



#### **AGENDA**

- Event Welcome
- Benthic Invertebrate Sampling Rosie Barlak (ENV)
- Stormwater Kristy Gabelhouse (ENV)
- Tire Wear Toxin Monitoring Haley Tomlin (BCCF)
- 12:30 Lunch and visit information tables
- 2023 Results and 2024 program Lauren Fegan (RDN DWWP)
- 2025 Community Watershed Monitoring Network Strategic Planning

#### COMMUNITY WATERSHED MONITORING NETWORK

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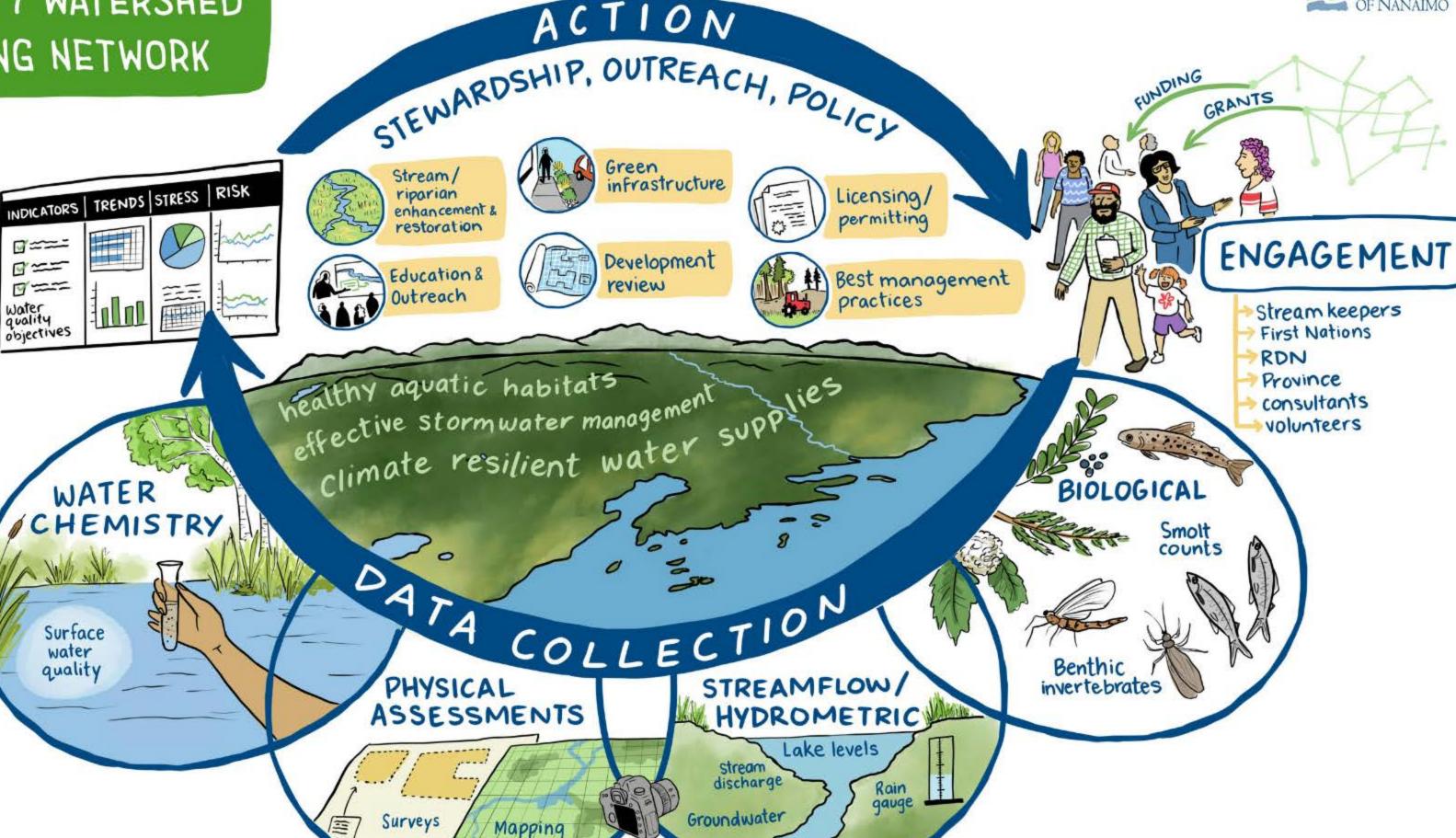
Water quality objectives

Surface water

quality

REPORTING





INFOGRAPHIC: thefuselight.com

#### DATA TO ACTION

- Action occurs at all levels including streamkeepers, environmental stewards, private industry, local and senior government, and First Nations
- Ensuring data is publicly available promotes collaboration and transparency for the common goal of promoting watershed health
- Funding is required to support actions, as is organization support and coordination across jurisdictions
- Sharing via annual results session for all participants every summer
- Stewardship seed funding & support for restoration and enhancement projects



#### RDN STEWARDSHIP SUPPORT

- With multiple years of data, we can identify sites that have consistent water quality concerns and support community actions to address these concerns
- This includes prioritizing sites for restoration & enhancement works undertaken by stewards and providing funding partnerships and tools for these efforts



See more about our volunteers that monitor, restore and steward freshwater habitat region wide

**Get Involved** 



- There have been over 30 projects supported across the region since 2016
  - Stewardship Seed Funding
  - Tool lending library
  - RDN Water Map
  - Riparian Analysis Map
  - Reports library on DWWP webpage
  - Water Stewardship Rebate program

rdn.bc.ca/stewardship-seed-funding rdn.bc.ca/tool-lending-library rdn.bc.ca/watermap rdn.bc.ca/riparian-analysis-map rdn.bc.ca/dwwp-reports rdn.bc.ca/rdn-rebates

#### COMMUNITY WATERSHED MONITORING: ALL ABOUT PARTNERSHIPS

#### **Ministry of Environment**

Provide training and sampling protocols, public database and portal, technical support, data review

Surface Water Quality

Data

Supports project prioritization, land use planning, funding applications, awareness & stewardship

#### Mosaic Forest Management

Provide safety gear, land access to upper watershed sites, sponser QA/QC lab analysis

#### **RDN DWWP**

Coordinate monitoring program, facilitate training sessions, manage equipment, technical support, review and report

### Community Stewardship Groups

Local knowledge, history, volunteer coordination, complete annual training, equipment calibration, summer and fall sampling



#### PAST AND PRESENT STEWARDSHIP PARTNERS

- Cat Stream Stewards
- Fanny Bay Salmonid Enhancement Society
- Nile Creek Enhancement Society
- Qualicum Beach Streamkeepers Society
- Friends of French Creek Conservation Society
- Mid Vancouver Island Habitat Enhancement Society
- Island Waters Fly Fishers
- Departure Creek Streamkeepers
- Walley Creek Streamkeepers
- Vancouver Island University
- Nanaimo and Area Land Trust
- Gabriola Streamkeepers
- Wexford Creek Streamkeepers
- Quennell Lake Watershed Stewardship Society



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## COMMUNITY WATERSHED MONITORING NETWORK

- Program started with the goal to increase knowledge and understanding of surface water quality in the region
- Monitoring program began in 2011, and was designed with protocols and methods aligned with the Provincial standards
- Partnership between Ministry of Environment & Climate Change Strategy (ENV), RDN DWWP, Streamkeeper Volunteers, & private forestry
- Sites are chosen to fill data gaps in provincial monitoring networks and are based on local knowledge of Streamkeepers



## COMMUNITY WATERSHED MONITORING NETWORK

- Streams are sampled during 2 seasonal periods (summer low flow & fall flush), 5 consecutive weeks
- All data is entered and stored in publicly accessible, provincially managed database -Environmental Monitoring System (EMS)
- Volunteers are trained on equipment use and sampling methodology at mandatory annual training sessions in July
- Provincial methodology used supports comparison to Ambient Water Quality
   Objectives/Guidelines and Quality Assurance Quality Control at 10% of sites



### COMMUNITY WATERSHED MONITORING NETWORK 2023 DATA COLLECTION

Collected by trained and experienced community stewards in 2023

Eight July training sessions - supports and informs community stewards

Two 5-in-30 sample periods
Aug. 8 to Sept. 5 (summer low flow)
Oct. 3 to Oct. 31 (fall flush)
provides data of most stressed times

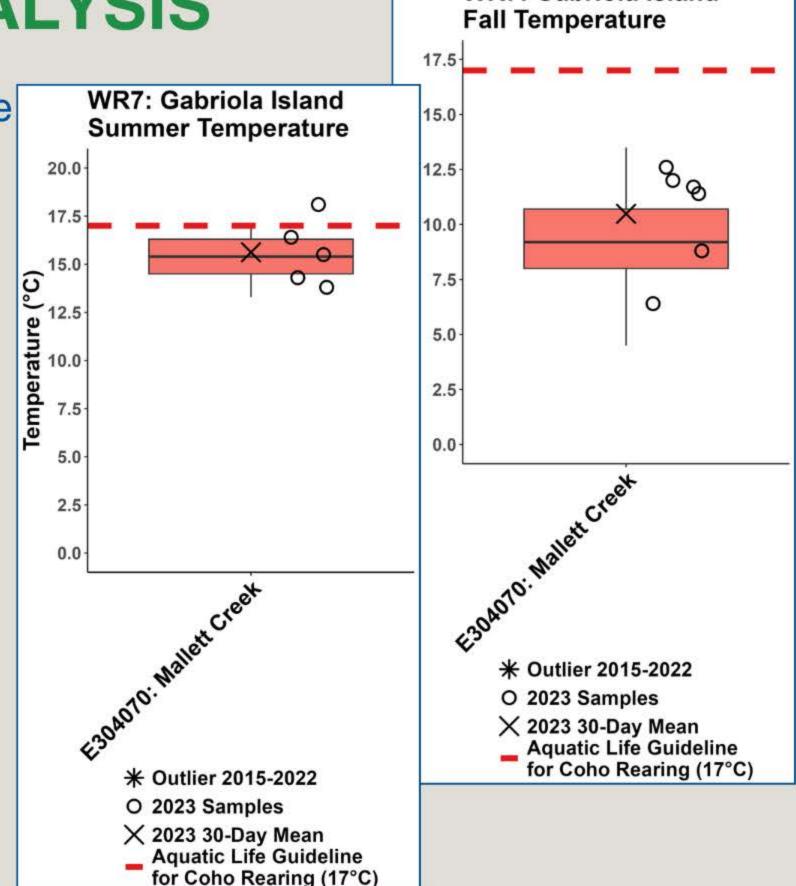
- 66 sites, 40 streams, and 26 watersheds were monitored
- 2 community events share information and provides a platform for connection and collaborations



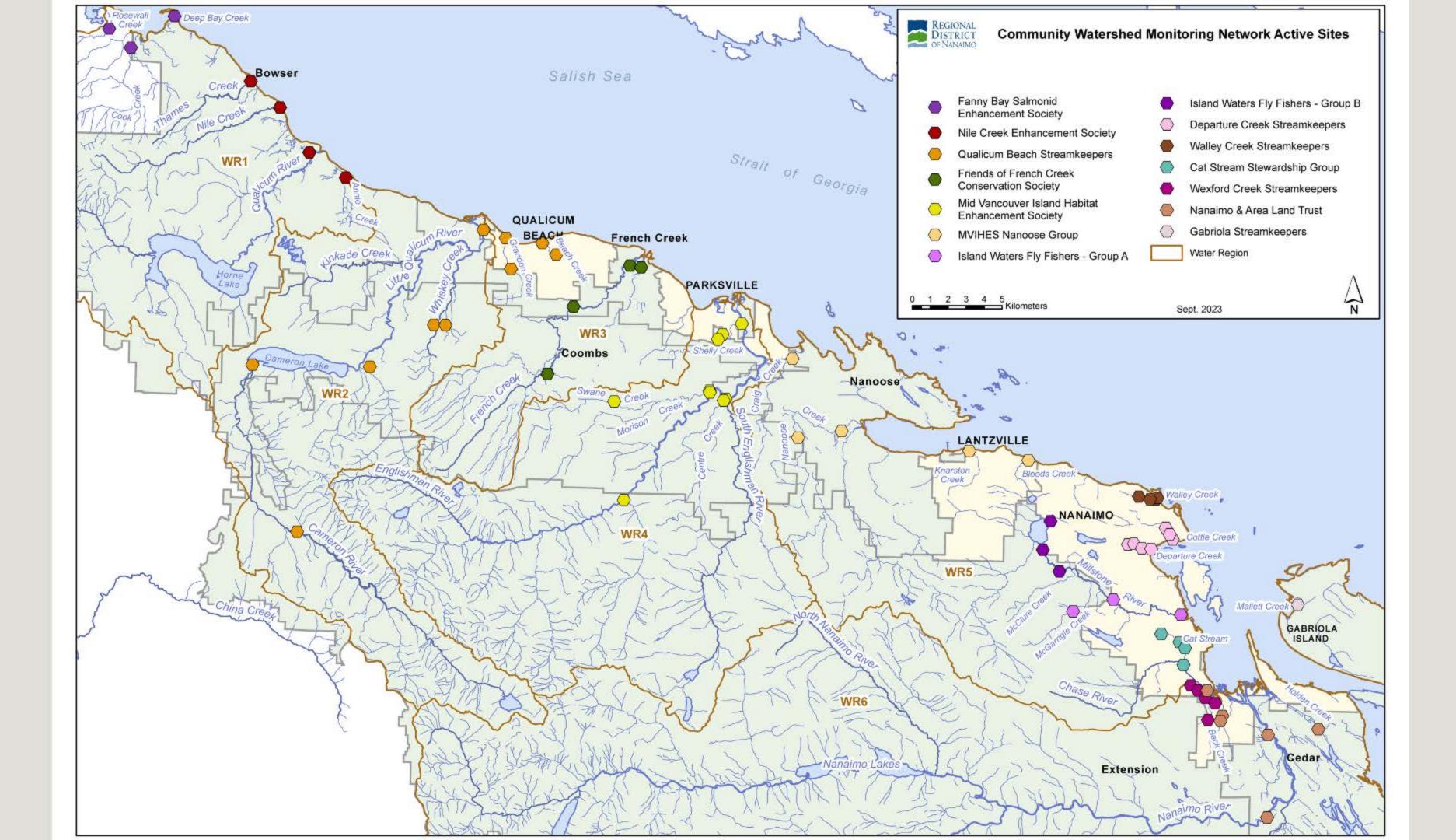
#### **COMMUNITY WATERSHED MONITORING NETWORK**

2023 DATA ANALYSIS

- Engaged Ecoscape Environmental Consulting to analyze the data collected from 2011 - 2023
- Update box plots that compare current year of data collected to previous years of data collection
- Completed trend analysis on 3 sites that have 6 years of data: Bloods, Knarston, and Holden Creeks
- Update basin delineations for each site to include storm drainage structures
- Update 2021 exceedance maps with current data and revised basin delineations
- Summary of the data presented here today
- Results will be online at ww.rdn.bc.ca/cwmn



WR7: Gabriola Island



## SURFACE WATER QUALITY MONITRING PARAMETERS

#### Turbidity

- suspended particles in the water column
- correlated to water temperature
- o linked to erosion, contaminants, storm water, etc.
- QAQC lab analysis

#### Water Temperature

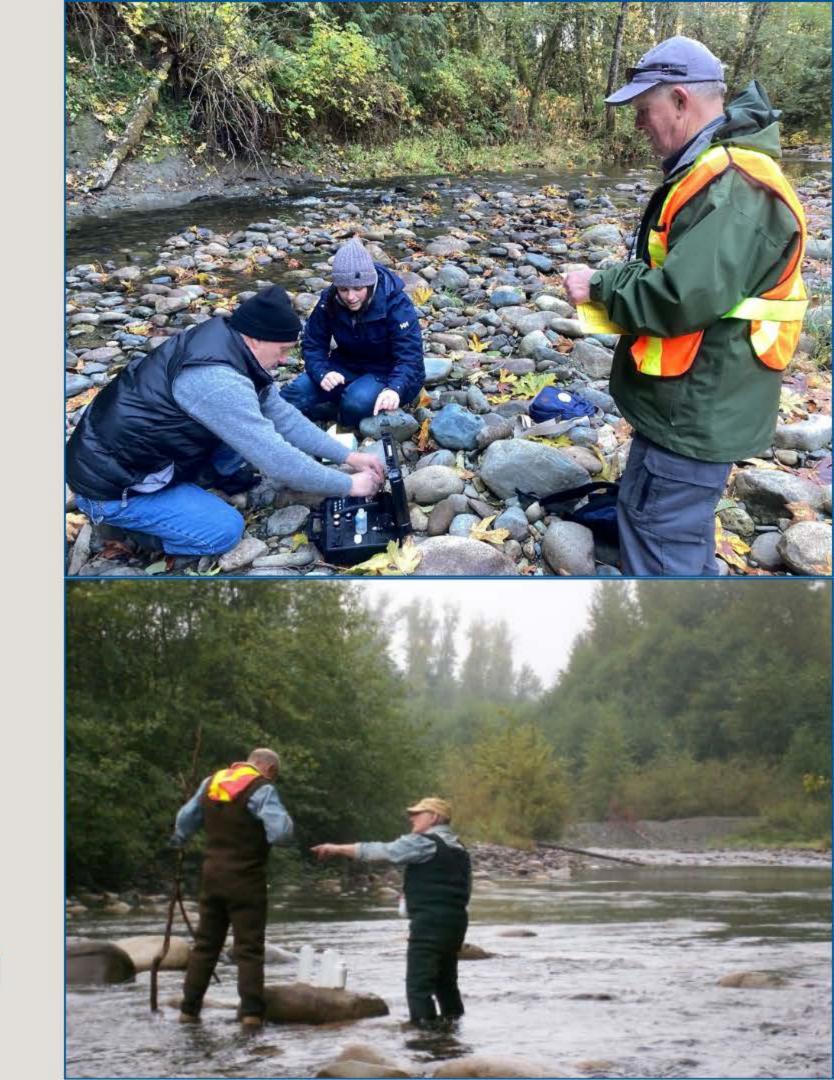
- alters physical and chemical properties of water
- affects the metabolic rate of aquatic organisms

#### Dissolved Oxygen

- supports aquatic life
- decreases as temperature increases

#### Specific Conductivity

- amount of dissolved minerals
- increases with temperature, turbidity, groundwater, evaporation, saline inputs (eg. tidal, roads, agricultural run-off)

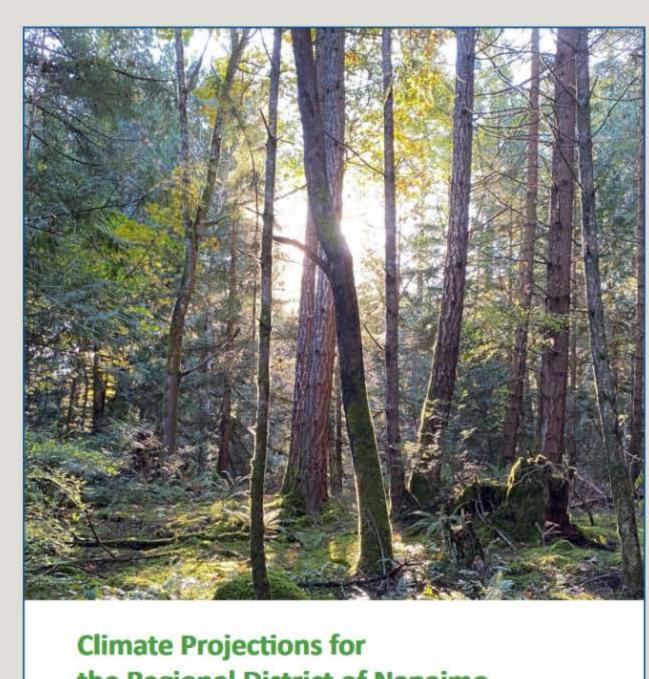


#### REGIONAL CLIMATE PROJECTIONS

The RDN worked with the Pacific Climate Impacts Consortium at the University of Victoria to develop climate projections for our area to better understand what the predictions of the latest global climate models likely mean for the future climate of our Region.

Study showed that with continued high global emissions, our region can expect:

- Hotter summer temperatures, more extreme heat days/heatwaves
- Warmer nights and a longer growing season
- Warmer winter temperatures and less days with ice or frost
- Less rain and more dry days in the summer
- More precipitation in fall, winter, and spring
- More precipitation falling as rain instead of snow
- More rain delivered in extreme rainfall events



the Regional District of Nanaimo





## CLIMATE IMPACTS ON SURFACE WATER QUALITY PARAMETERS RESULTS

Climate change trends (hotter air temperatures, longer dry periods, heavier rains) influence surface water quality parameters measured

- Turbidity impacted by streamflow; turbid water can absorb more solar heat
- Water Temperature influenced by air temperature; canopy cover and groundwater inputs maintain cooler water temperatures
- Dissolved Oxygen strongly correlated with stream flow, stream structure, and water temperature
- Specific Conductivity supports data interpretation; groundwater higher conductivity than surface water



Beck Creek d/s Cedar Road August 8, 2022

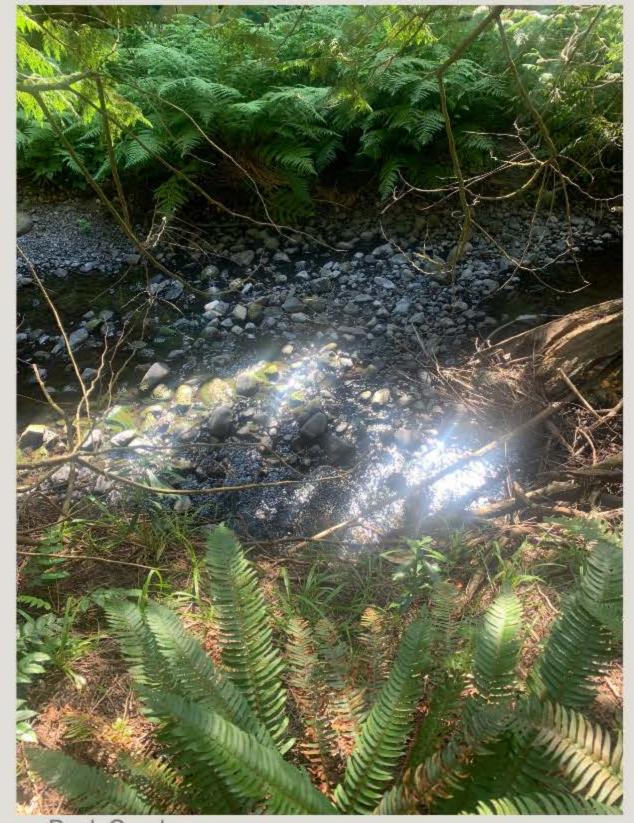
## CLIMATE IMPACTS ON SURFACE WATER QUALITY PARAMETERS RESULTS

Example: Summer Sample Period Comparison Average Regional Air Temperature & Total Precipitation

YEAR	AVG TEMP.	T-PRECIP.
2014	24.3°	26.0 mm
2015	24.1°	23.1 mm
2016	25.1°	19.6 mm
2017	26.1°	3.3 mm
2018	25.3°	1.5 mm
2019	24.0°	19.3 mm
2020	23.7°	40.7 mm
2021	25.1°	5.1 mm
2022	26.1°	1.0 mm
2023	24.7°	13.5 mm

Functioning, healthy watersheds are more resilient to climate change impacts

Hydrological monitoring (climate, snow, surface water, and groundwater) supports prioritizations and decision-making for drought and flood mitigations, infrastructure planning, and ecological modeling



Beck Creek

#### TURBIDITY

#### **Two Guidelines**

- 2 NTU maximum January to September used for summer low flow period
- 5 NTU maximum October to December used for fall flush period



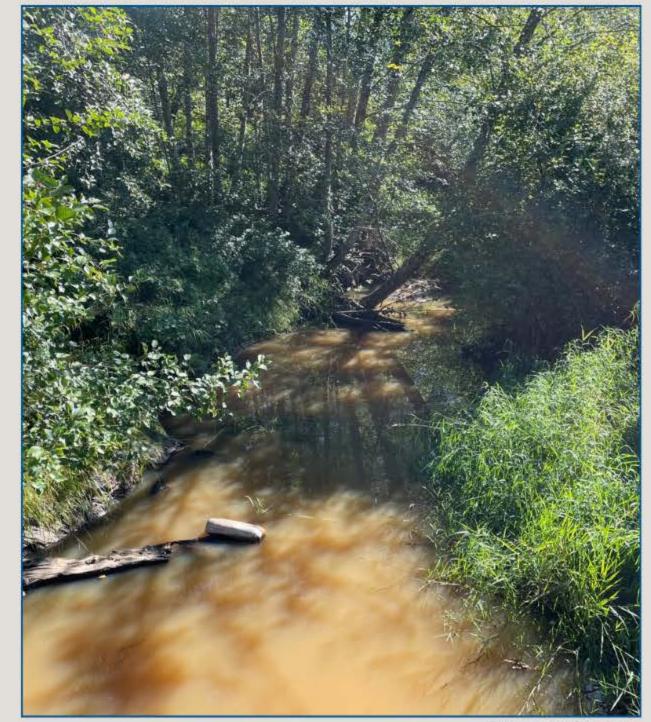
Annie Creek

- Measurement of water clarity via light reflected by suspended particles
- Turbidity exceedances highly correlated with rainfall
- Exceedances in summer period often related to human influences (recreation) and algae blooms (particles refract light)

#### **TURBIDITY RESULTS**

Total of 151 exceedances over 10 sample dates for both turbidity Guidelines

- Summer period 2 NTU maximum
  - 110 exceedances at 36 sites
    - 53 of these occurred on Aug. 8 & 29
    - precipitation within 24 hours of these sample dates most likely cause of increase in summer exceedances
- Fall period 5 NTU maximum
  - 38 exceedances at 20 sites
    - exceedances evenly distributed across dates
    - precipitation occurred before or on 4 out of 5 samples



French Creek

17 sites (25%) had exceedances in both sample periods

45% of sites sampled met both turbidity Guidelines

#### **TURBIDITY RESULTS**

- Compared to 2022, overall there was a 23% decrease in sites that met turbidity Guidelines in 2023
- This decrease is most likely attributed to more precipitation captured in both summer and fall sample periods
- 48% of summer exceedances likely attributed to precipitation while 52% of summer exceedances most likely due to algae, anthropogenic influences, and low flows

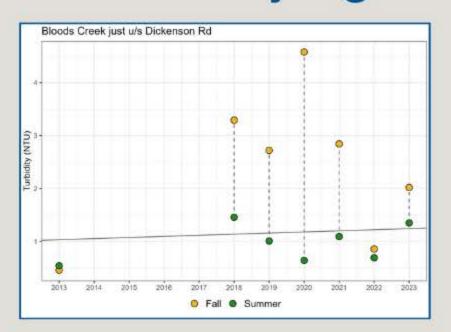


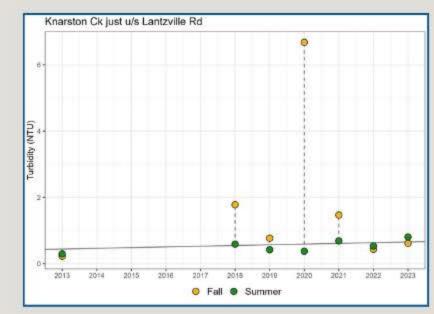
#### **TURBIDITY TRENDS**

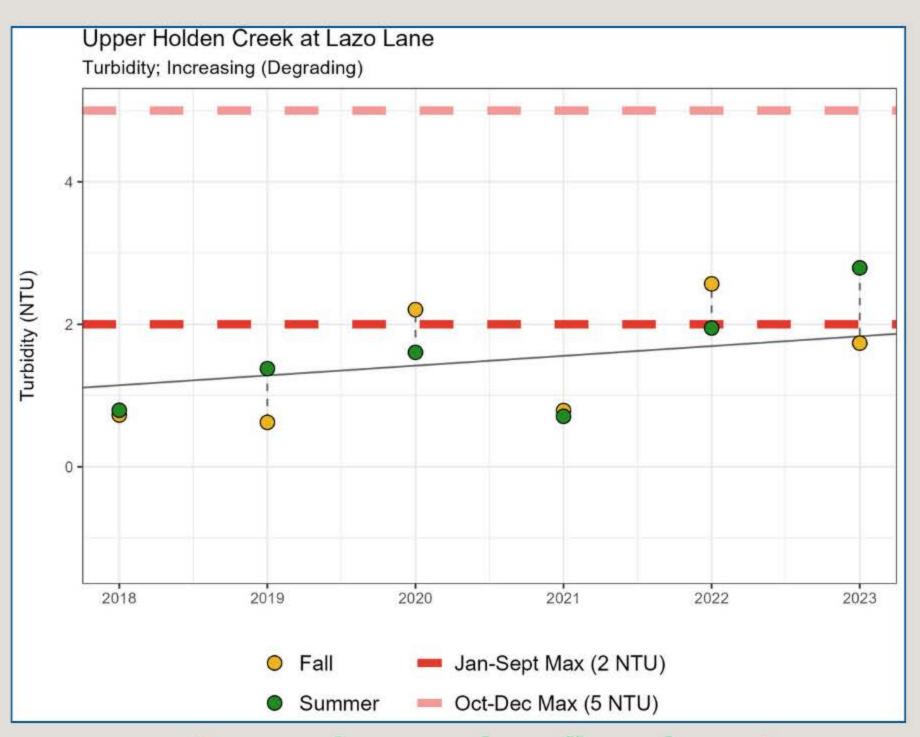
Three sites met the 6 year threshold for trend analysis in 2023

- Bloods Creek upstream Dickinson Rd
- Knarston Creek upstream Lantzville Rd
- Holden Creek at Lazo Ln

Though all three sites showed increasing turbidity over time, only **one** site had a **statistically significant trend** 







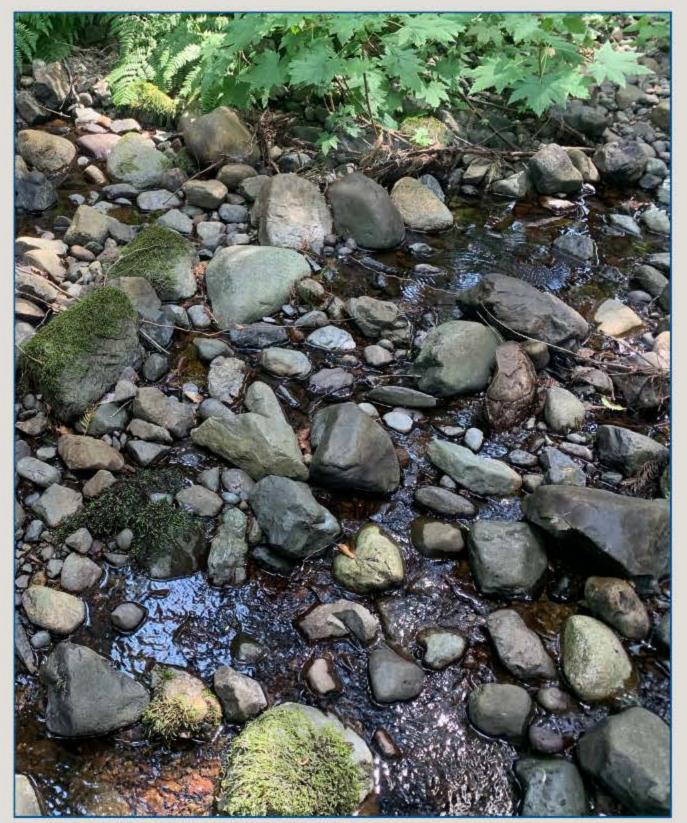
Physical stream assessments, flow measurements, and mapping flow inputs are recommended to understand degrading trends

#### **WATER TEMPERATURE**

Objective for Englishman River for drinking water supply weekly average ≤15°C

Guideline for aquatic life (Coho rearing) weekly average ≤17°C

- Increased water temperature can alter
   chemical properties of water, e.g., warmer
   water holds less oxygen
- Exceedances of this parameter are recorded during summer low-flow period



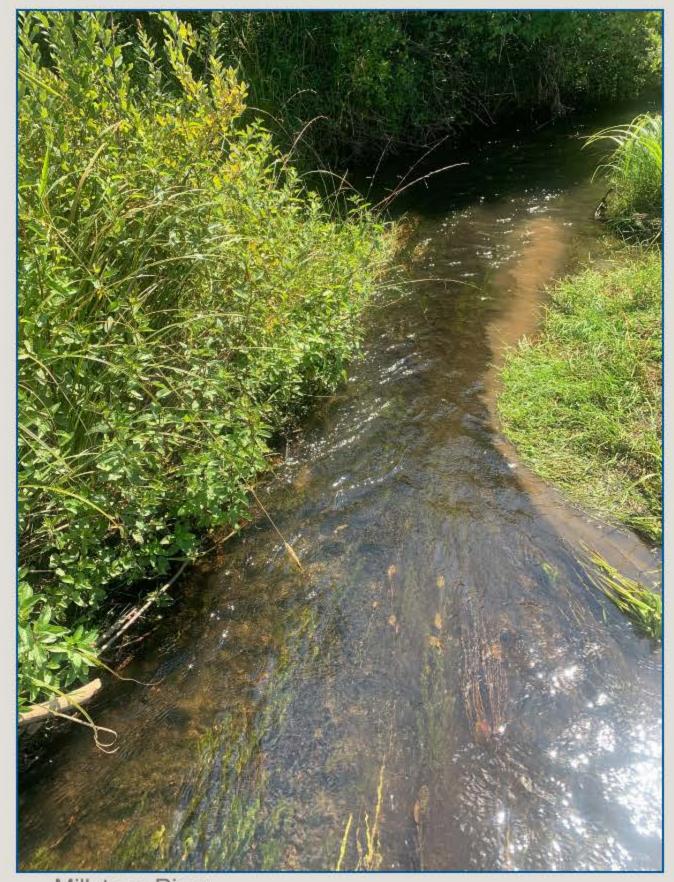
Beach Creek August 2022

#### WATER TEMPERATURE RESULTS

### 33% of sites sampled met temperature Guidelines

As with previous years, the highest weekly average air temperature correlated with the greatest number of values over 17°C

- 43% of values over 17°C on August 15
- 26.4°C Qualicum Airport Climate Station
- 29.8°C Nanaimo Airport Climate Station



Millstone River

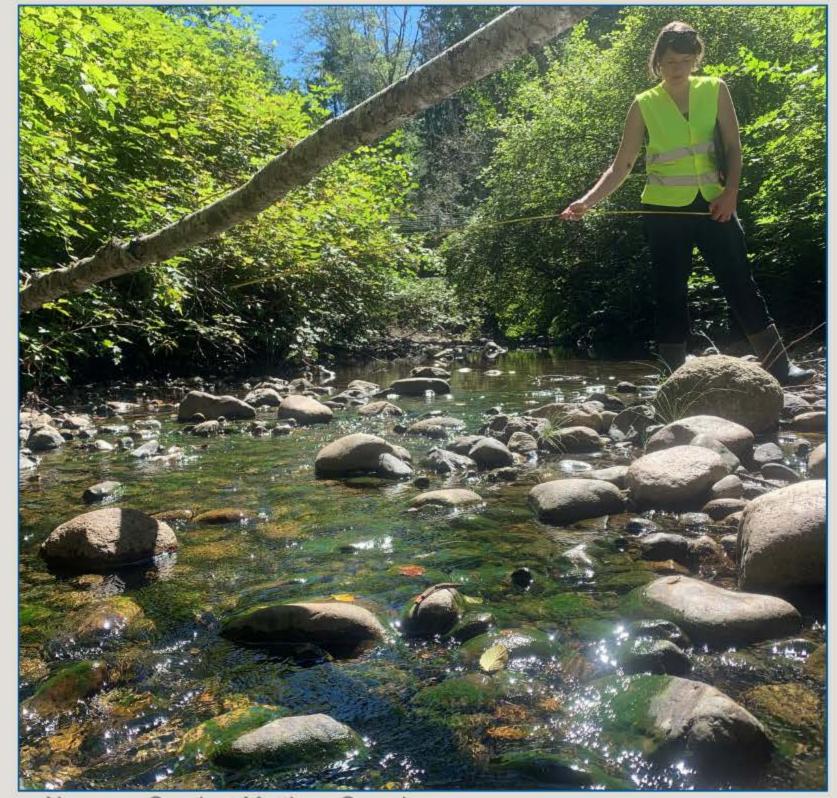
#### WATER TEMPERATURE TRENDS

For the three sites that underwent analysis, there were no significant trends in temperature

Temperature naturally varies across a watercourse, with exceedances being more common in the lower reaches (less riparian cover, wider and more shallow reaches) and in urban vs. more naturalized streams

In watercourses with temperature exceedances, **cool refuges** (i.e., deep pools, groundwater inflows, areas with more canopy cover) **support juvenile salmon** 

Physical stream assessments and an understanding of adjacent land uses and inputs are recommended to better understand how to mitigate increasing water temperatures



Nanoose Creek at Matthew Crossing

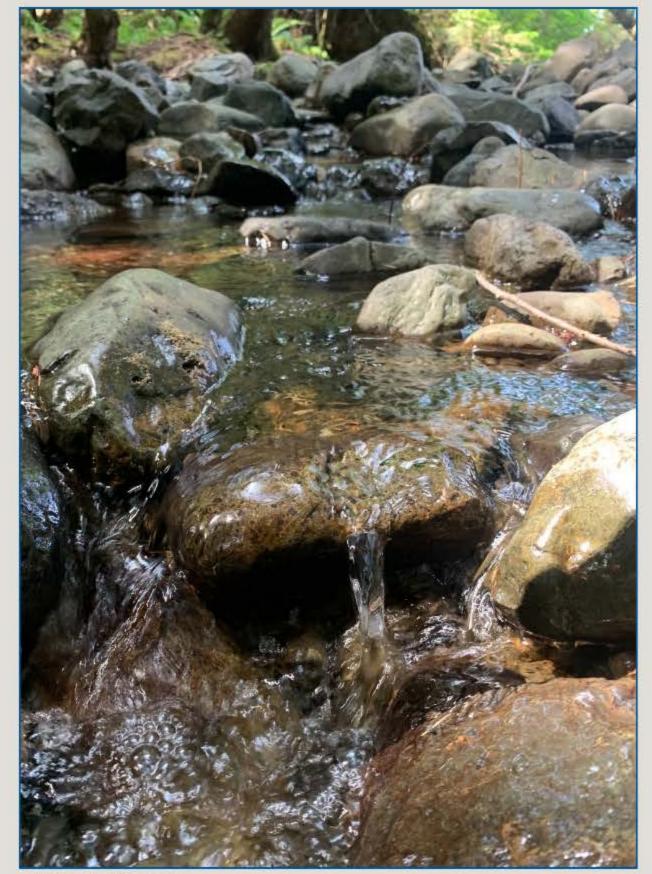
#### **DISSOLVED OXYGEN**

#### Two Dissolved Oxygen (DO) Guidelines

5-in-30 day average of 8 mg/L

#### Instantaneous minimum of 5 mg/L

- Oxygen is key for surface water self-purification processes and maintenance of aquatic organisms
- DO levels below Guidelines are usually recorded during summer low-flow period
- Sites with very low flow in the fall sample period may also experience DO levels below Guidelines



Beach Creek

#### **DISSOLVED OXYGEN RESULTS**

#### Instantaneous minimum 5 mg/L Guideline

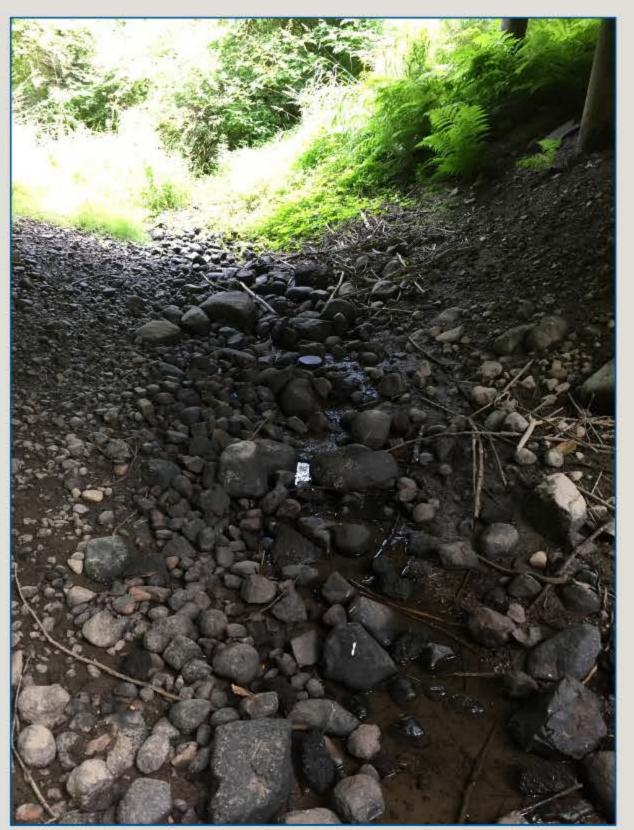
- 39 instances occurred at 13 sites
- 3 of these occurred in the fall at Swayne and Grandom at Laburnum

#### 30-day average Guideline

- 38 occurrences at 32 sites
- 6 of these occurred in the fall

Also below the fall instantaneous minimum DO

<b>EMS ID</b>	D Site Name	
E288091	Grandon Creek @ Laburnum Rd	
E308186	Swayne Creek d/s of Errington Rd	
E306256	Walley Ck d/s Hammond Bay	
E290478	Millstone River @ Biggs Rd	
E325371	Cat Stream d/s Wakesiah Ave	
E321395	Richards Creek 5m u/s Frames Rd	

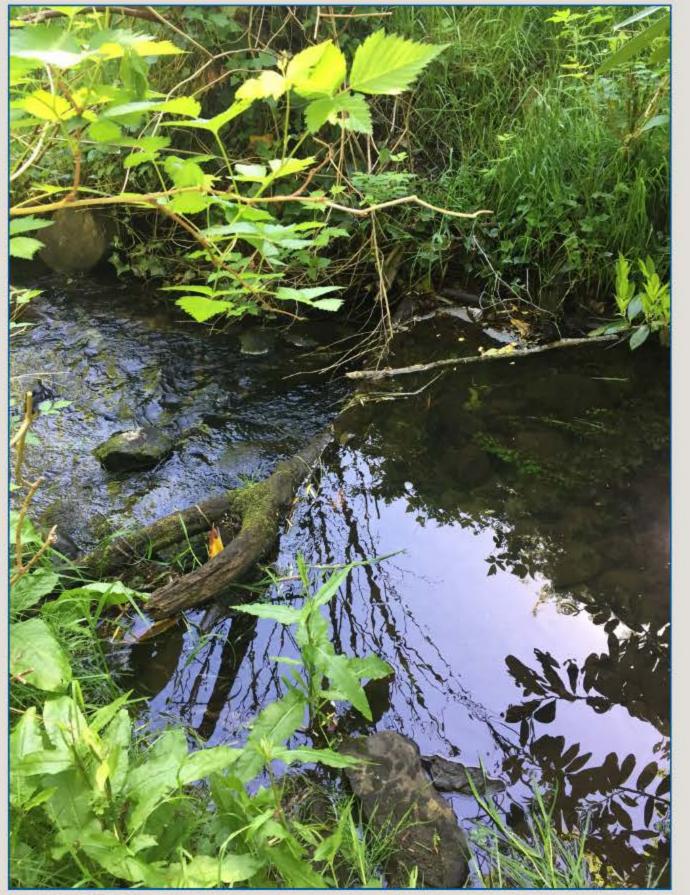


Swayne Creek

#### **DISSOLVED OXYGEN RESULTS**

As with 2022, all sites with levels below instantaneous Guideline were also below the 30-day average Guideline

- 52% of sites sampled met both DO Guidelines
- DO is correlated to water temperature, stream structure, amount of flow, and nutrient inputs
- Riffles and groundwater contribution to flow help maintain DO levels for aquatic life and stream health

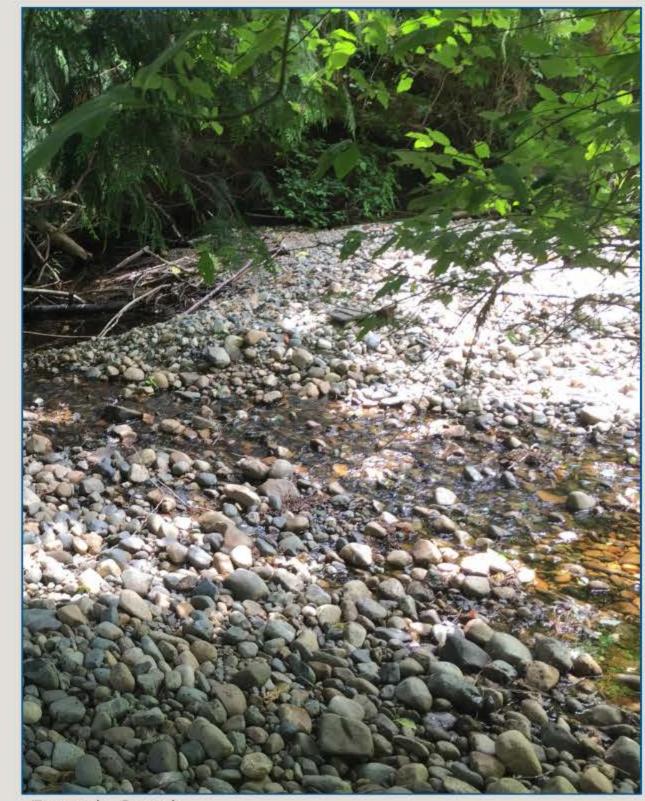


Beach Creek

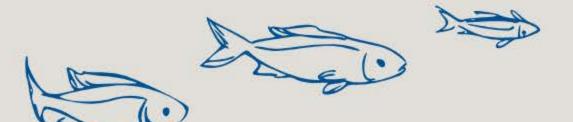
#### **DISSOLVED OXYGEN TRENDS**

For the three sites that underwent analysis, there were no significant trends in DO

Physical stream assessments, mapping adjacent land uses and potential inputs, and completing flow measurements will improve the understanding of why sites have DO levels below the Guidelines









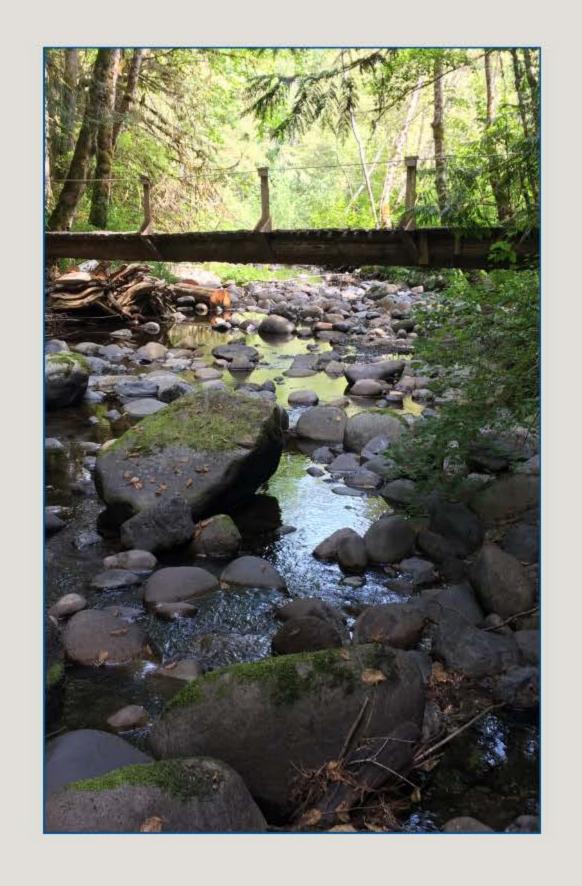


#### SPECIFIC CONDUCTIVITY

- Conductivity is the measure of the concentration, charge, and mobility of dissolved ions in water
- Specific conductance measures conductivity corrected to 25°C, standardizing readings across periods and sites
- Influenced by water temperature, turbidity, groundwater, evaporation, pollution, and other saline inputs (i.e., sea water, road density, agricultural run-off, etc.)

No provincial Guideline for this parameter

Adds context to other parameters when interpreting data



#### SPECIFIC CONDUCTIVITY TRENDS

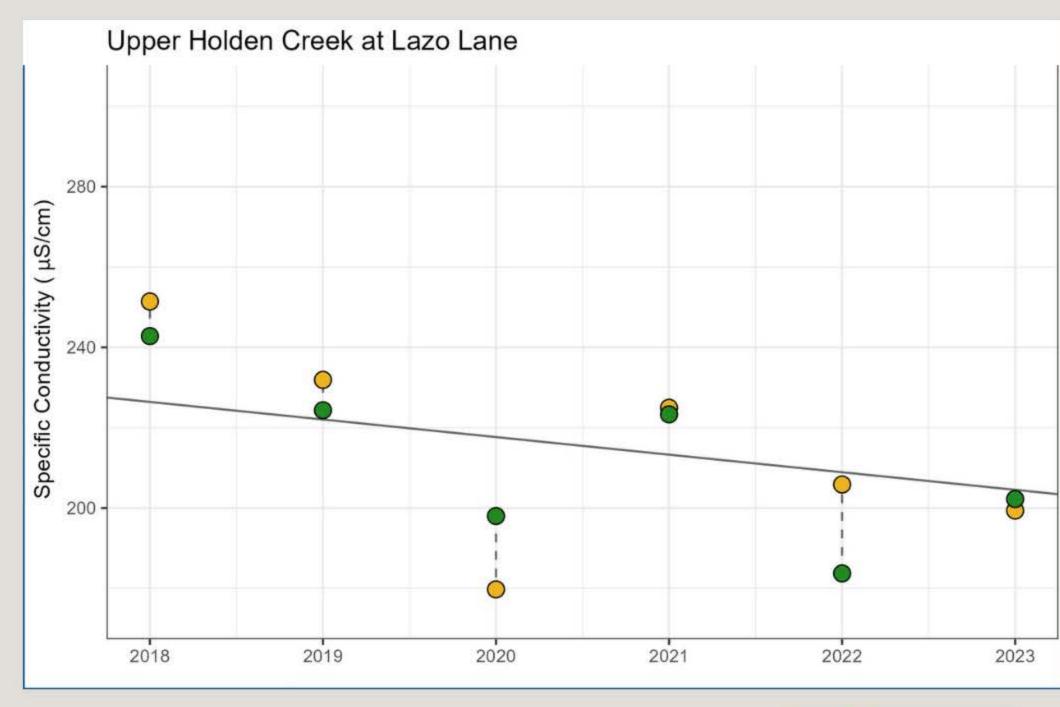
One of the three sites that underwent trend analysis has a declining statistically significant trend

### Trends in conductivity do not indicate improving or degrading water quality

 e.g., declining conductivity levels could be related to lower amounts of groundwater input or it could be related to less nutrient run-off

This parameter helps us to better understand the three parameters with Guidelines

As this site also had an increasing trend in turbidity, it is most likely not related to nutrient inputs





### COMMUNITY WATERSHED MONITORING NETWORK

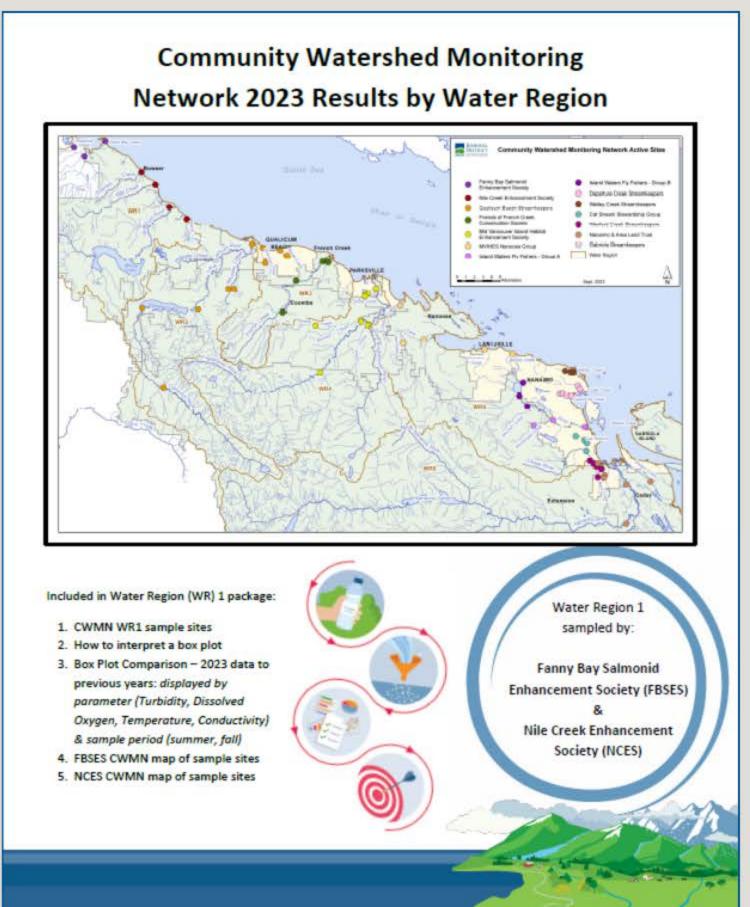
2023 ANALYSIS PER SITE

The analysis of CWMN data 2011 - 2023 is available in 8 Water Region (WR) handouts

- WR 1 Big Qualicum
- WR 2 Little Qualicum
- WR 3 French Creek
- WR 4 Englishman River
- WR 5-1 Nanoose to North Nanaimo
- WR 5-2 North Nanaimo to South Wellington
- WR 6 Nanaimo River
- WR 7 Gabriola, Mudge, and DeCourcy Islands

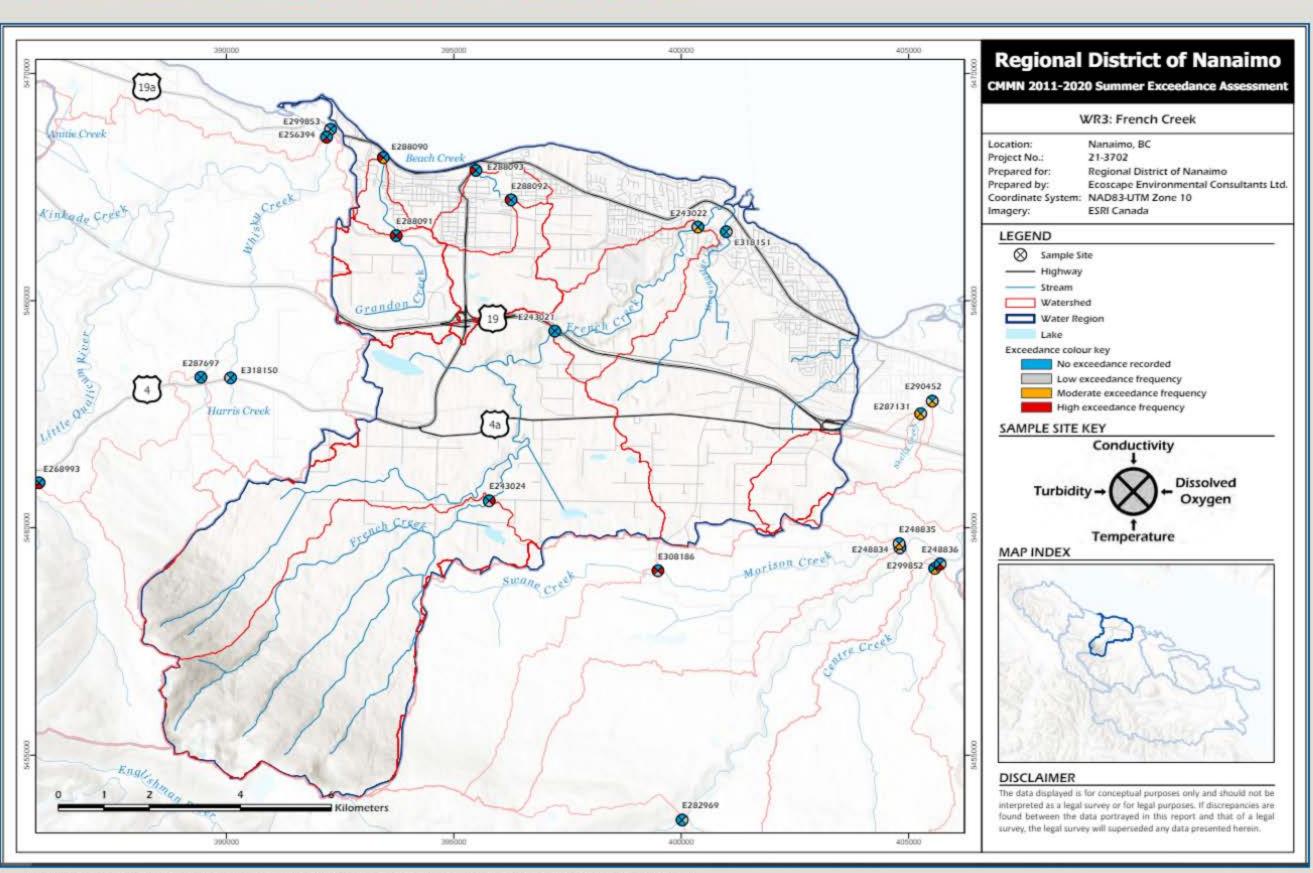
Handouts include sites sampled, updated box plots, and maps of the sample sites

Printed copies available today and will be posted online at www.rdn.bc.ca/cwmn



# COMMUNITY WATERSHED MONITORING NETWORK 2023 ADDITIONAL SPATIAL ANALYSIS

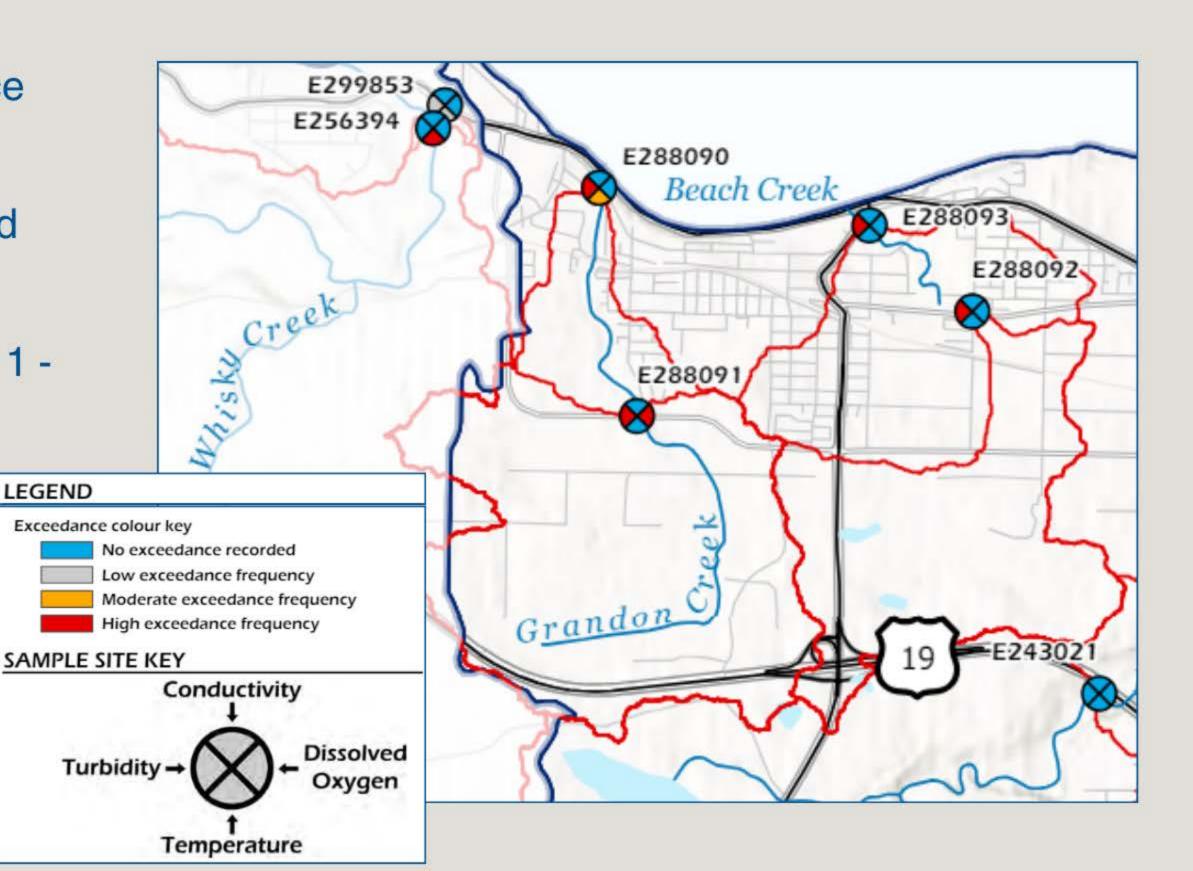
- In progress....
- Update of 2021 exceedance maps to include data 2011 - 2023
- Topographic basin delineations for each site
- Water quality parameters by crosshairs location



2021 exceedance map created by Ecoscape Environmental Consulting

# COMMUNITY WATERSHED MONITORING NETWORK 2023 ADDITIONAL SPATIAL ANALYSIS

- Colours represent exceedance category
- Map for each water region and sample period
- Update in 2024 to display 2011 -2023 data
- Basins will incorporate stormwater data layers
- Maps will be available online
- Basin delineations will be added to the RDN Map



#### DATA TO ACTION

- Action occurs at all levels including streamkeepers, environmental stewards, private industry, local and senior government, and First Nations
- Ensuring data is publicly available promotes collaboration and transparency for the common goal of promoting watershed health
- Funding is required to support actions, as is organization support and coordination across jurisdictions
- Sharing via annual results session for all participants every summer
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- There have been over 30 projects supported across the region since 2016

#### Watershed Stewardship Network

See more about our volunteers that monitor, restore and steward freshwater habitat region wide

**Get Involved** 



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- Reports library on DWWP webpage
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rdn.bc.ca/stewardship-seed-funding rdn.bc.ca/tool-lending-library rdn.bc.ca/watermap rdn.bc.ca/riparian-analysis-map rdn.bc.ca/dwwp-reports rdn.bc.ca/rdn-rebates

#### 2024 SURFACE WATER QULAITY MONITORING

Sampling will continue in 2024 following the same protocol and methodologies as previous years - sampling for turbidity, water temperature, DO, and conductivity



#### New in 2024

- pH testers will be added to the measured water quality parameters, training on these will be included in the annual July training session
- Beaufort Watershed Stewards will join the CWMN



#### 2024 SURFACE WATER QULAITY MONITORING

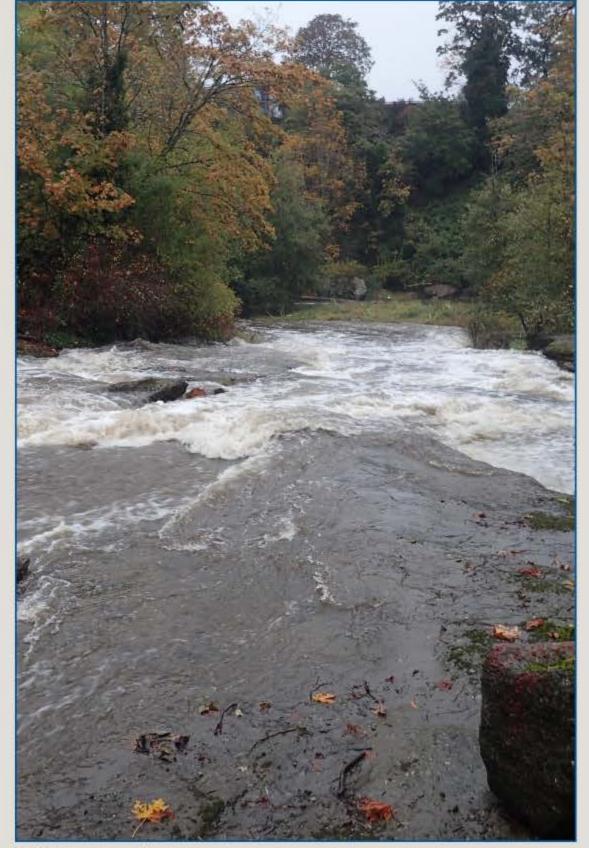
#### TRAINING SESSIONS

To ensure consistent sampling protocols and methodologies, five annual training sessions will be hosted by the RDN before monitoring commences

Training sessions are mandatory for everyone using the water quality monitoring equipment

- Thurs, July 25 from 1 to 3:30 pm in Nanaimo
- Fri, July 26 from 10 am to 12:30 pm at French Creek
- Mon, July 29 from 1 pm to 3:30 pm at Nile Creek
- Tues, July 30 from 10 am to 12:30 pm at French Creek
- Wed, July 31 from 10 am to 12:30 pm in Nanaimo

RSVP which training session you will be attending to Ifegan@rdn.bc.ca



Millstone River

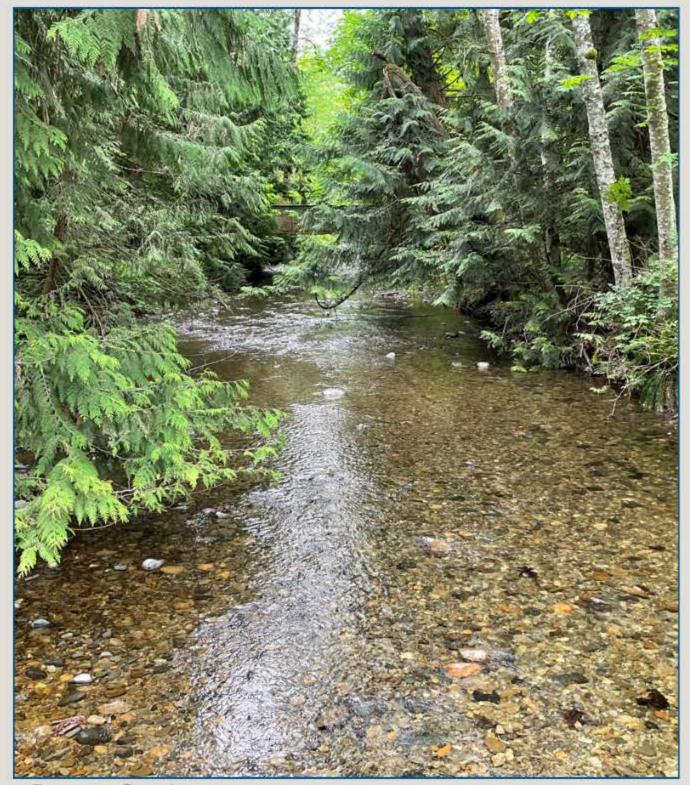
#### 2024 SURFACE WATER QULAITY MONITORING

#### SUMMER SAMPLE DATES

The summer low flow monitoring dates will be on Tuesdays between 8:00 am and 2:00 pm

- Week 1 Aug. 6
- Week 2 Aug. 13
- Week 3 Aug. 20
- Week 4 Aug. 27
- Week 5 Sept. 3

The fall sample dates will depend on when the first fall flush occurs, this is usually in October around the first or second Tuesday, with sampling continuing into November



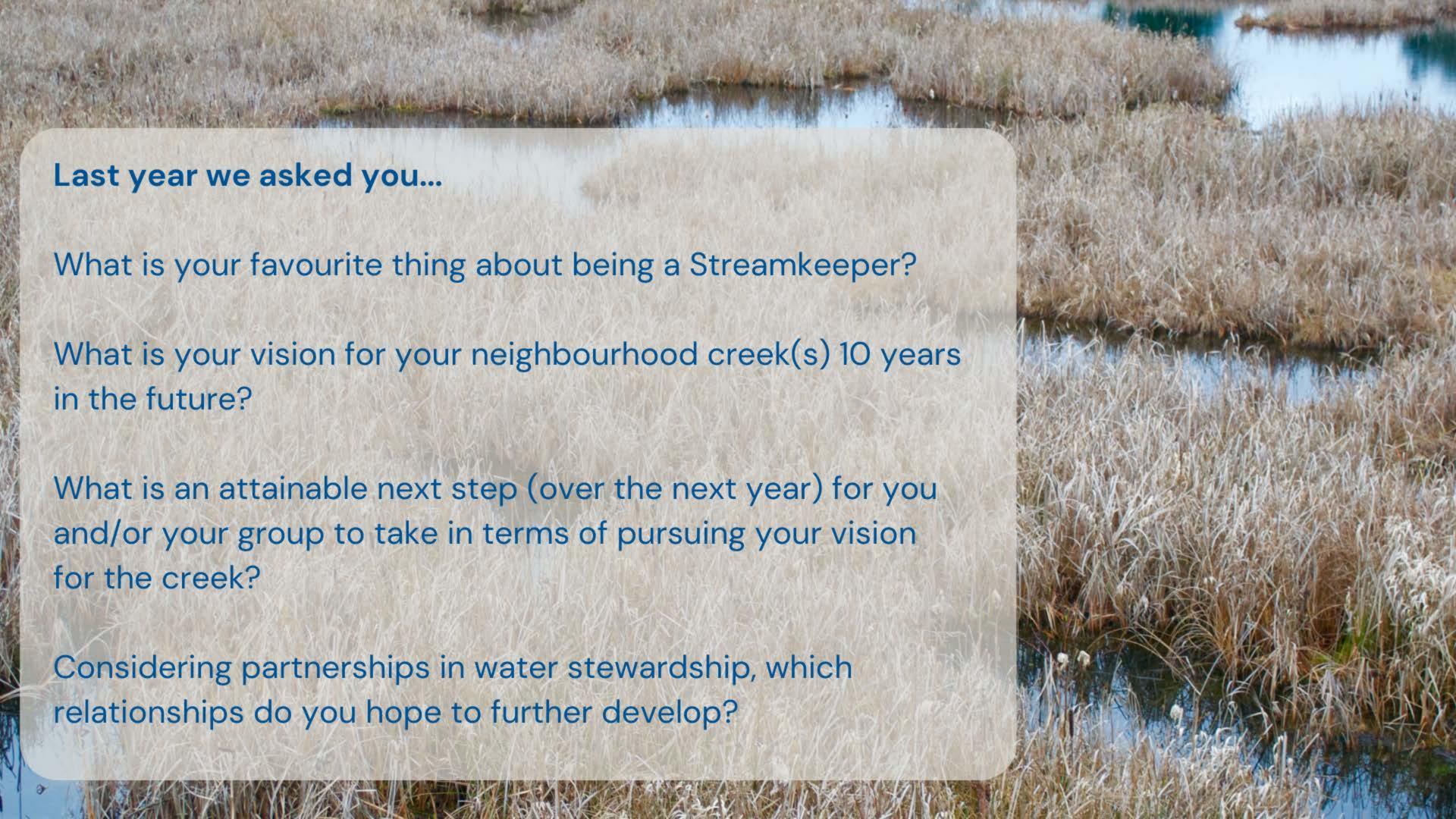
Benson Creek

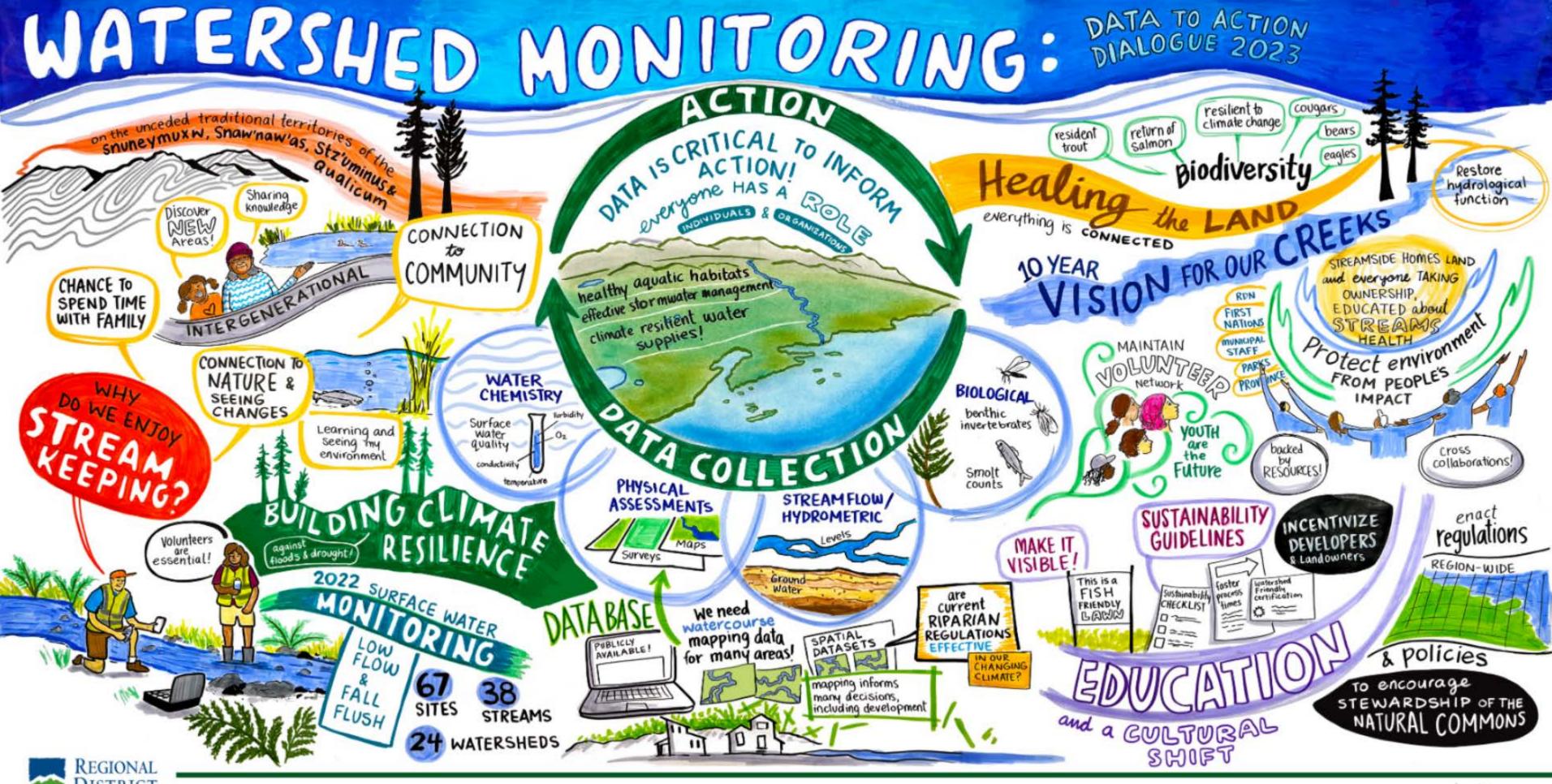
# **THANK YOU**











#### COMMUNITY WATERSHED MONITORING NETWORK

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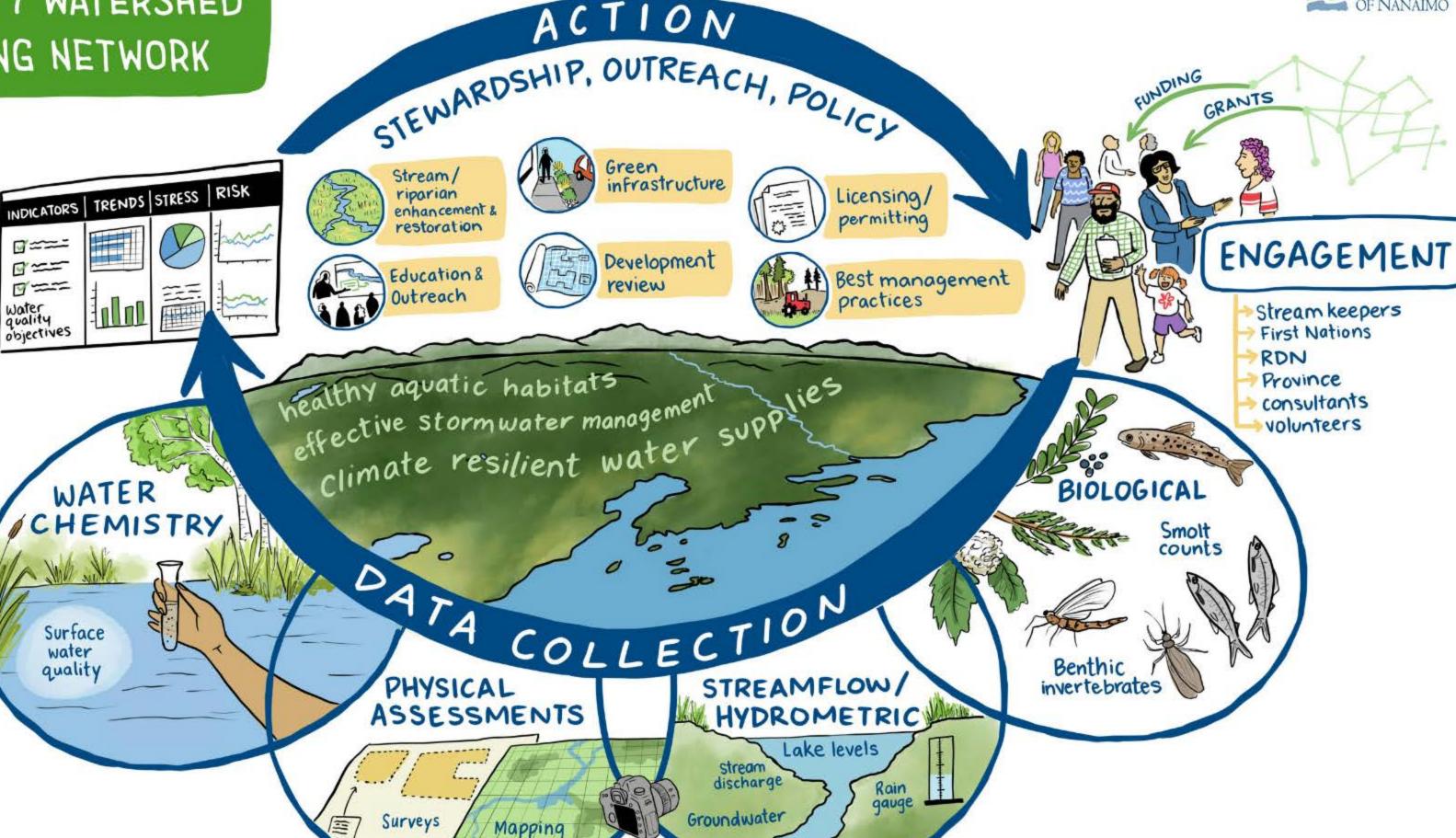
Water quality objectives

Surface water

quality

REPORTING





INFOGRAPHIC: thefuselight.com

## COMMUNITY WATERSHED MONITORING NETWORK WHAT ARE WE MONITORING?

- Surface water quality
- Hydrometric
- Lake Levels
- Lake Water Quality
- Groundwater Levels
- Groundwater Quality
- Assessments / Mapping
- Biological Monitoring
- Wetlands
- Snowpack

#### Each monitoring initiative:

- relies on strong partnerships
- operates on specific spatial and temporal scales
- requires planning, prioritization, and capacity to succeed

### COMMUNITY WATERSHED MONITORING NETWORK STRATEGIC PLANNING

#### Purpose:

To review the RDN Community Watershed Monitoring Network and refresh its strategic direction for the next 5 years, based on past learnings, current momentum, and related priorities.

As stated within the DWWP Action Plan, the vision for the network is not to be limited to surface water quality only, but to extend the concept to all water monitoring in the region's watersheds that involves the RDN and community partners.

### COMMUNITY WATERSHED MONITORING NETWORK STRATEGIC PLAN - WHAT WOULD IT INCLUDE?

- What is being done: An inventory of what monitoring / stewardship is being done (or has been done) per group in which systems
- What has been found so far:
  - Summary of what monitoring findings point towards, what issues need to be addressed, determine what is outside of the scope of the network
  - Recommendations on what should continue / where to focus next
- What are possible next steps: Detailed and implementable next steps
  - A roadmap of how implementation occurs
  - General timelines
  - o Identification of leadership, resources, partners, etc.
- Map out a framework for implementation
  - produce clear direction for CWMN Strategy for DWWP staff work planning and an approach for the next 5+ year horizon

Developed through engagement with stewards & partners

## COMMUNITY WATERSHED MONITORING NETWORK STRATEGIC PLAN – WHAT WOULD IT INCLUDE?

CWMN Strategic Plan will include a framework to help direct implementation of recommendations in different spheres of monitoring. i.e. would ideally provide a clear path for volunteers on implementing recommendations that arise from monitoring and how DWWP / other partners can provide support

- Target recommendations to groups, over a multi-year timeframe
- Clarify RDN roles / Partner roles / Stewardship group roles in the various monitoring 'nodes'.
- Have short-mid-long term actions.
- Include a resource analysis both for funding and staff capacity
- Alignment with other DWWP Action Plan goals and objectives (ie. education / policy)

## COMMUNITY WATERSHED MONITORING NETWORK STRATEGIC PLANNING - PROPOSED APPROACH

Share the concept across the network in 2024; pause the surface water quality sampling in 2025 to roll out the strategic planning process

- Internal planning 2024 ongoing to refine this concept "planning for the planning"
- Engage with stewards and partners July results session (share concept & initial feedback) and at November appreciation event (iterative engagement, building on previous feedback)
- Implement Strategic Planning efforts in 2025 across the network;
  - Temporary DWWP staff to collect data at stations that need additional years;
  - Stewards will be engaged in strategic planning
- At 2026 results session, present the CWMN Strategic Plan
- Relaunch! 2026 monitoring resumes with Strategic Plan recommendations implemented

COMMUNITY WATERSHED MONITORING NETWORK

STRATEGIC PLANNING - FEEDBACK

#### We want to hear from you!

Co-Creating a Strategic Plan

Monitoring Priorities

Key Goals for the Plan

Resource Allocation and Partnerships

Making Room for Strategic Planning



### COMMUNITY WATERSHED MONITORING NETWORK STRATEGIC PLANNING - NEXT STEPS



- Initial feedback compilation and analysis sharing with stewardship partners
- Refine approach as needed, report back and gather input again in November



- Data analysis and spring streamside workshops / focus groups
- Drafting the strategic plan components



- Review and iteration with partners
- Implementation with adaptive approach

