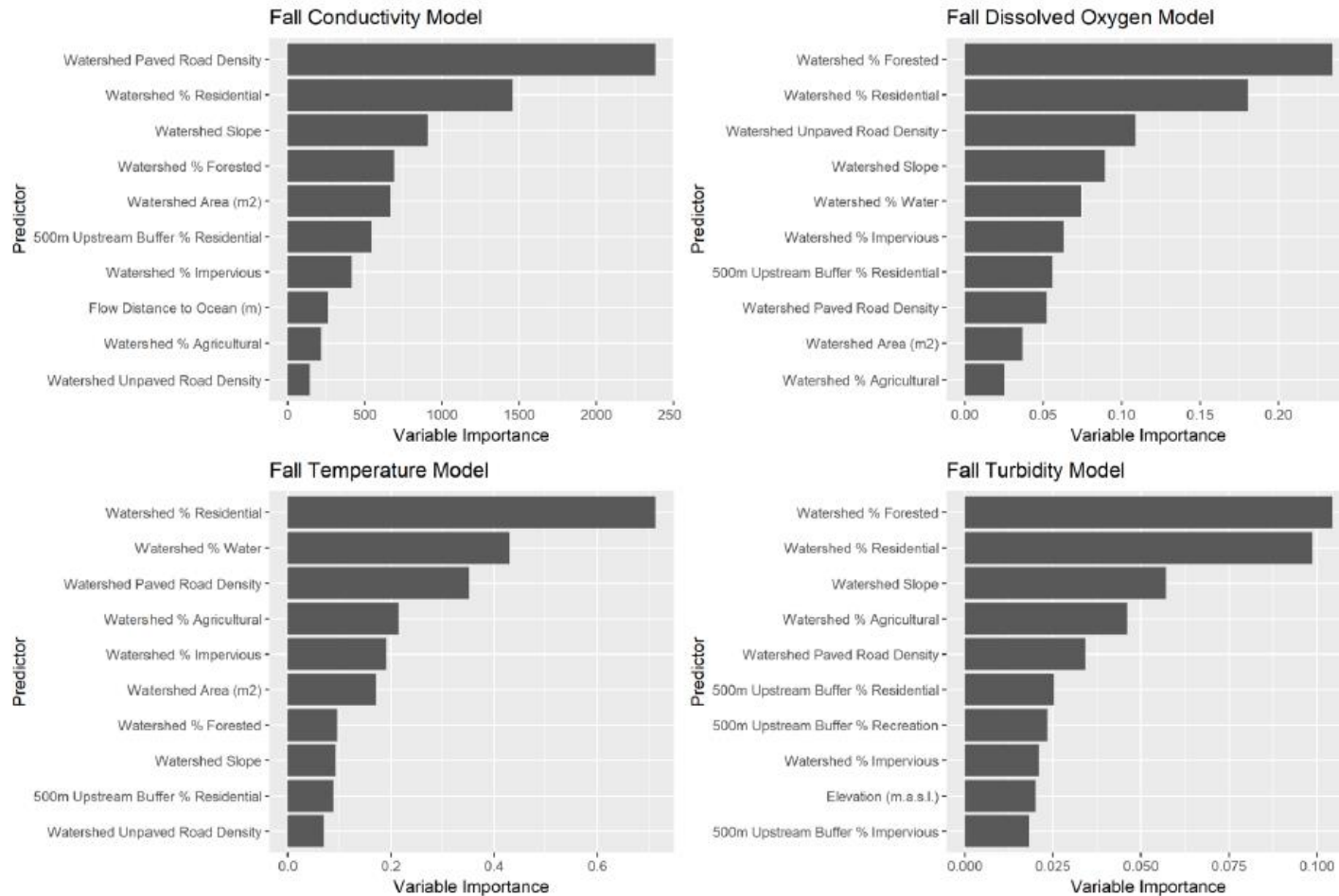


Figure 3-10: Variable importance plots for fall water quality models.

SURFACE WATER QUALITY TREND ANALYSIS

Random Forest Statistical Models

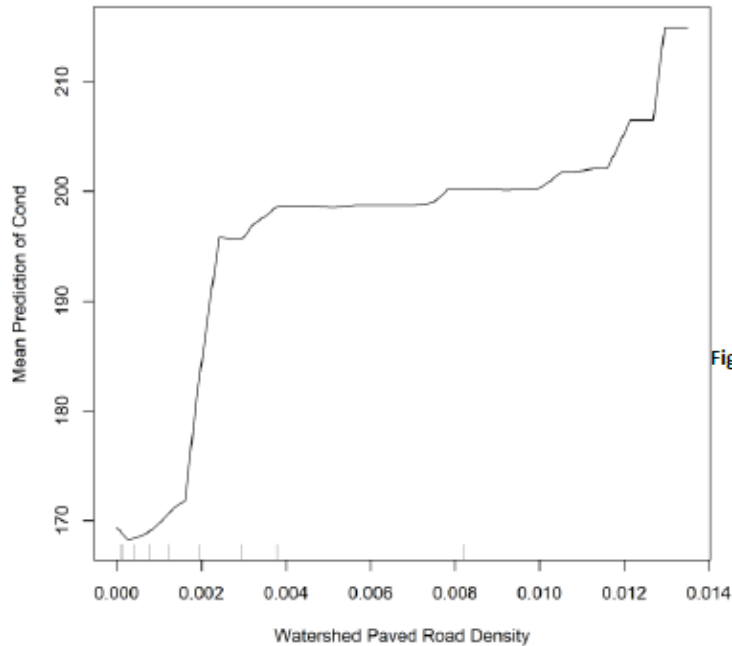


Figure 3-11: Partial Dependence plot for summer conductivity model shows paved road density has a threshold effect on conductivity.

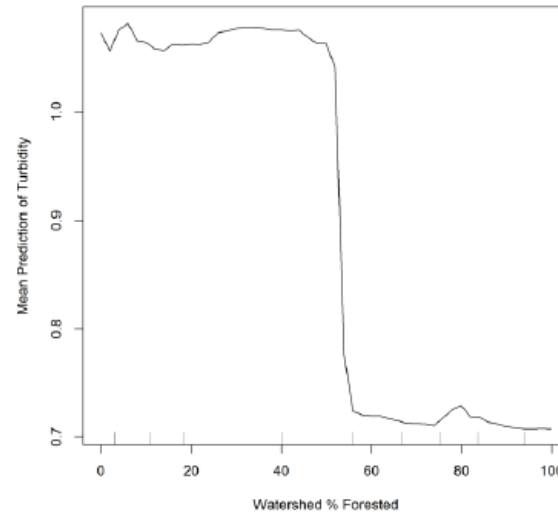


Figure 3-12: Partial Dependence plot for summer turbidity model shows percent forested has a threshold effect on turbidity.

SURFACE WATER QUALITY TREND ANALYSIS

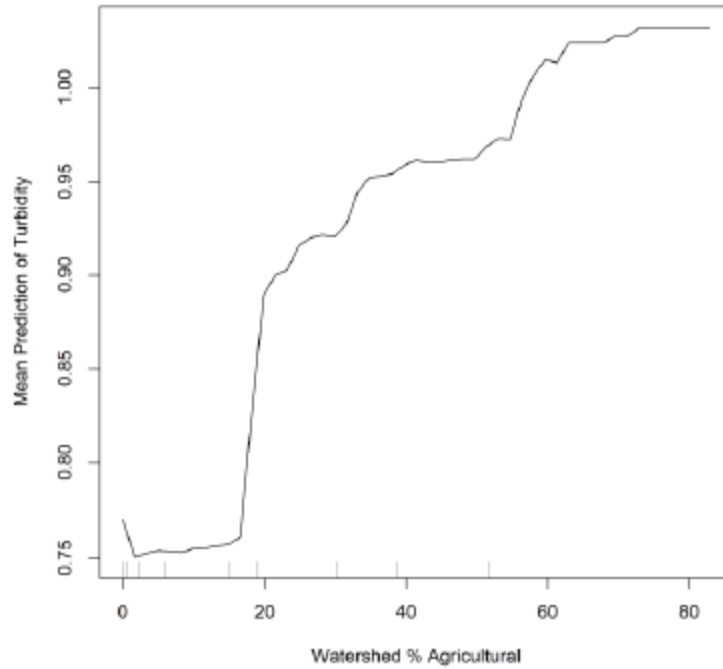


Figure 3-13: Partial Dependence plot for summer turbidity model shows percent agricultural/rural has a threshold effect on turbidity.

SURFACE WATER QUALITY TREND ANALYSIS

Recommendations:

Total P – sample phosphorus during summer and fall periods in watersheds that have high agricultural land use or evidence of excessive algae growth (every 2-5 years depending on budget).

Chloride – sample during summer low flow period for sites that have elevated conductivity and high road densities or > 30% impervious surface. Help to identify if urban activities are causing high conductivity levels and impairing stream health.

Benthic Invertebrate Sampling – before and after restoration works to assess effectiveness and as long term watershed level indicator of health (every 2-5 years) to allow better trend analysis over time.

Riparian Planting – 7 key sites identified; consistent with USHP assessment recommendations.

Targeted Public Education – around stormwater impacts and agricultural impacts.

Stormwater Management via Rain Gardens / Swales – reduce volume and rate and improve quality of stormwater runoff to creeks that are experiencing water quality concerns attributed to stormwater outfalls.

Refine and improve land use layer – use remote sensing techniques, work with VIU to accurately map extent of tree cover, impervious surface and other relevant components of the landscape (update every 5-10 years).

NEW BUSINESS

2019 Key Projects:

- **DWWP Action Plan Update (Jan - July)**
- **Water Conservation Plan Update** (RDN Water Service Areas; opportunity to collaborate with Muni's)
- **Area E (Nanoose Water Region) Phase 3 Water Budget**
- **Proposed C2C Forum(s) on Water Governance with First Nations**
- **Area F (French Creek Water Region) Water Studies to Support OCP Update**
 - **Water quality risk analysis** (second half 2019)
 - **Water Budget Phase 3 for French Creek Water Region** (likely early 2020)

Thoughts, ideas, emphasis, partnership opportunities?



THANK YOU!

Chase River Riparian Restoration Oct. 2018 – photo Lindsey Haist