

The Community Watershed Monitoring Network - Results Session

Looking back at 2019; Looking forward in 2020

Overview &
Introduction

2019 Data

Stewardship
Support

CWMN
2020

Discussion

Presented by
Julie Pisani, DWWP Program Coordinator &
Lauren Fegan, Monitoring Network Coordinator
Webinar June 18, 2020

First, some context...

why

RDN's
DWWP
Program

how

CWMN
Background

Partnerships

who

Monitoring
Sites

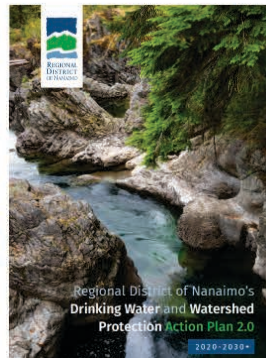
Guidelines &
Objectives

where

WQ
Parameters

what





Drinking Water & Watershed Protection Program

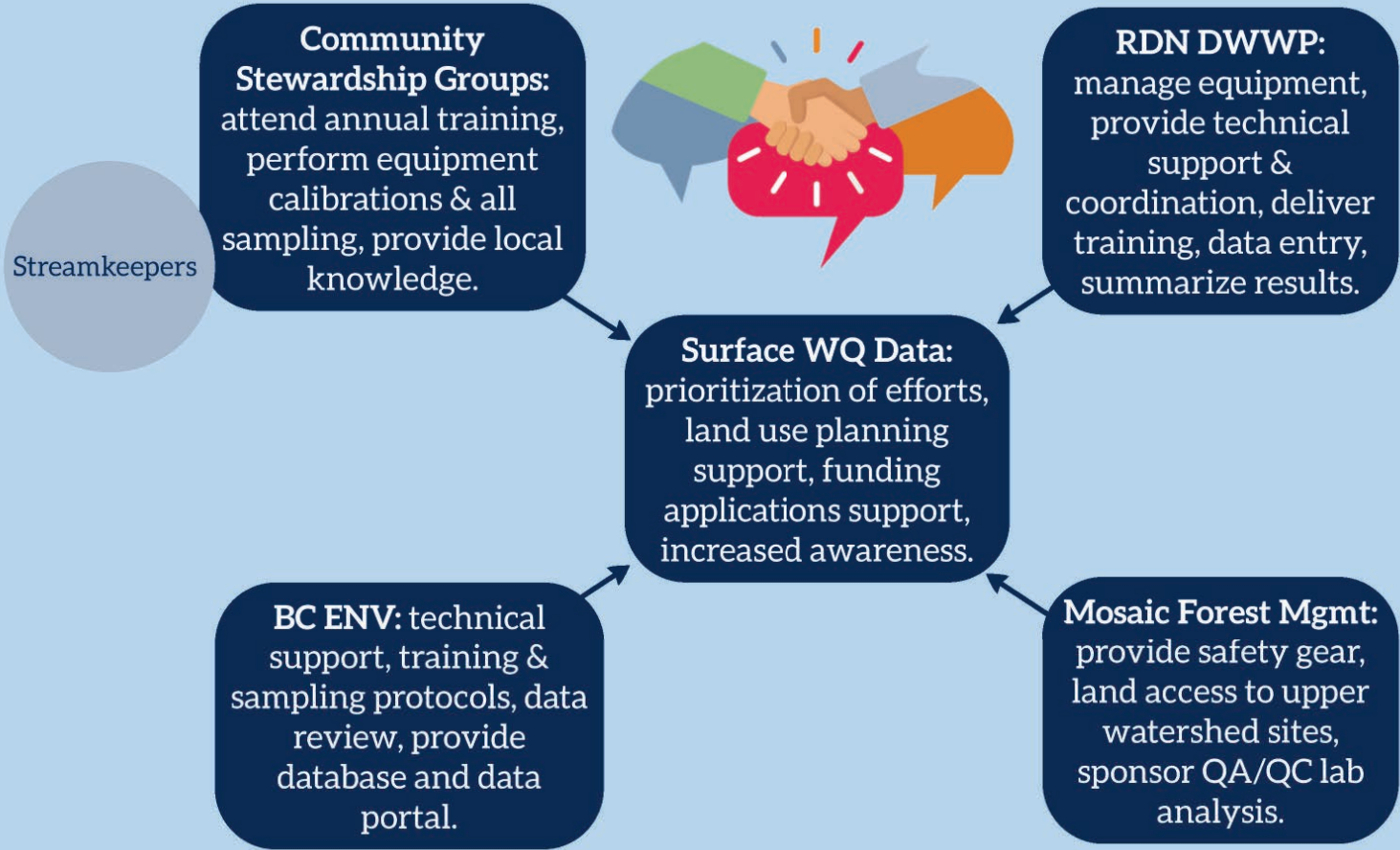
- Parcel tax funded regional program established in 2008, implemented in 2009.
- Delivers science, education, and planning initiatives focused on water sustainability in the RDN.
- DWWP Action Plan Updated in 2020 for the next decade & beyond.



Community Watershed Monitoring Network

- Started with shared goal to increase knowledge and understanding of surface water quality in the region.
- Monitoring program designed with provincial protocols and methodologies began in 2011.
- Partnership between Ministry of Environment & Climate Change Strategy (ENV), RDN, Streamkeepers, private forestry.
- Streams sampled during 2 seasonal periods (summer low flow & fall flush), 5 consecutive weeks each.
- Sites chosen to fill data gaps in provincial monitoring networks, based on local knowledge of Streamkeepers.
- All data entered and stored in publicly accessible, provincially managed database - Environmental Monitoring System (EMS).

Partners



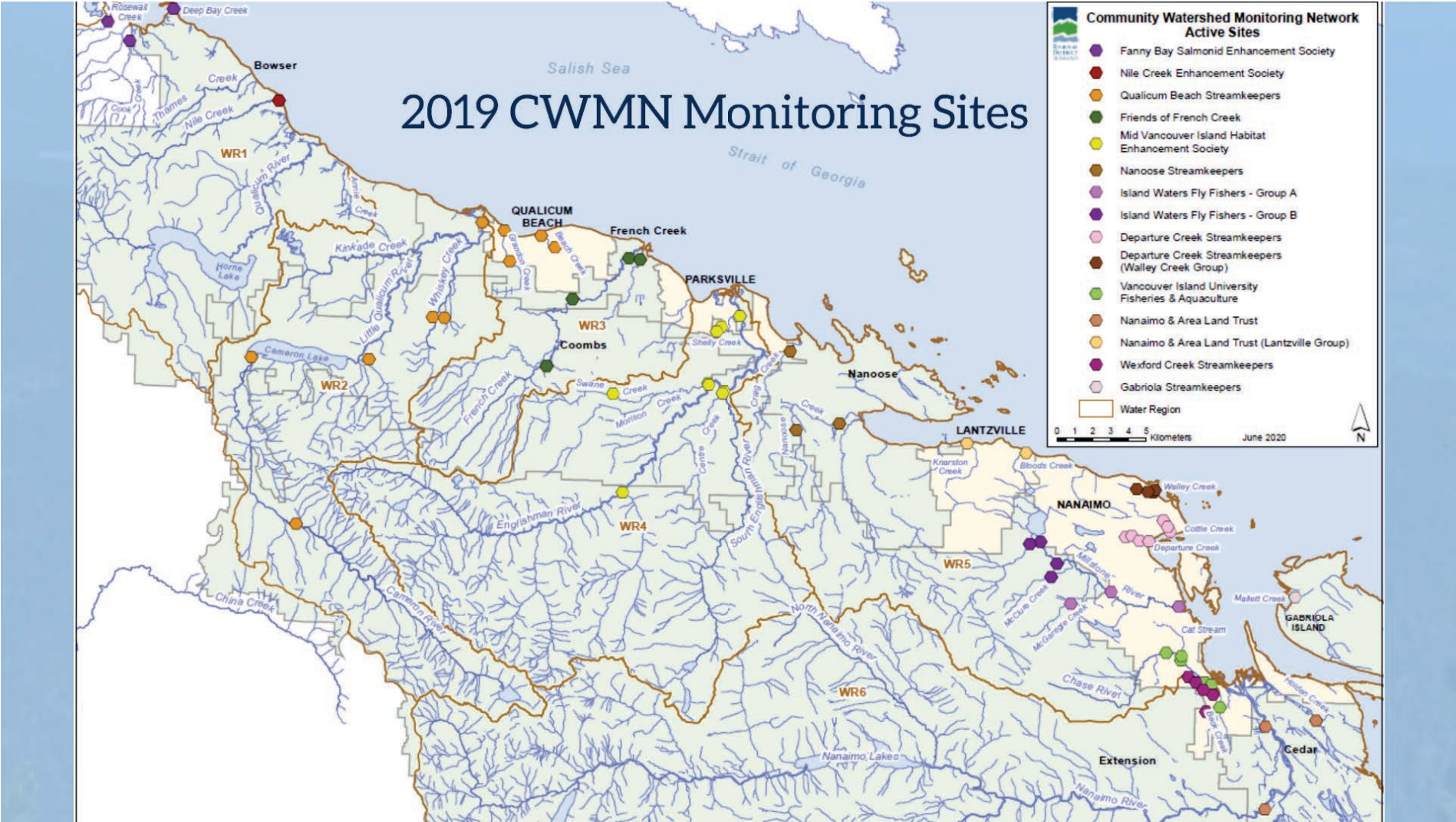
Community Stewardship Groups



- Departure Creek Streamkeepers (DCS)
- Fanny Bay Salmonid Enhancement Society (FBSES)
- Friends of French Creek Conservation Society (FFCCS)
- Gabriola Streamkeepers (Gsk)
- Island Waters Fly Fishers (IWFF - 2 groups)
- Lantzville Streamkeepers (LS)
- Nanoose Streamkeepers Society (NSS)
- Nanaimo and Area Land Trust (NALT)
- Nile Creek Enhancement Society (NCES)
- Mid Vancouver Island Habitat Enhancement Society (MVIHES)
- Qualicum Beach Streamkeepers (QBS)
- Walley Creek Streamkeepers (WCS)
- Wexford Creek Streamkeepers (WxCS)
- Vancouver Island University Research Lab (VIU)

Thank you!

2019 CWMN Monitoring Sites



Water Quality Monitoring Parameters



- **Water Temperature**
 - Affects processes in water and in aquatic life.
- **Dissolved Oxygen**
 - Supports aquatic life.
 - Lower when flows are lower.
- **Specific Conductivity**
 - Ability to conduct electrical current.
 - Higher when more dissolved minerals, higher turbidity or less dilution.
- **Turbidity**
 - Particles in water linked to higher levels of contaminants.
 - Quality assurance-quality control (QA/QC) lab analysis.

Objectives & Guidelines



Water Quality Objective (WQO)

- Developed by the Province for specific water bodies.
- To manage protect specific water uses in that watershed.
- i.e. Englishman River Aesthetic Water Temperature Objective $\leq 15^{\circ}\text{C}$.

Water Quality Guideline (WQG)

- Developed by the Province for B.C.'s aquatic resources and the protection of aquatic life, wildlife, agriculture, drinking water sources, and recreation.
- To assess and manage the health, safety and sustainability of freshwater.
- i.e. Coho Rearing Water Temperature Guideline $\leq 17^{\circ}\text{C}$

CWMN Data

- Sites with data exceeding WQO's & WQG's flagged for further investigation - physical stream assessments, lab analysis, etc.
- Regular reporting of results publicly available: www.rdn.bc.ca/cwmn
 - Annual reports/summaries since 2011.
 - Milestone reports:
 - 3 year trend reports (2013, 2014, 2015).
 - 7 year trend report (2018).



2019 CWMN Data

- 65 surface water quality sites were sampled on 41 streams.
- 8 new sites added:
 - in Water Regions 2, 3, 5 & 6.
- Implemented recommended actions from 2018 Trend Report.

Box
Plots

Climate
Data

Water
Temperature

Dissolved
Oxygen

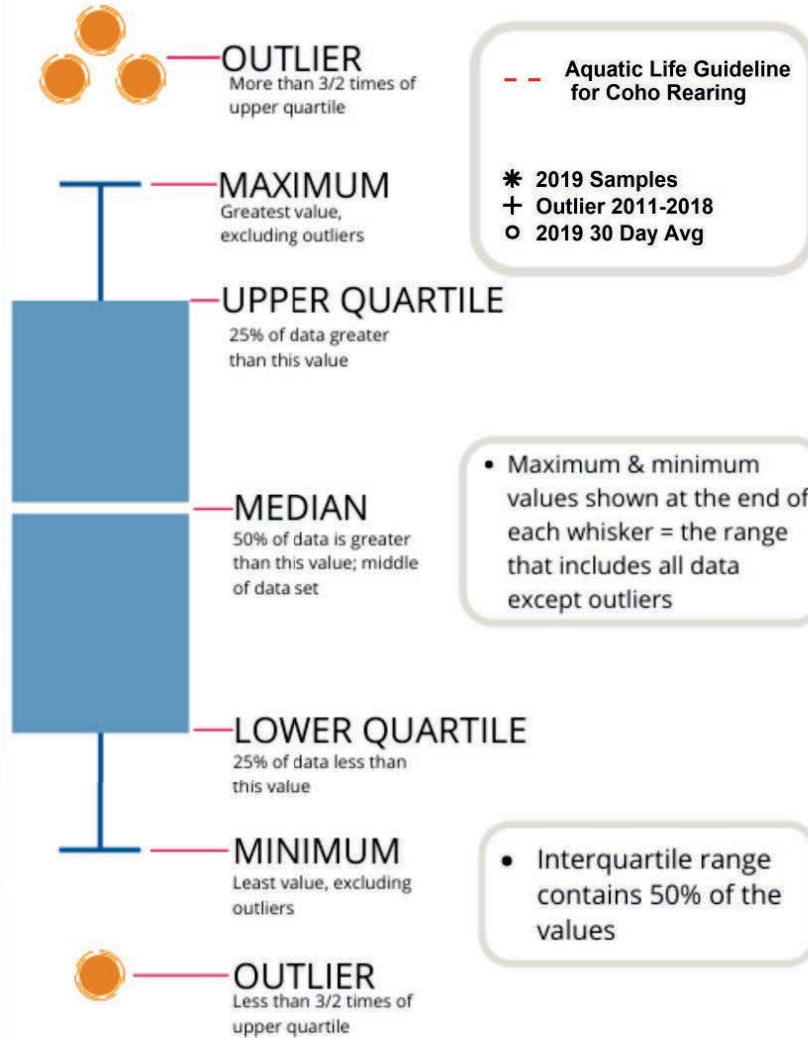
Specific
Conductivity

Turbidity

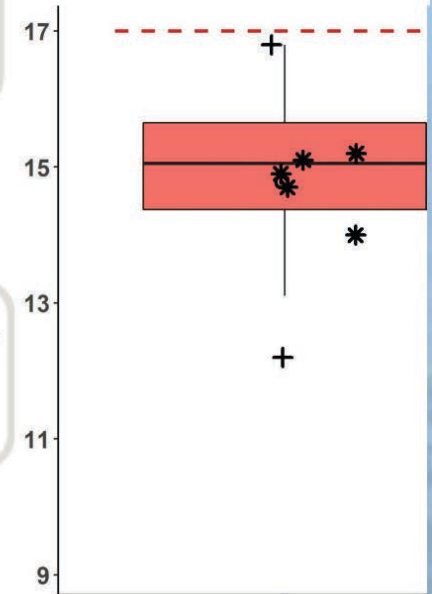
Lab Analysis

Analysis of
Trends

How to Interpret a Box Plot

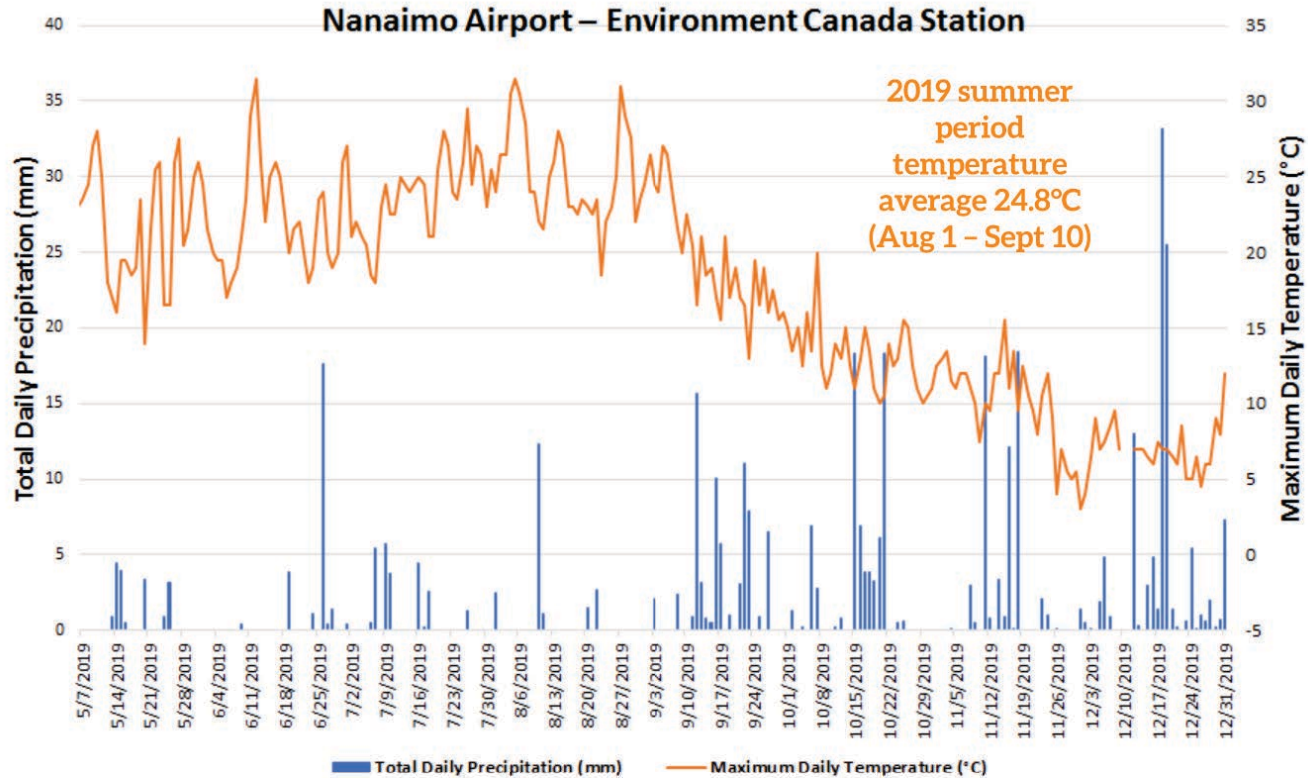


Temperature Example:



ROSEWALL CREEK AT
ROSEWALL CREEK PARK

SOUTH




Summer Maximum Temperature Averages:
 2016* - 26°C
 2017 - 26.9°C
 2018 - 25.8°C
*only 16 dates with temperature data.

2014 rainfall:
 22.6 mm Summer (Aug 1 - Sept 10)
 282.2 mm Fall (Oct 1 - Nov 12)

2015 rainfall:
 22.1 mm Summer (Aug 1 - Sept 1)
 116.7 mm Fall (Oct 1 - Nov 11)

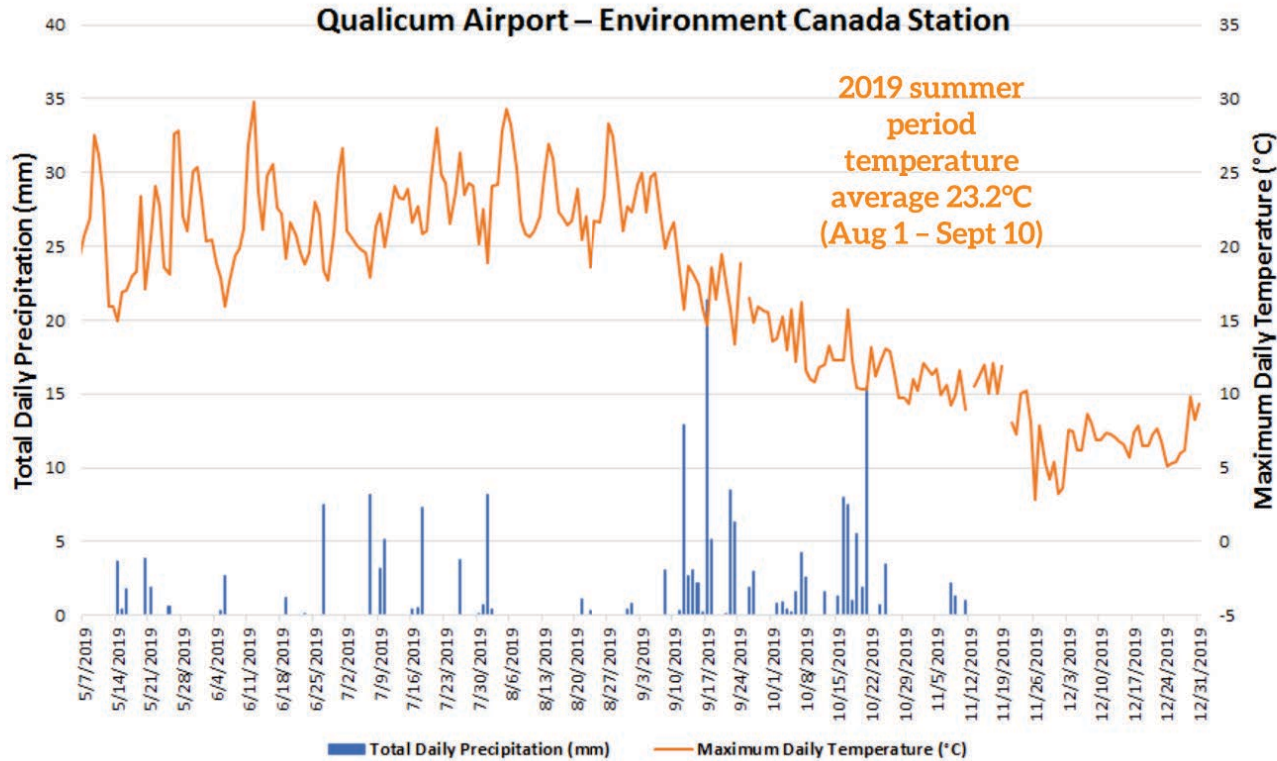
2016 rainfall:
 23.4 mm Summer (Aug 1 - Aug 31)
 379.2 mm Fall (Oct 1 - Nov 8)

2017 rainfall:
 3 mm Summer (Aug 1 - Aug 31)
 336.4 mm Fall (Oct 1 - Nov 21)

2018 rainfall:
 3 mm Summer (Aug 1 - Aug 31)
 109.1 mm Fall (Oct 1 - Nov 6)

2019 rainfall:
 24.6 mm Summer (Aug 1 - Sept 10)
 141.4 mm Fall (Sept 11 - Nov 5)

NORTH




Summer Maximum Temperature Averages:
 2016 - 24.2°C
 2017 - 25.3°C
 2018 - 24.7°C

2014 rainfall:
 29.4 mm Summer (Aug 1 - Sept 10)
 187.5 mm Fall (Oct 1 - Nov 12)

2015 rainfall:
 24.0 mm Summer (Aug 1 - Sept 1)
 82.3 mm Fall (Oct 1 - Nov 11)

2016 rainfall:
 15.7 mm Summer (Aug 1 - Aug 31)
 252.2 mm Fall (Oct 1 - Nov 8)

2017 rainfall:
 3.5 mm Summer (Aug 1 - Aug 31)
 257.2 mm Fall (Oct 1 - Nov 21)

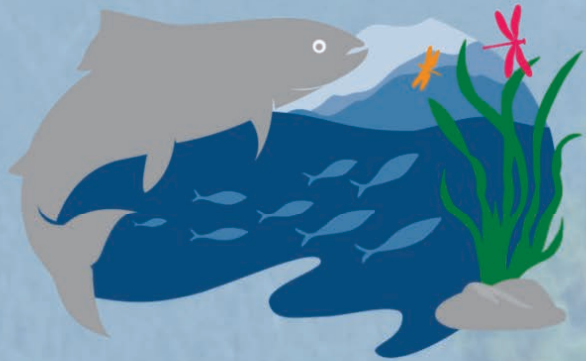
2018 rainfall:
 0.8 mm Summer (Aug 1 - Aug 31)
 53 mm Fall (Oct 1 - Nov 6)

2019 rainfall:
 14.3 mm Summer (Aug 1 - Sept 10)
 125.0 mm Fall (Sept 11 - Nov 5)

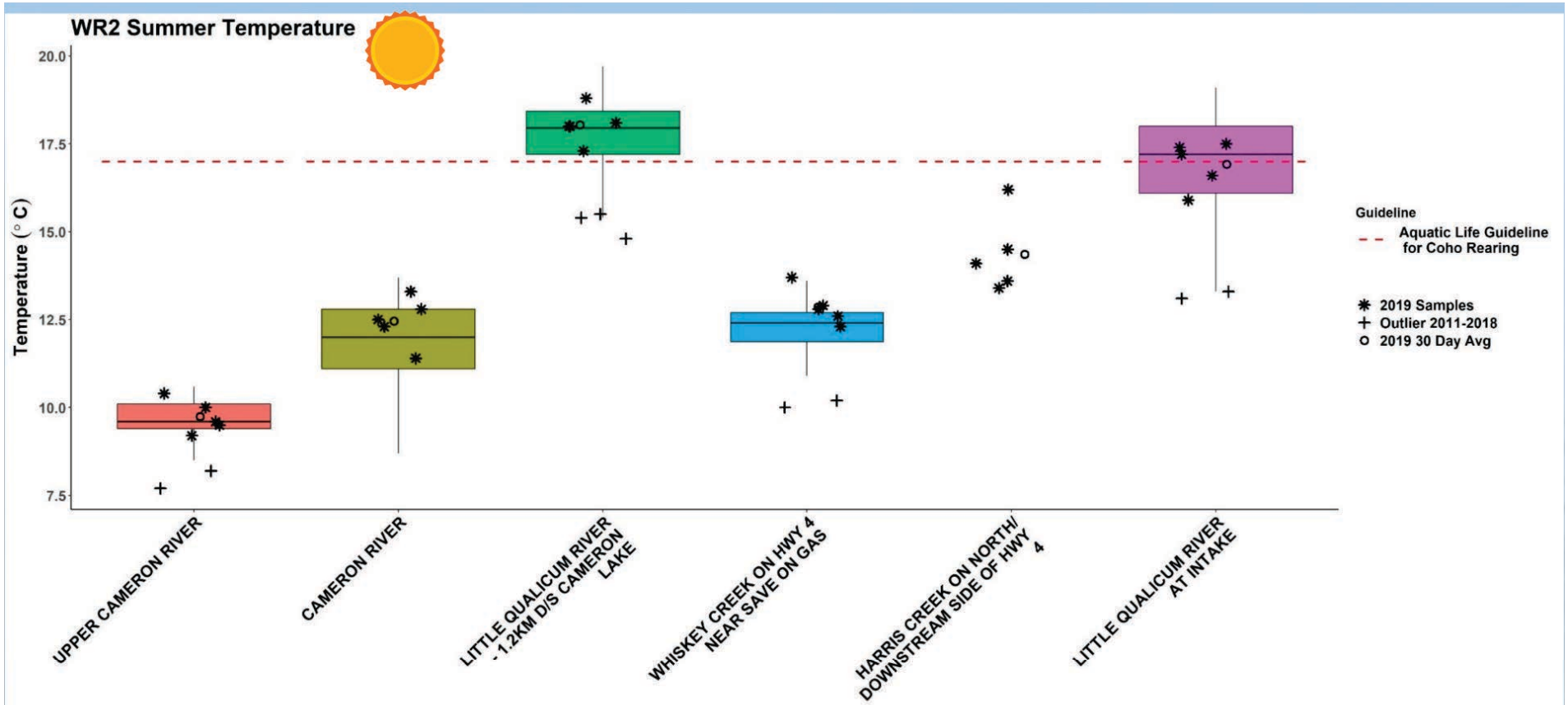
Water Temperature



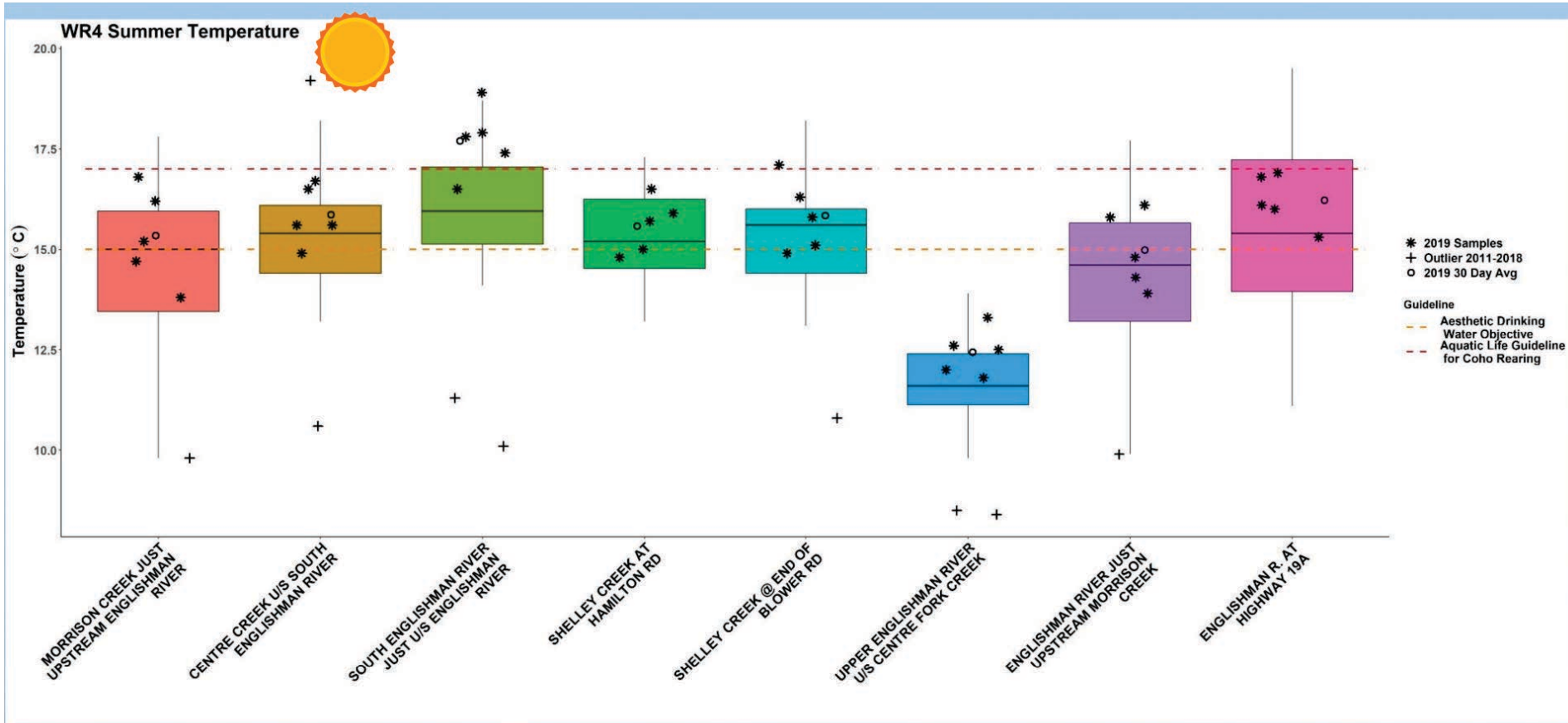
- Temperature (temp) WQO: Englishman River aesthetic drinking water objective (weekly average $\leq 15^{\circ}\text{C}$)
- Temp WQG: Aquatic life guideline for Coho rearing (weekly average $\leq 17^{\circ}\text{C}$)



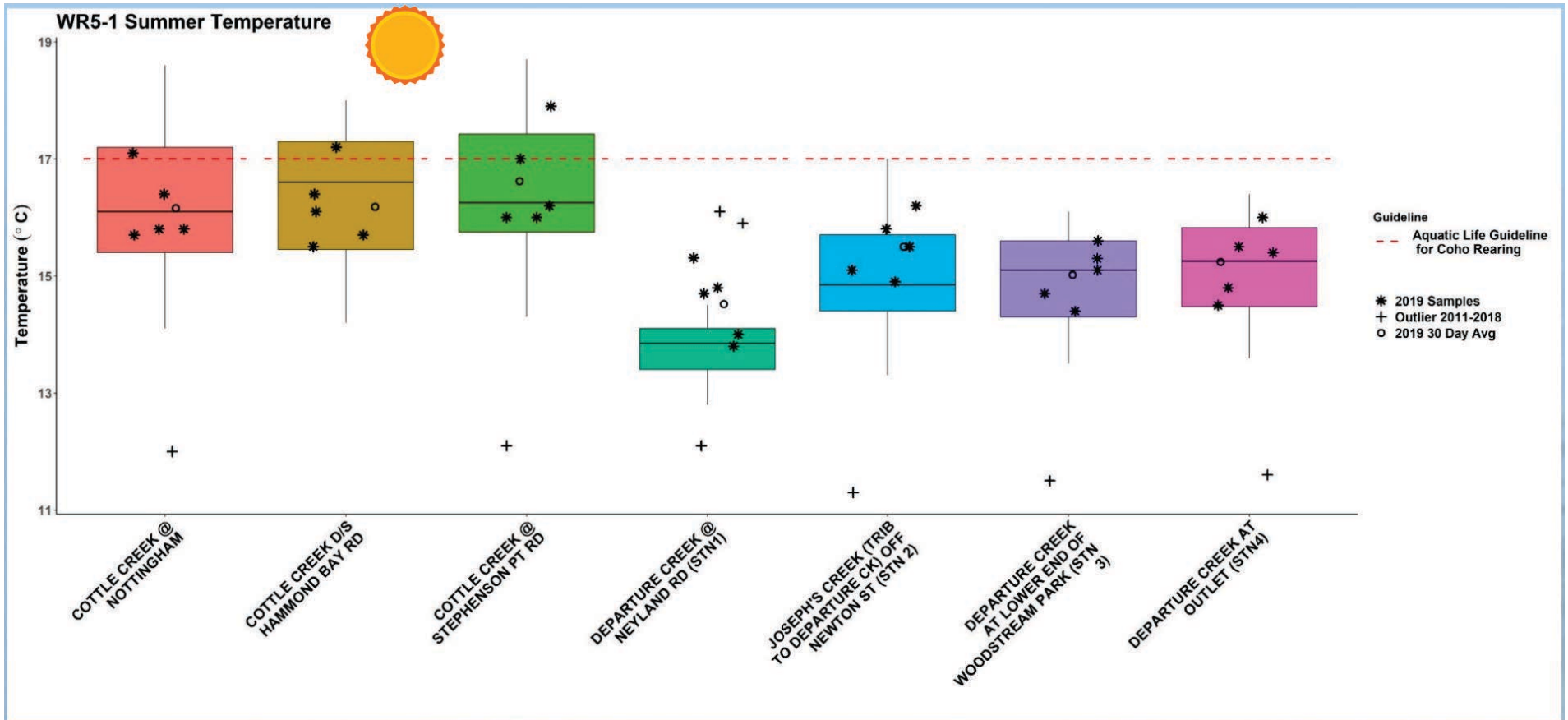
- Affects metabolic rates of aquatic organisms.
- Can alter physical and chemical properties of water (i.e. dissolved oxygen, pH, conductivity).
- Influenced by air temperature, stream exposure (canopy cover, riparian vegetation), hydraulic connectivity (groundwater - surface water interaction), stream flow and physical attributes.



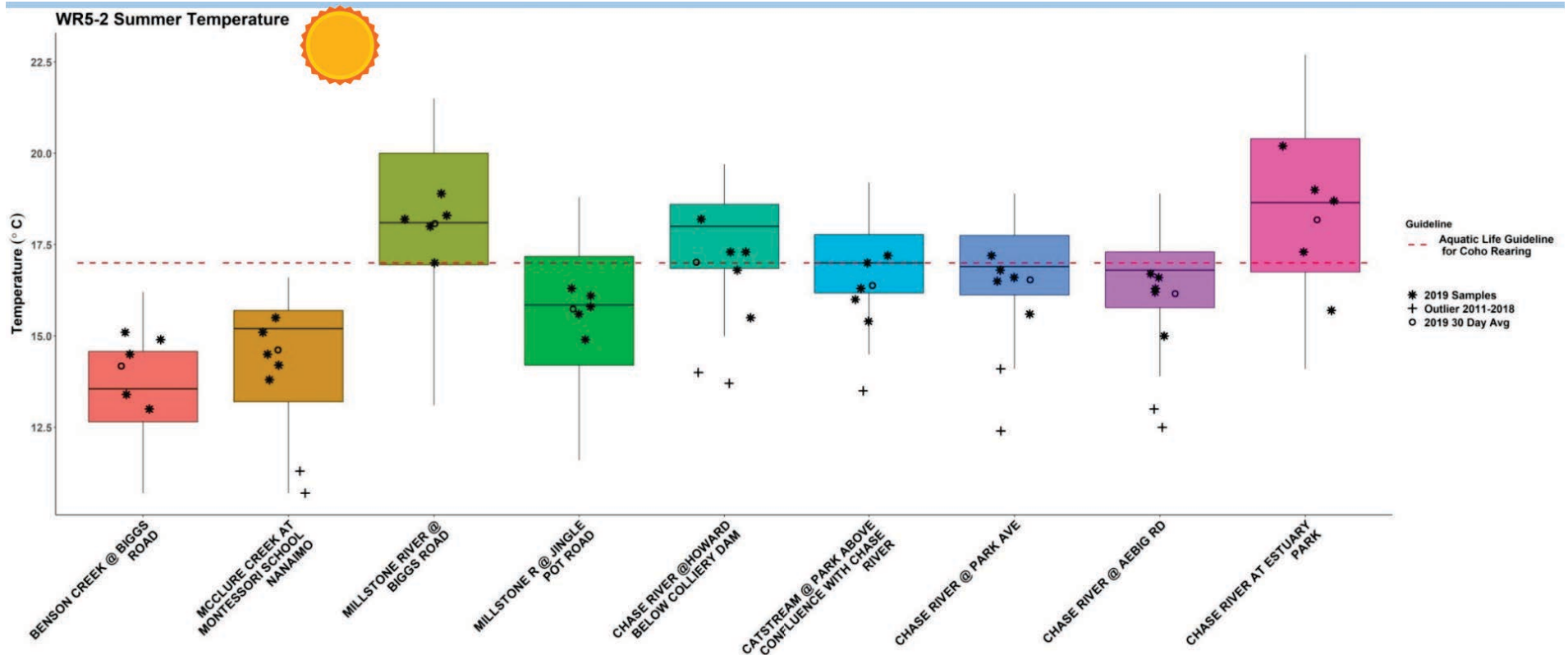
- Both sites with exceedances are within normal range for those sites.
- As long as there are cooler pools (i.e., groundwater), refuges remain for juvenile salmon.



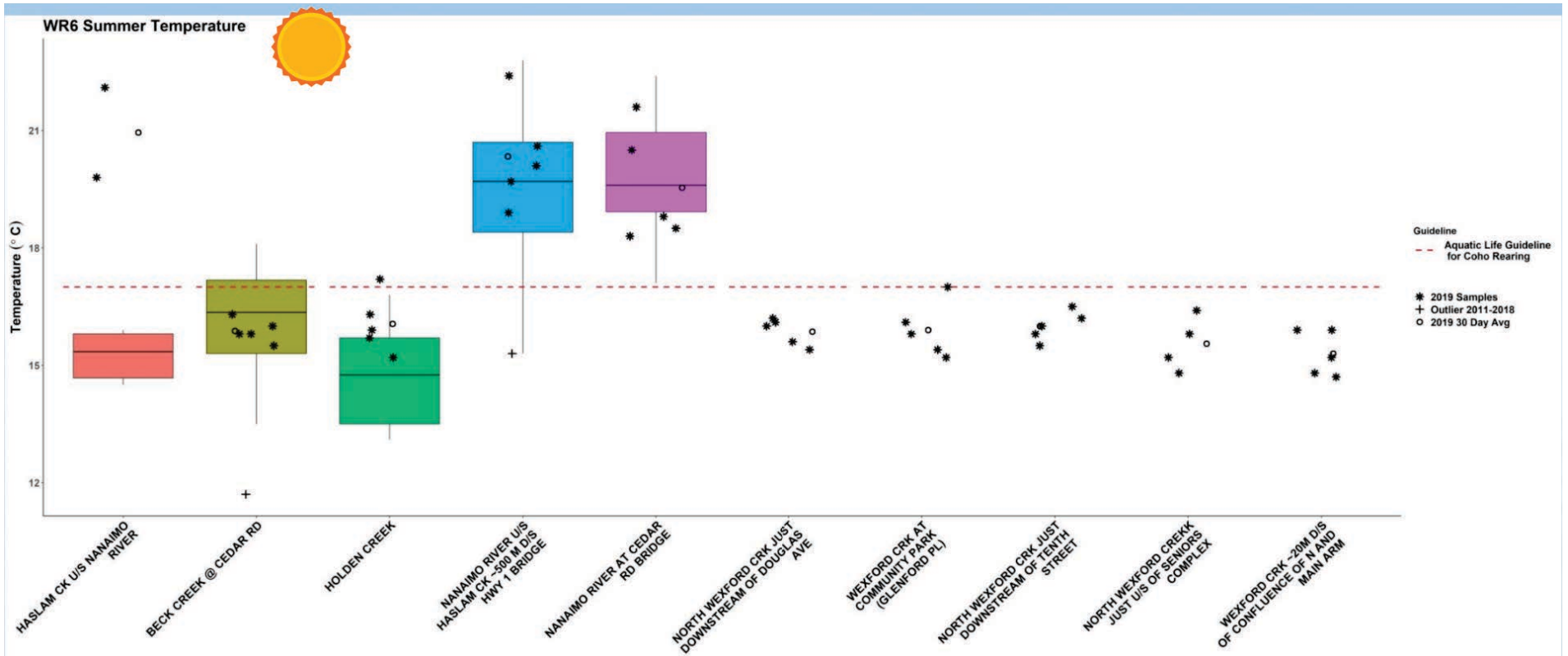
- Englishman River **aesthetic WQO** for drinking water exceeded at nearly all sites.
- Physical attributes of sites (i.e., Ferguson Swamp) key factor in **WQG** exceedances.



• Exceedances in Cottle Creek potentially due to lower flows (water heats up faster), source difference (lake vs. spring fed), and/or higher exposure to sun than it's neighbour Departure Creek.



- Generally, urbanized streams tend to have higher temperature averages.
- Physical stream assessments have led to a better understanding of temperature exceedances (i.e., water bodies u/s, riparian vegetation).



- Haslam Creek average based on 2011 - 2013 data, not monitored 2014 onwards.
- Some sites may be naturally cooler - more groundwater contribution.
- Sites introduced in 2019 - no box plot.

Temperature WQG

- Exceedances of temp WQG common in lower reaches.
- As long as cooler refuges remain juvenile salmon can withstand temp exceedances.

Aquatic Life Guideline for Coho Rearing Potential to Exceed in:

Cat Stream	Millstone River
Chase River	Nanaimo River
Cottle Creek	Shelley Creek
Haslam Creek	South Englishman River
Holden Creek	Walley Creek
Little Qualicum River	Wexford Creek

Temp WQG Percentage of Exceedances per Year:

2014	29.2%	<ul style="list-style-type: none"> • During 2019 sampling, weather was cooler and experienced more rainfall than in previous years. • Sites with subsurface flows were not included.
2015	22.7%	
2016	21.2%	
2017	28.4%	
2018	18.7%	
2019	15.9%	



Addressing temp exceedances:

- Riparian enhancement & restoration.
- Groundwater conservation programs & actions.

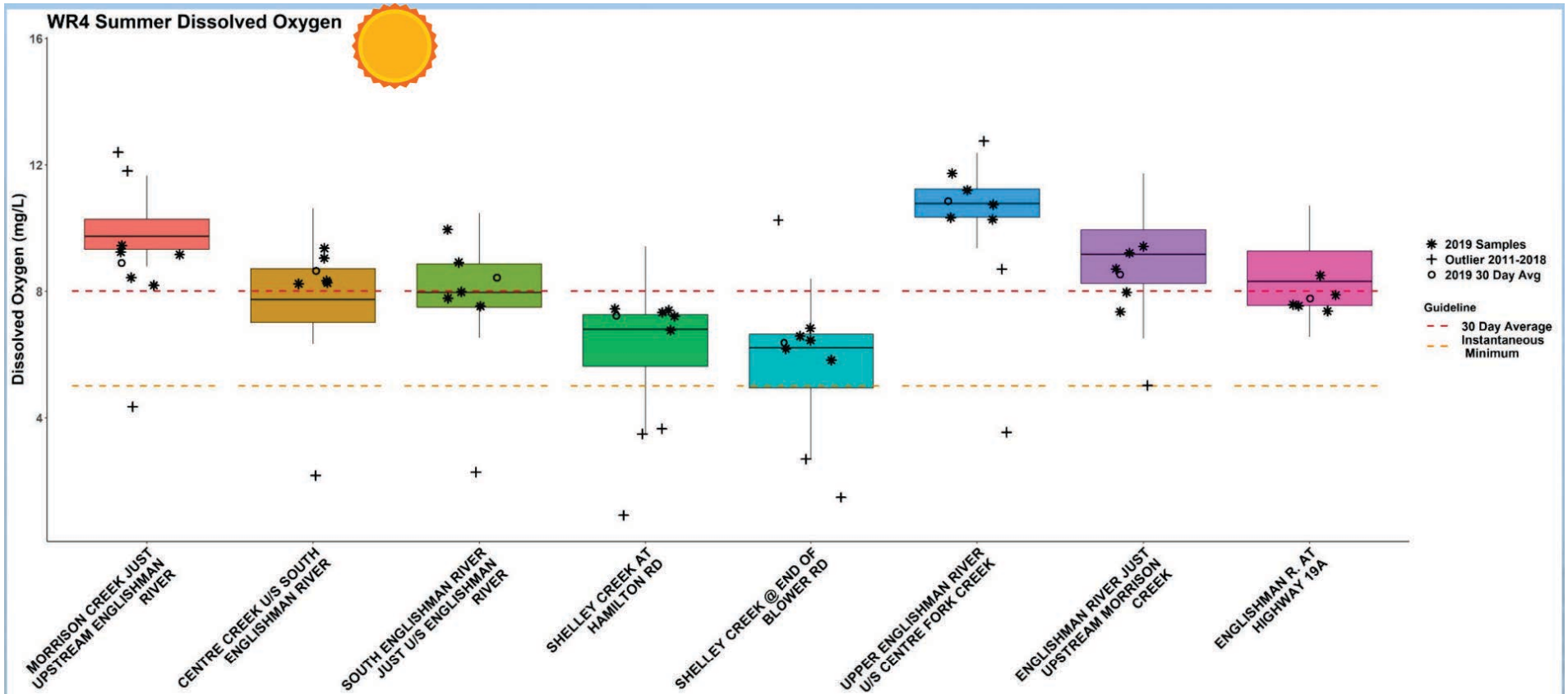
Dissolved Oxygen



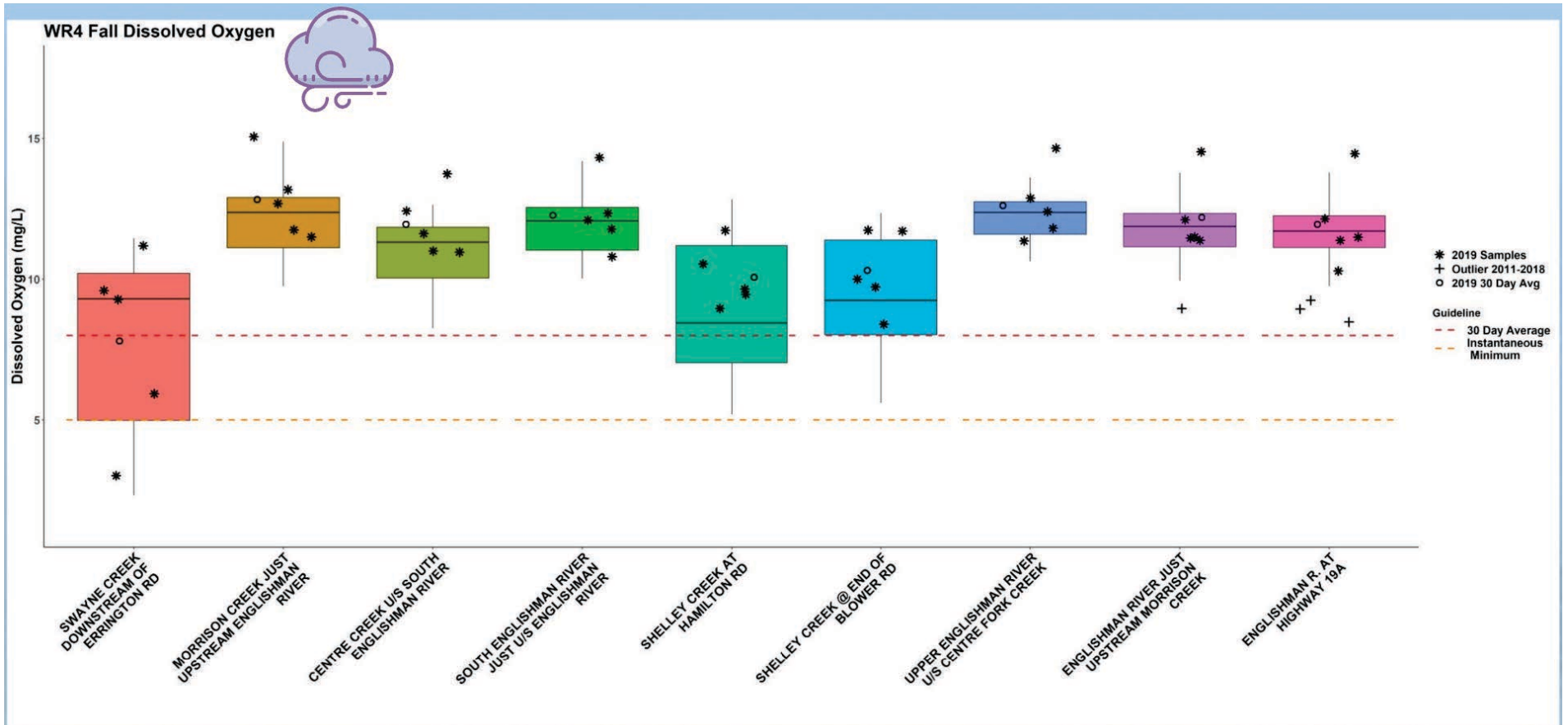
Dissolved Oxygen (DO) Aquatic Life WQG's:

- 30 day average should be at least 8 mg/L
 - Instantaneous minimum should not go below 5 mg/L
-
- Solubility of oxygen decreases as temperature increases.
 - Additional factors affecting DO: photosynthesis, water turbulence, and oxygen demand.
 - Most pristine coastal streams would average >8 mg/L.

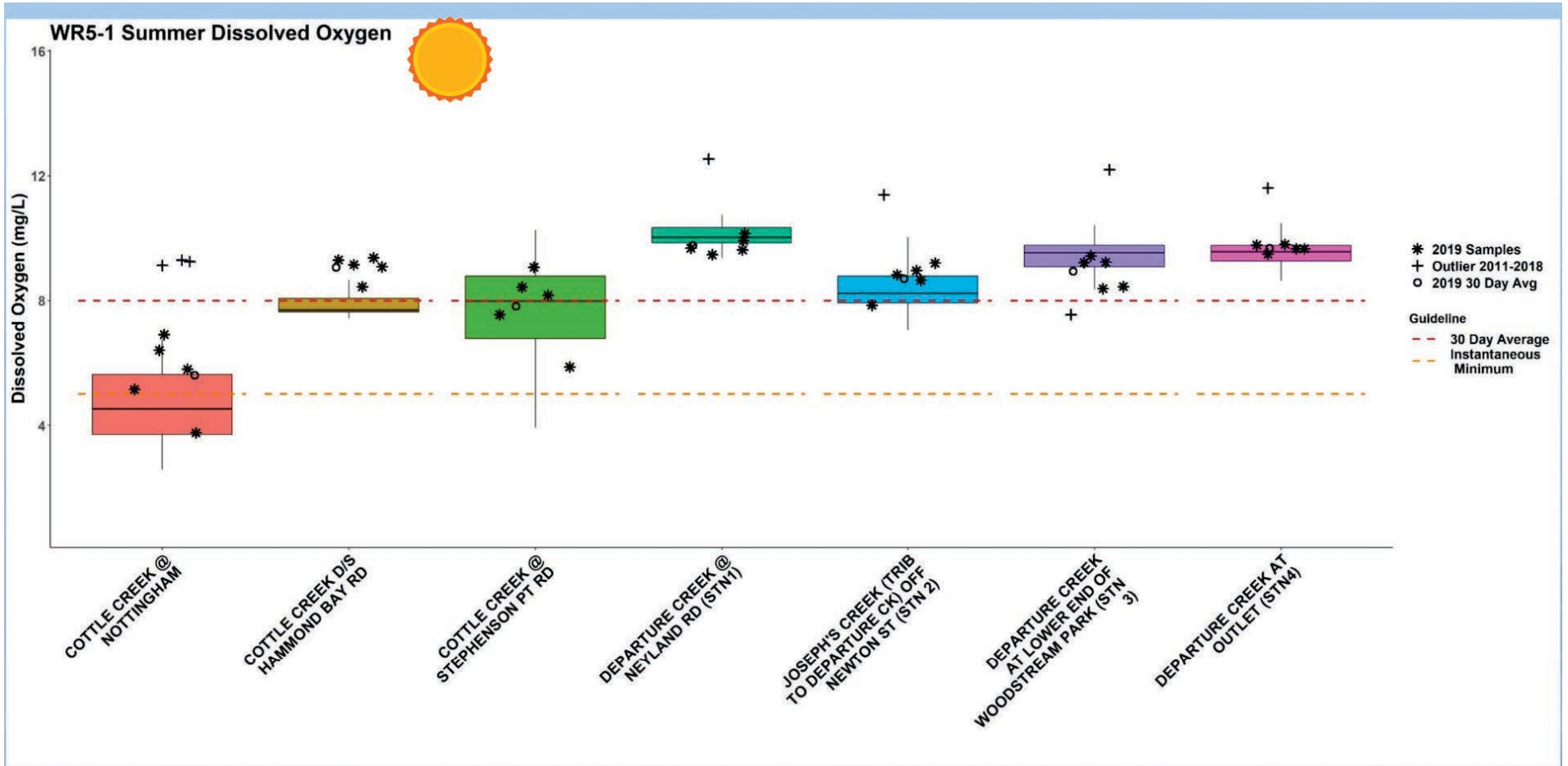




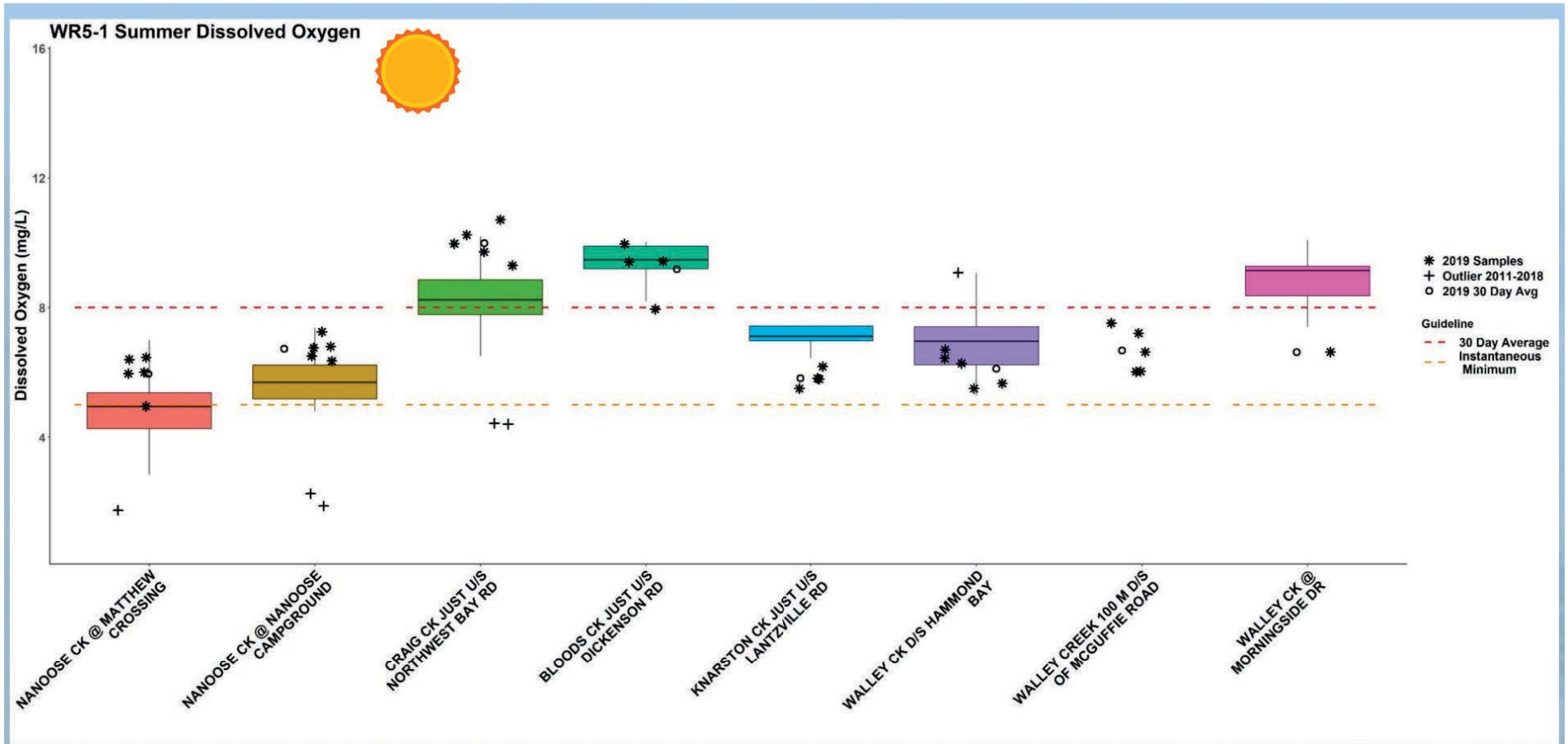
- 2019 DO 30-day averages within range of previous years.
- Both Shelley Creek sites slightly higher than previous years - potential result of restoration efforts.



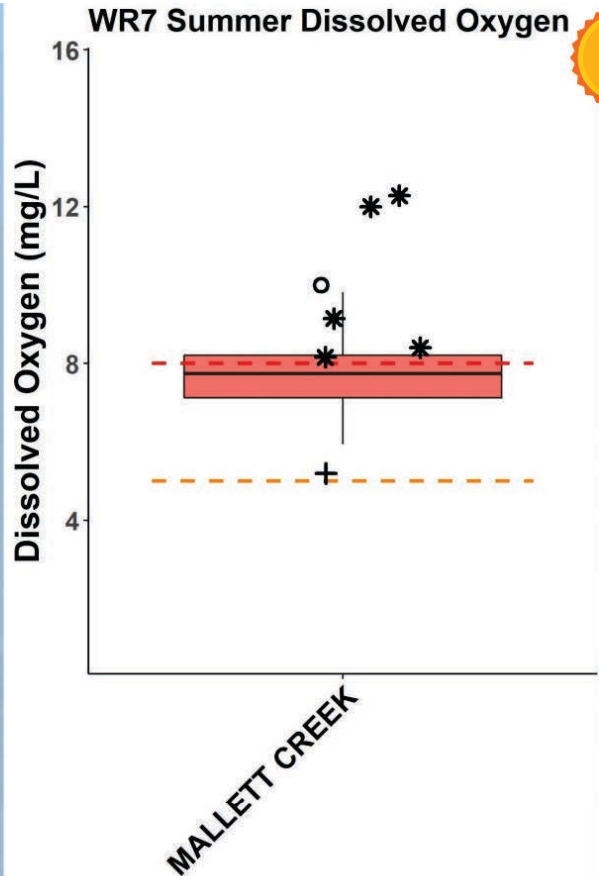
- Swayne Creek had fall DO exceedances, most likely due to low flows and site characteristics.



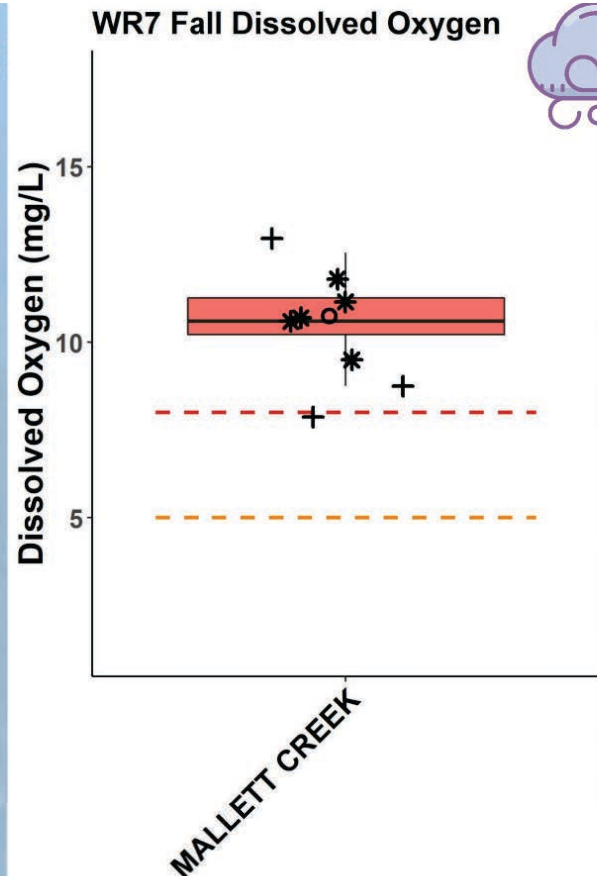
• Cottle at Nottingham is upper most site monitored in 2019, field notes recorded "no visible flow" to "low flow" for summer monitoring period.



- Craig Creek slightly higher than previous years - sampled u/s of regular site (construction).
- Walley Creek at Morningside - low to subsurface flows & higher temp this year.



* 2019 Samples	Guideline
+ Outlier 2011-2018	- - - 30 Day Average
o 2019 30 Day Avg	- - - Instantaneous Minimum



* 2019 Samples	Guideline
+ Outlier 2011-2018	- - - 30 Day Average
o 2019 30 Day Avg	- - - Instantaneous Minimum

- In 2019 summer DO was above average - flows above average?
- In 2019 fall DO was slightly above average.

Dissolved Oxygen WQG

Sites with Values Below the DO Instantaneous Minimum Guideline (5 mg/L):

Cottle at Nottingham	Benson at Biggs
French at Grafton	Chase at Estuary (tidal)
Grandon at Laburnum	Millstone at Biggs
Nanoose at Matthew X	Walley u/s beach*
Swayne at Errington*	N. Wexford at Douglas
Beck at Cedar Rd	N. Wexford at Tenth

- Sites in **bold** above also did not meet this guideline in 2018.

*= sites were subsurface during summer period and were below guideline in fall period.

- Occurred consistently at very low flow and low gradient sites.
- Similar to previous years, sites with values <5 mg/L were likely to also be below the 30-day average threshold (8 mg/L).



Dissolved Oxygen WQG

- 9 sites (**in bold beside**) had levels below both the instantaneous minimum and 30-day average guidelines.
- In 2019, multiple sites were subsurface during the summer period: **Walley Creek at Morningside, Walley Creek u/s beach, and Swayne Creek.**



Sites with Values Below the DO 30-day Average Minimum Guideline (8 mg/L):

Beck at Cedar Rd
Benson at Biggs
Cottle at Nottingham
French at Grafton
Grandon at Laburnum
Millstone at Biggs
Nanoose at Matthew X
N. Wexford at Tenth
Swayne at Errington*
Chase at Howard
Cottle at Stephenson Pt
Englishman at Hwy 19A

Holden Creek
Knarston at Lantzville
McClure Creek
Millstone at Jingle Pot
Morningstar Creek
Nanoose at campgrnd.
N. Wexford u/s seniors complex
Shelley at Blower
Shelley at Hamilton
Walley d/s Hammond
Walley d/s McGuffie

* = below guideline during fall monitoring period

Addressing DO exceedances:

- Improve temp (restoration & conservation).
- Increase stream complexity & structure (i.e., LWD).

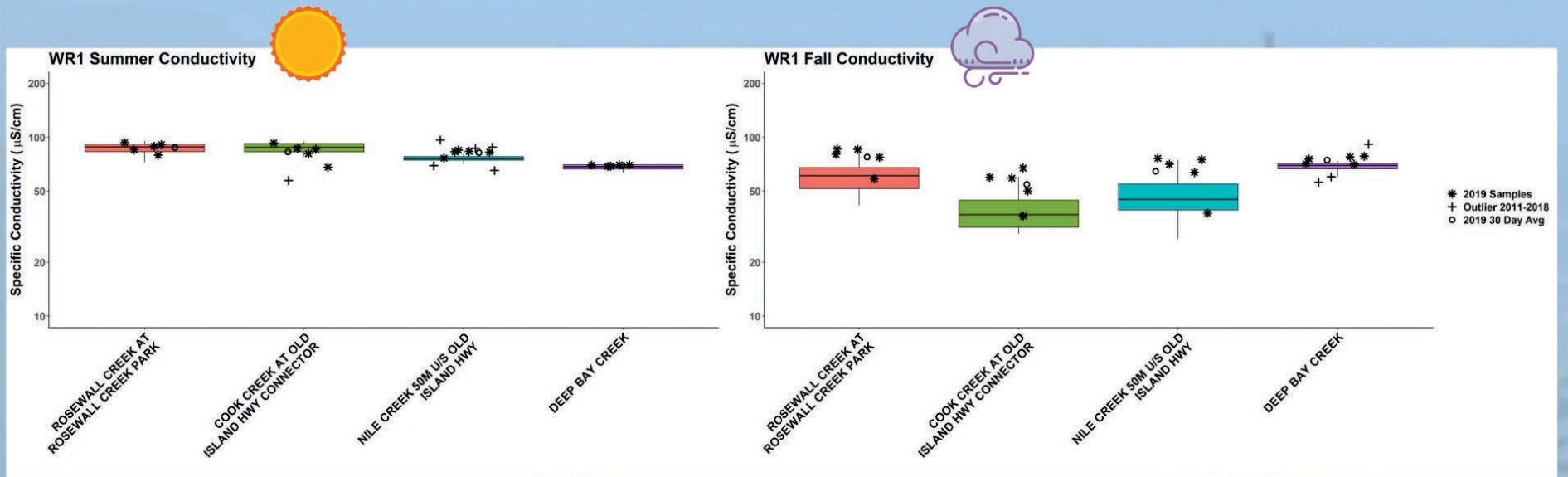
Specific Conductivity



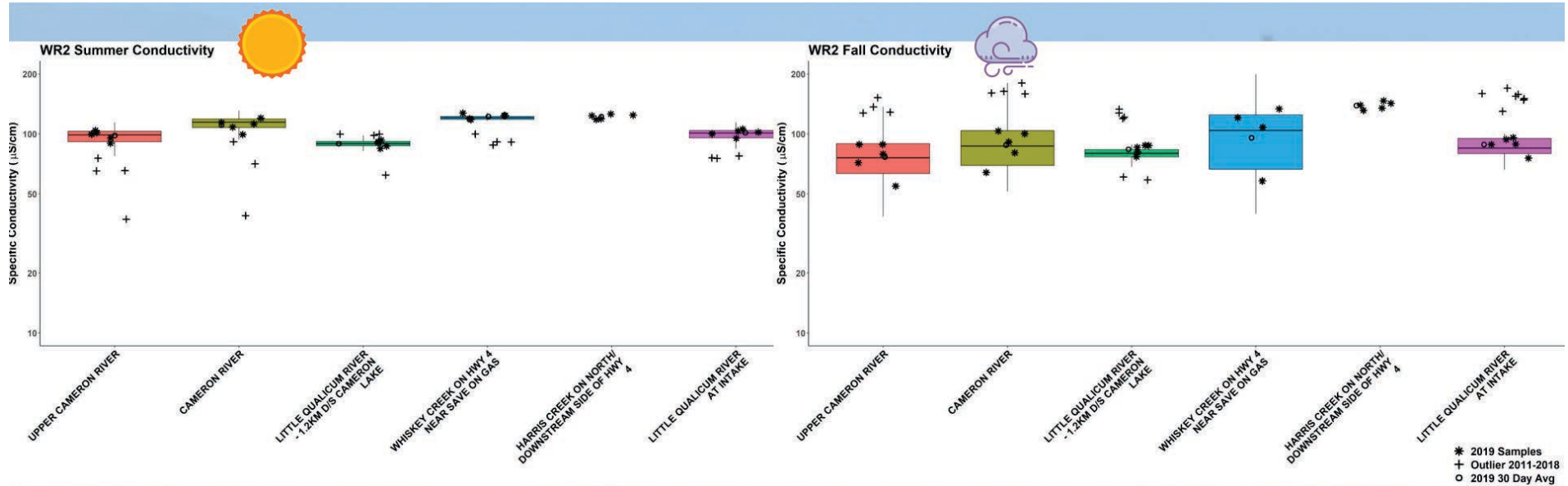
- **Most pristine coastal streams measure <math><80\text{ uS/cm}</math>** *(may be higher if large groundwater influence)*
- **No provincial guideline for this parameter**



- Measure of concentration, charge and mobility of dissolved ions in water.
- Usually increases with corresponding increases in water temperature and/or turbidity.
- Specific conductance measures conductivity corrected to 25°C - standardizes readings so they are comparable across sites/dates.
- Influenced by groundwater, pollutants, and salt water (tidal sites) - adds context to other parameters measured.

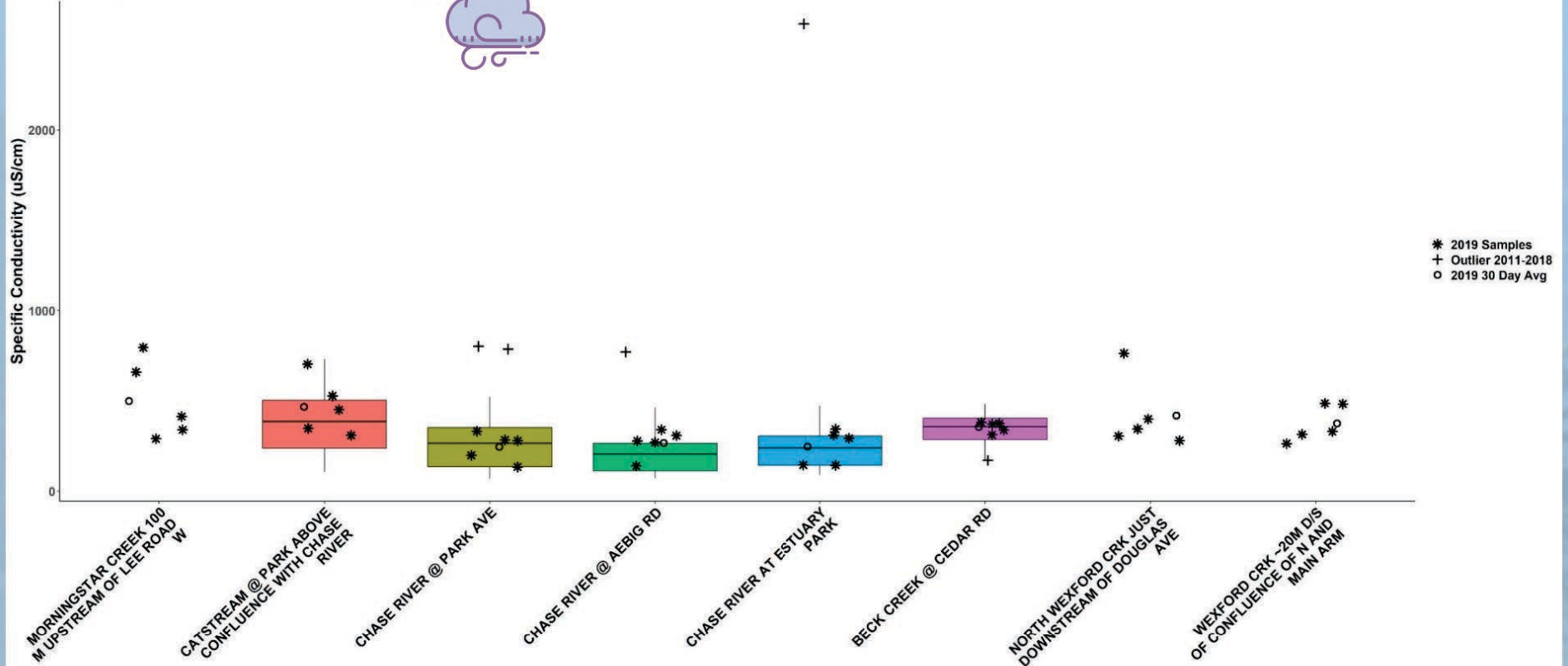


- WR 1 displays typical values for East coast Vancouver Island streams.
- Summer levels slightly higher - potentially from higher contribution of groundwater or less dilution in lower seasonal flows.

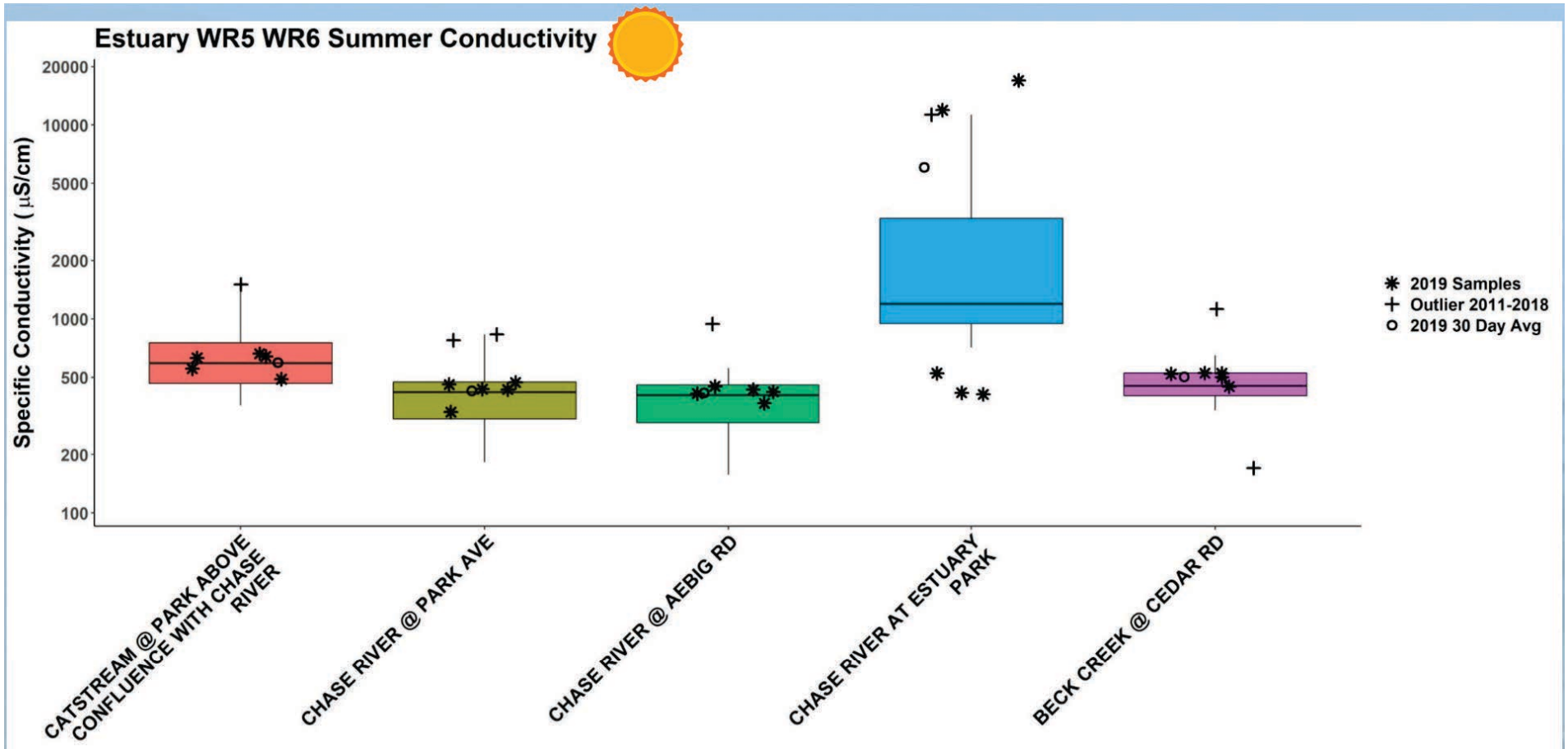


- Summer Specific Conductivity values have less variability than fall values.
- Fall values have a larger range, potentially from additional influences associated with rainfall - i.e. more turbidity from erosion and/or stormwater inputs.

Estuary WR3 WR5 WR6 Fall Conductivity



- The higher values seen in these lower watershed sites suggest tidal influence, increased turbidity input, or higher groundwater contributions.



- Tidal influence or other factor(s) causing high levels?

Specific Conductivity (SpC)

- Most east coast Vancouver Island streams have both groundwater AND human influences that impact conductivity.

Sites with High SpC ($>130\mu\text{S}/\text{cm}$):

Most likely tidal*:

- Chase at Aebig
- Chase at Estuary
- Wexford d/s confluence

Other influences likely:

- Beck at Cedar
- Cat Stream
- Chase at Park
- Morningstar Creek
- Wexford at Douglas

* = Sites with tidal influence have large variance in SpC values - Chase at Estuary $143.9\mu\text{S}/\text{cm}$ (Oct. 22) to $16965\mu\text{S}/\text{cm}$ (Aug. 6)



- Conductivity gives added context when interpreting data.
- i.e., SpC levels $>80\mu\text{S}/\text{cm}$ may indicate more groundwater contribution to flow (good) or increased turbidity or pollutants entering stream (not good).

Turbidity

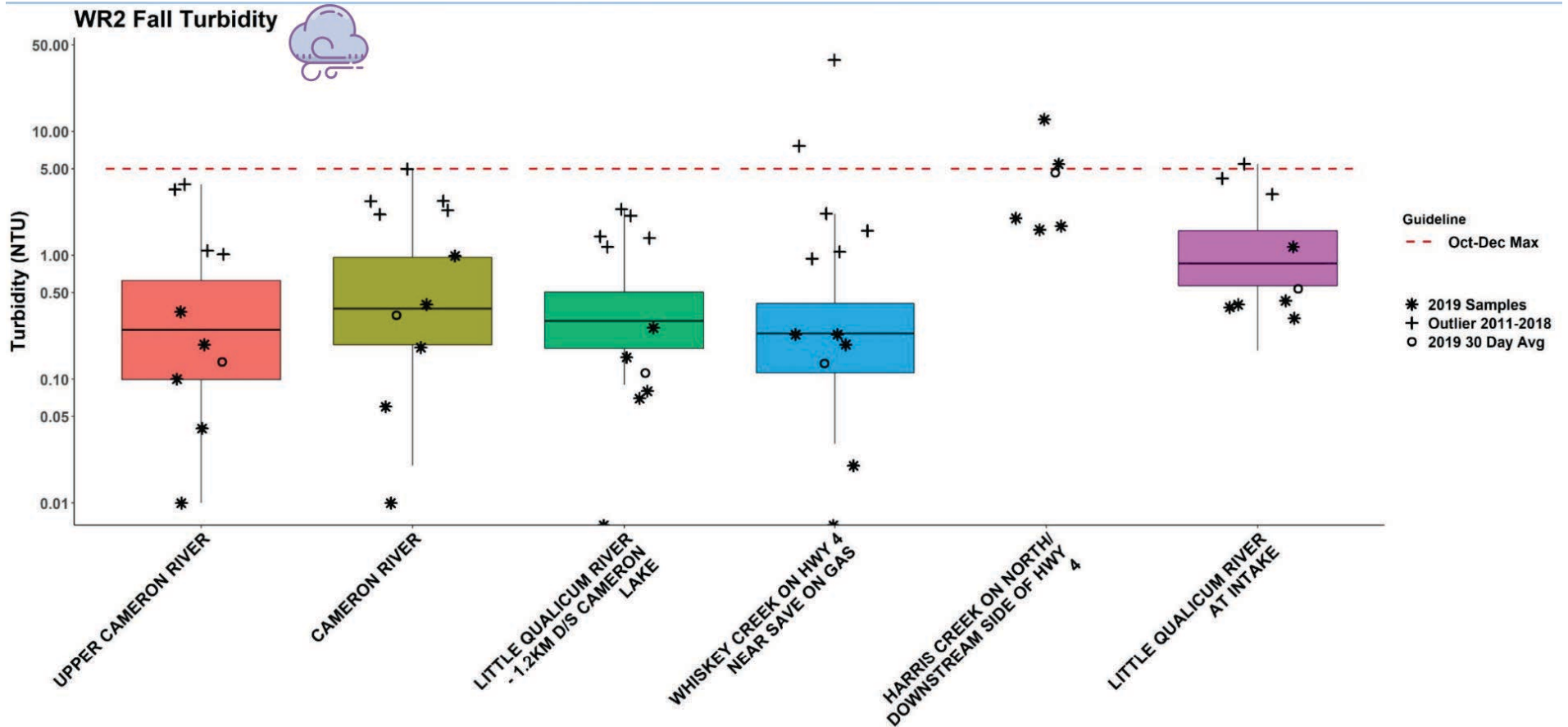


Turbidity (Turb) Aquatic Life WQG's:

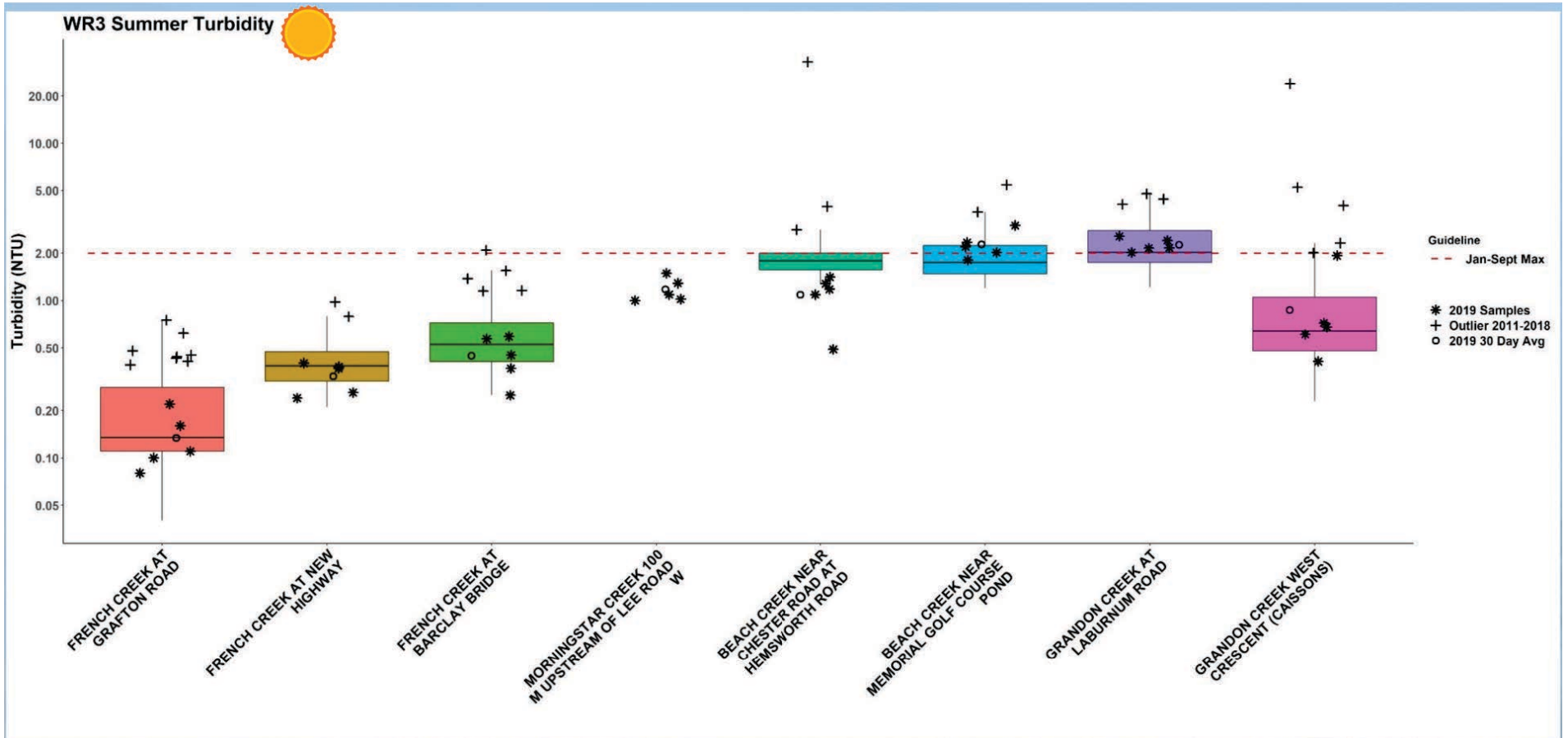
- **January to September (summer period)**
maximum: 2 NTU
- **October to December (fall period)**
maximum: 5 NTU



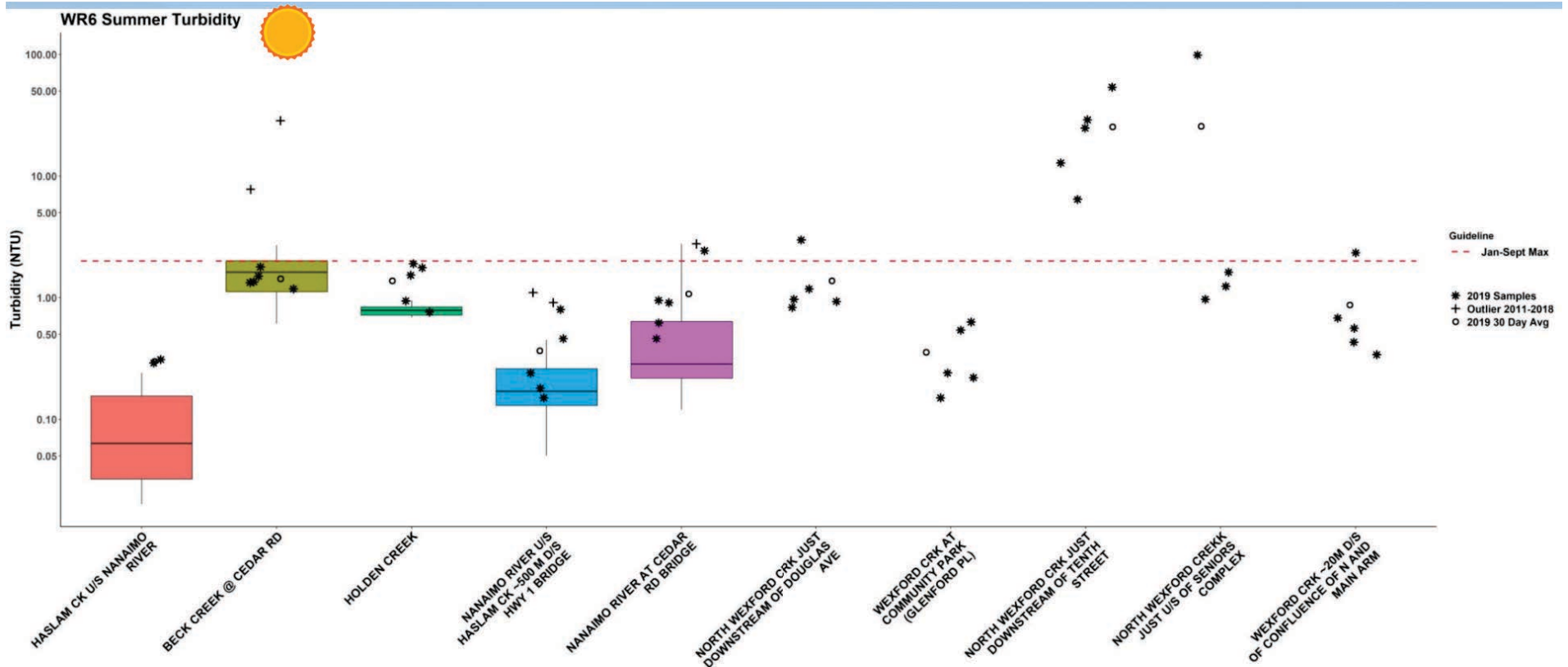
- A measure of water clarity - i.e., cloudiness caused by suspended particles.
- Increased turbidity can increase water temperature as suspended particles will absorb sun more efficiently than clear water.
- Algal growth in summer months may increase turbidity.
- Values vary in pristine streams - generally <2 NTU.



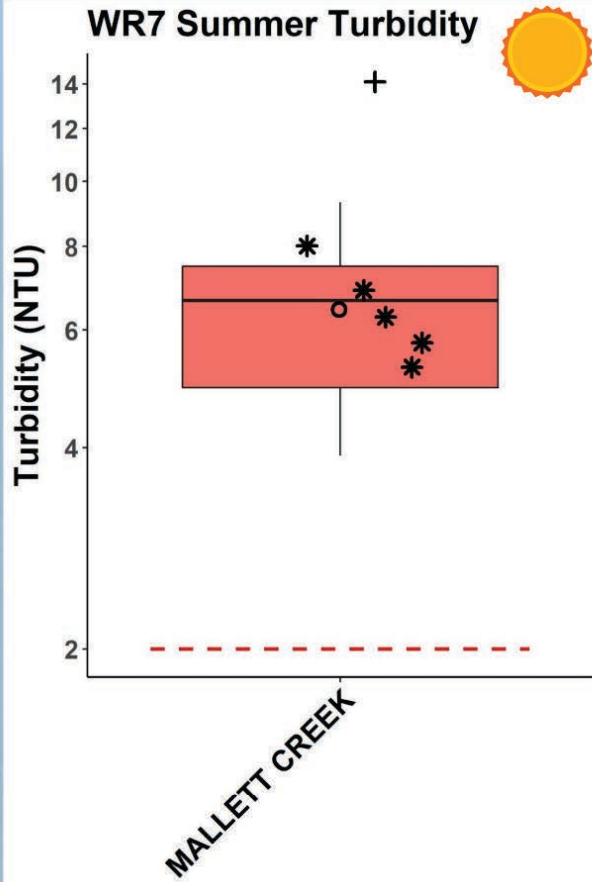
- Both Harris Creek exceedances coincide with rainfall events (Oct. 8 & Oct. 22).
- All WR 2 sites experienced highest turb values on Oct. 22 - largest rain event.



- Summer exceedances did not coincide with rainfall events except on Sept. 3 at Grandon at Laburnum & Beach at Golf Course (1.2 mm of rain within 48 hours).

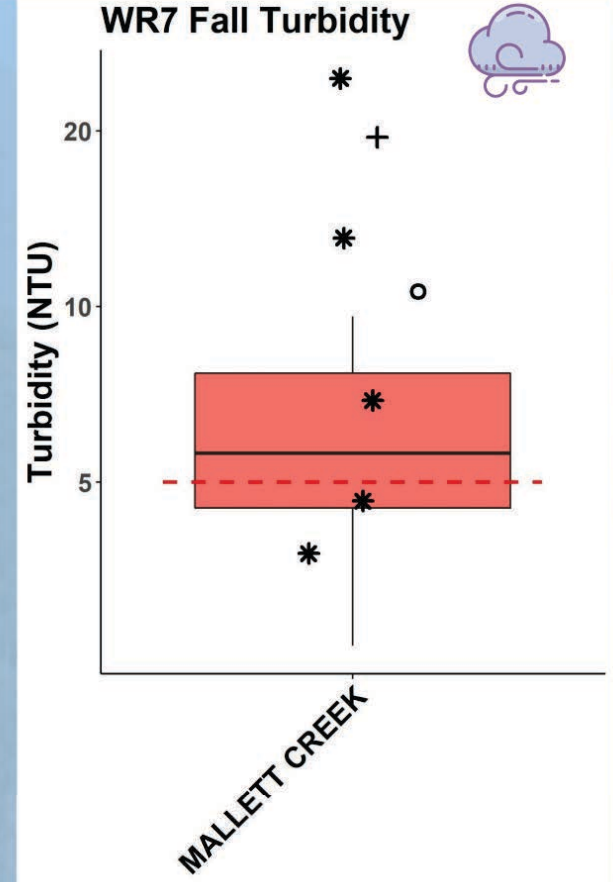


- N. Wexford d/s 10th had high turb, SpC, temp, and low DO throughout summer period - highly urbanized watercourse.
- N. Wexford u/s of seniors complex nearly went subsurface; Aug. 6 reading of 98.9 NTU, field notes: "water is very murky, low volume/no flow".



* 2019 Samples
 + Outlier 2011-2018
 ○ 2019 30 Day Avg

Guideline
 - - Jan-Sept Max



* 2019 Samples
 + Outlier 2011-2018
 ○ 2019 30 Day Avg

Guideline
 - - Oct-Dec Max

- Summer exceedances within range of previous years.
- Mallett has low flow and lots of fine sediment during summer sample period.
- All three fall exceedances coincide with rainfall events, bigger event = higher turb value.

Summer Turbidity WQG



- Some high values are explained by field observations or weather on a given day.
- Urban streams much more difficult to interpret due to various anthropogenic influences.



2 NTU Summer turb WQG Exceeded:

Once at:

- Cat Stream (1)
- Cottle d/s Hammond (1)
- Millstone at Jingle Pot (1)
- Nanaimo at Cedar
- N. Wexford u/s seniors complex
- N. Wexford at Douglas
- Wexford d/s confluence (1)

Note: numbers in brackets indicate exceedances that coincide with rainfall events.

Twice at:

- Millstone at Biggs (2)
- Walley d/s Hammond (1)

Four times at:

- Beach at Golf Course (1)
- McClure Creek (2)

Five times at:

- Grandom at Laburnum
- Harris Creek (1)
- Mallett Creek (3)
- N. Wexford d/s 10th (3)

- 39 summer turb exceedances.
- 17 (44%) coincide with rain events.
- 22 (56%) most likely due to anthropogenic influences.

Addressing summer turb:

- Algal growth can increase turb - cooler temp & stream cover.
- Water conservation to maintain flows throughout summer.

Fall Turbidity

5 NTU Fall turb WQG Exceeded:

Once at:

- Bloods Creek (1)
- Chase at Aebig
- Departure at outlet (1)
- Englishman at Hwy 19A (1)
- Morningstar Creek (1)
- Morrison Creek (1)
- Swayne Creek (1)

Once at:

- Walley at Morningside (1)
- Walley d/s Hammond (1)
- Walley u/s beach (1)

Twice at:

- Harris Creek (2)
- Millstone in Barsby (2)

Four times at:

- Mallett Creek (3)

- *In 2017, 53 of the 63 fall exceedances were experienced after heavy rain events.*
- *In 2018, 18 fall turbidity exceedances - fall flush was not captured at all sites.*
- *In 2019, 17 fall turbidity exceedances, all except Chase at Aebig coincide with rain.*



Addressing fall turb:

- Riparian restoration & streambank stabilization.
- Stormwater management to slow & infiltration before inputs enter streams.

Lab Analysis



- Quality Assurance-Quality Control (QA/QC) lab analysis for **turbidity** to validate field methodology & protocols.



- Based on recommendations from 2018 Trend Report two additional parameters tested in 2019:
 - 12 sites sampled for total **phosphorus** as a proxy for agricultural run-off.
 - 9 sites sampled for **Chloride** as a proxy for road run-off.

Turbidity QA/QC

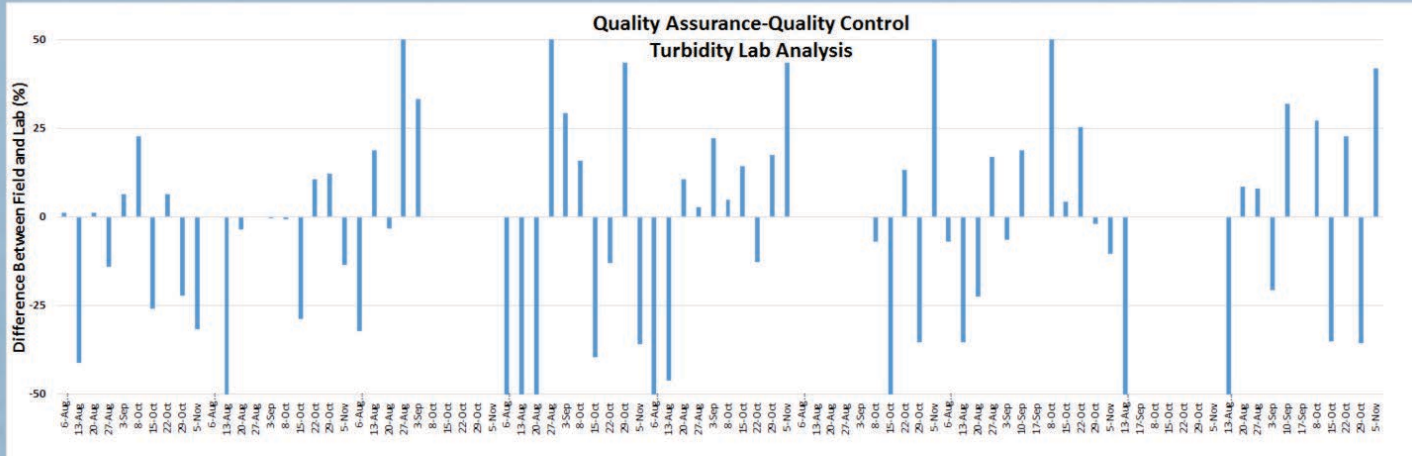


- 10% of sites randomly selected.
- Different groups complete QA/QC each year.
- Streamkeepers collect during regular sampling and take to courier.
- Sponsored by Mosaic Forest Management.



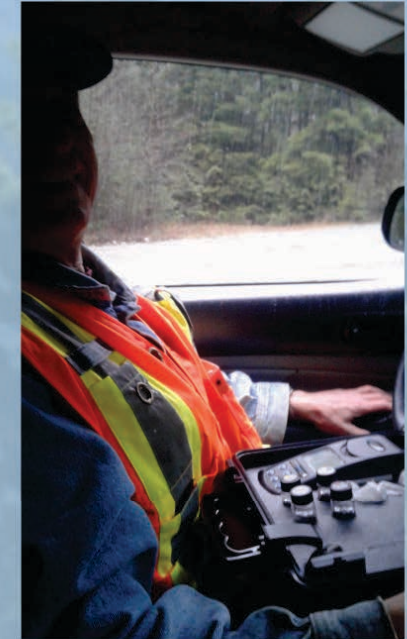
Turbidity QA/QC

- Turb QA/QC results validate CWMN protocols & methodologies.
- Larger percent difference with values under 2 NTU.



Reminders:

- *Equipment calibrated and in good working order.*
- *Sample bottle in water column (does not touch stream bed).*
- *Raining? Complete LaMotte turbidity analysis under cover.*
- *Record any potential disturbances in field notes.*



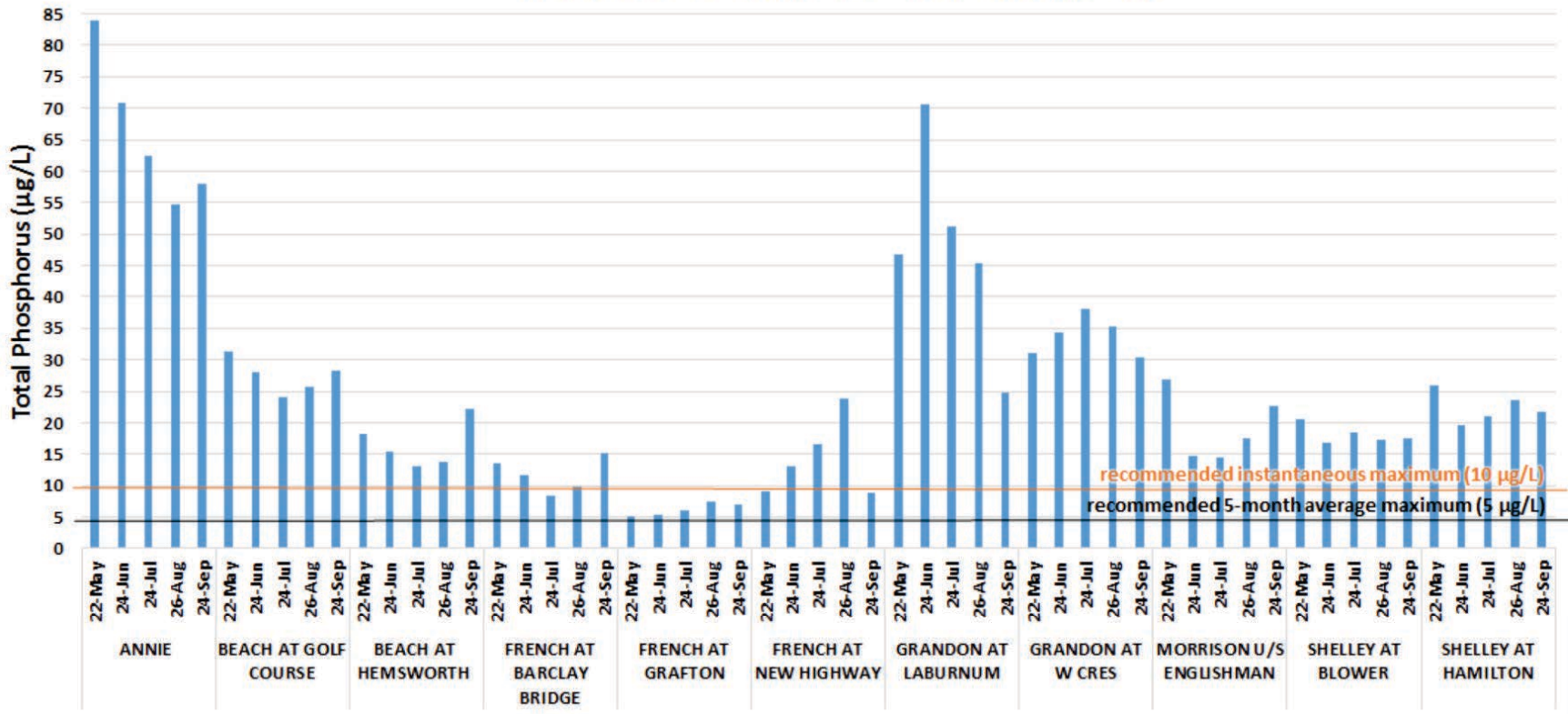
Annual training sessions help maintain high standard of data collection.

Total Phosphorus (P-T)

- Vancouver Island (VI) streams are phosphorus limited.
- Levels slightly higher than background can have exponential adverse effects (i.e., excessive algal growth).
- Potential sources: agriculture, failing septic fields, effluent.
- ***No approved WQG or WQO for P-T.***
- **To proactively manage the following has been recommended for VI:**
 - Instantaneous maximum of 10 µg/L (0.01 mg/L)
 - 5-month average maximum of 5 µg/L (0.005 mg/L)
- **Provincial sampling protocols:**
 - Monthly for 5 consecutive months
 - During growing season & lowest flows (May - Sept)

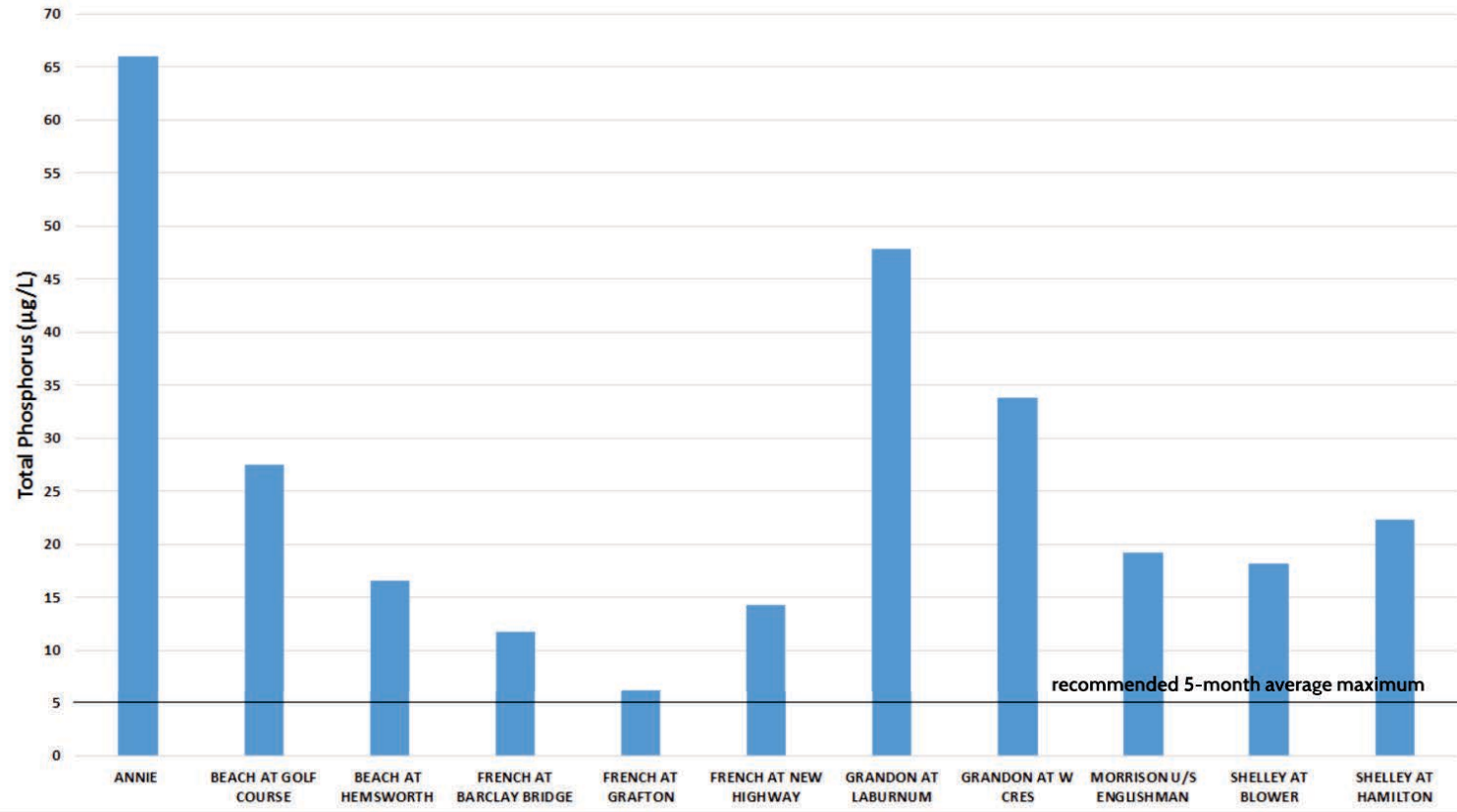


Total Phosphorus Summer 2019 Instantaneous Maximum - May through Sept.



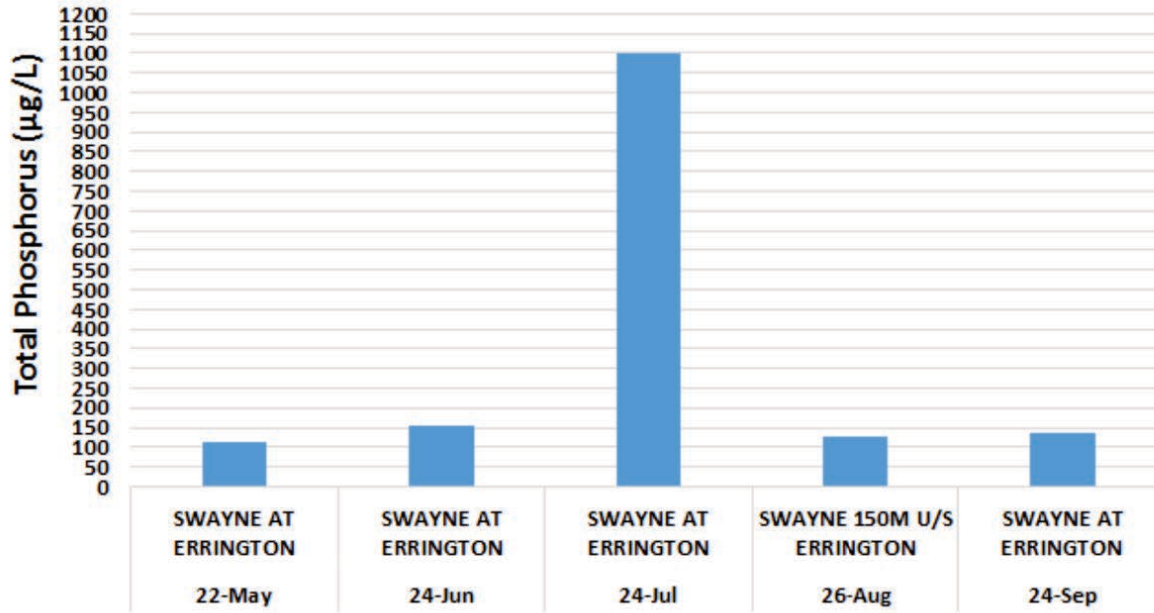
- All sites, except French at Grafton, had values above recommendations for instantaneous maximum (10 µg/L).

Total Phosphorus Summer 2019
Five Month Average - Sample Dates: May 22, Jun. 24, Jul. 24, Aug. 26, Sept. 24



- All sites had values above recommendations for 5-month average maximum (5 µg/L).

Total Phosphorus Summer 2019 Instantaneous Maximum - May through Sept.



Swayne Creek:

- Went subsurface mid-summer.
- July sample was taken in concentrated pool - not representative sample.
- Would require re-sampling for comparison to recommendations.

- Results indicate need for communications to agricultural landowners in this creekshed - educational materials for nutrient management.
- Notified Provincial regulators who implement the Agricultural Environmental Management Code of Practice.

Total Phosphorus (P-T)

- Results confirm suspected nutrient inputs from local land uses.
- Need for reduction of nutrient inputs into watercourses.
- Depending on land uses, reduce through:
 - Riparian restoration.
 - Education & outreach - fertilizer use, septic field maintenance, stream-side landowners.
 - Nutrient management best practices for industry/agriculture areas.
- *Future sampling:*
 - *At remaining locations recommended in 2018 Trend Report.*
 - *Re-visit sites in 3 - 5 years for comparison to 2019.*



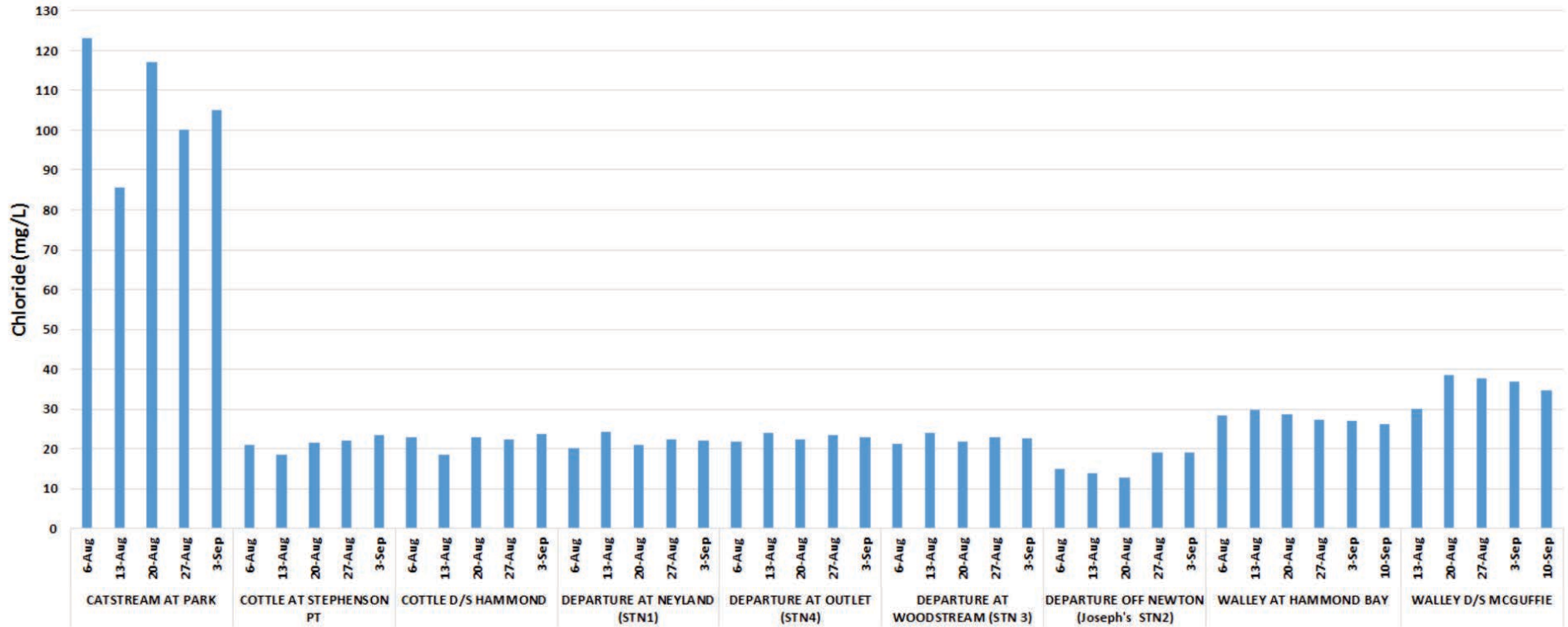
Chloride (Cl)



- Ubiquitous in the environment.
- *Source of interest: road salts as an indicator of stormwater off roadways being conveyed rapidly into watercourses. Cl enters soil, ground and surface water after snow-melt and remains in solution in freshwater systems.*
- Impacts depend on environmental conditions - i.e., DO, temp, presence of other contaminants.
- **Freshwater Aquatic Life Guideline:**
 - Instantaneous maximum of 150 mg/L
 - 5 in 30 average maximum of 600 mg/L
- **Irrigation WQG:**
 - To protect plants/crops sensitive to Cl
 - Instantaneous maximum of 100 mg/L
- Provincial sampling protocols:
 - 5 in 30 for guideline comparison
 - During lowest flows (summer period)



Chloride 2019 Summer Low Flow Period



- No exceedance of Chloride aquatic life guidelines.
- Cat Stream exceeds irrigation WQG three times (Aug 6, Aug 20 & Sept 3).



Chloride (Cl)



- *More testing required to determine correlation to road density.*
- *2018 Trend Report recommends Cl sampling at six additional sites.*
- *Remaining sampling paused until 2021 CWMN season.*

2019 Analysis of Trends

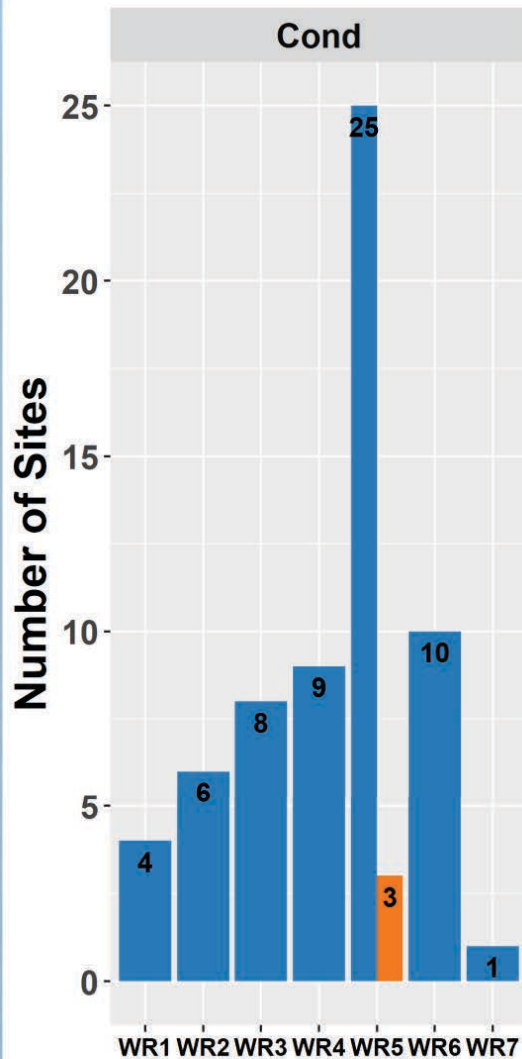
- 2019 data analyzed by Ecoscape for trends.
- Trends by water region, parameter, and category.
- 66 sites included in analysis.

Four trend categories:

1. **Improving*** = Significant Mann-Kendall Trend indicates improving WQ.
2. **Stable** = No Exceedances or less than 6 years of data.
3. **Declining*** = Significant Mann-Kendall Trend indicates declining WQ.
4. **Exceeding** = Has exceeded a WQG at any time from 2011-2019 (*DO, temp., turb. only*).

**Category only includes sites with 6 years of data or more.*

 **Improving**  **Stable**  **Declining**  **Exceeding**

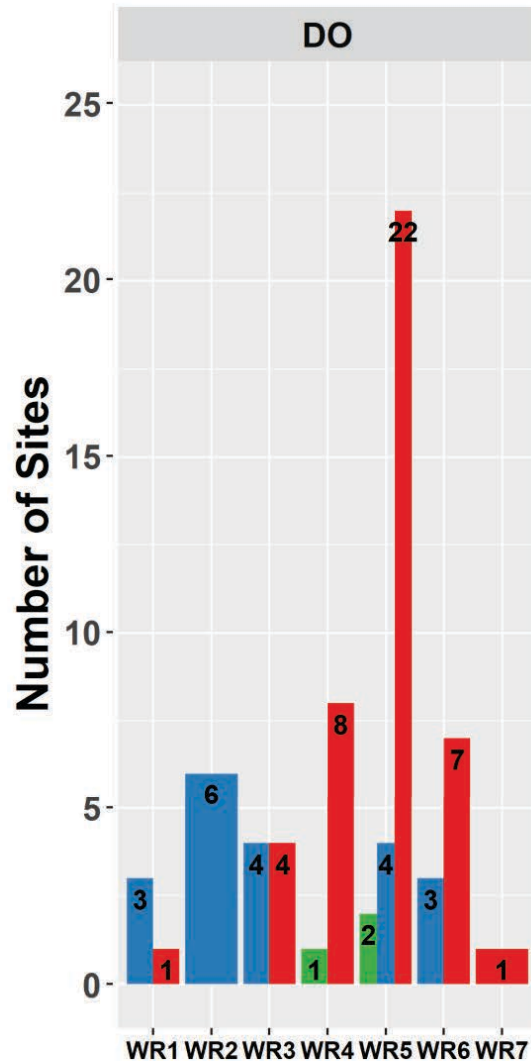


Trend Categories Sp. Conductivity

- 95% of sites **Stable**.
- No WQG = no **Exceeding** category.
- 3 sites in WR 5 with **Declining** trends (SpC increasing):
 - Chase River at Howard, Cottle Creek at Nottingham & Cottle Creek at Stephenson Pt.
- Reason for declining trends/increasing SpC values unknown.
- SpC relationships:
 - Increases as input of dissolved minerals increases - i.e., from groundwater and/or stormwater.
 - Increases as turbidity increases.
 - Can decrease as flows increase (more dilution).

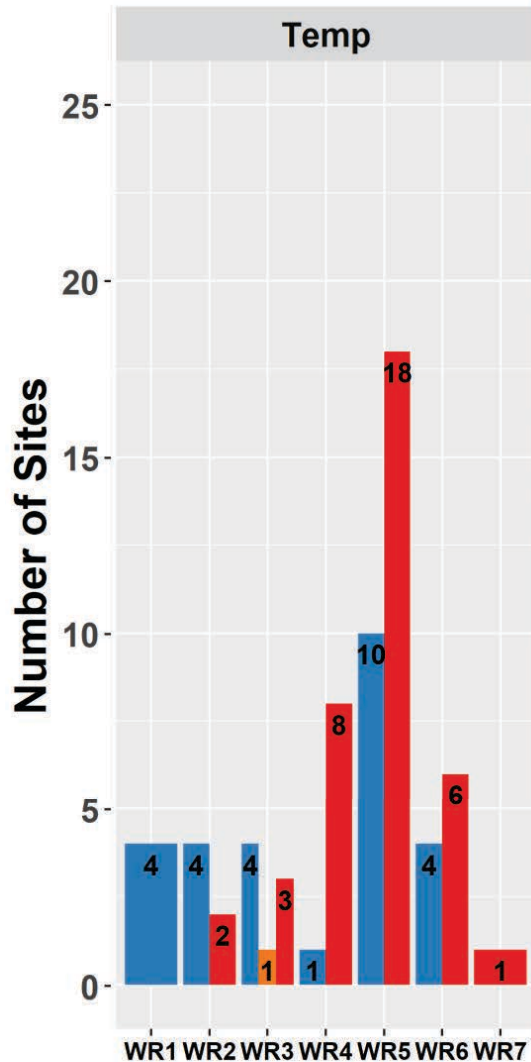
■ Improving
 ■ Stable
 ■ Declining
 ■ Exceeding

Trend Categories DO



- 30% of sites, including all in WR 2, have **Stable** trends.
- 65% of sites analyzed have **Exceeded** DO WQG (5 mg/L min. or 8 mg/L avg.) *at least once*.
- 3 sites in WR 4 & 5 with **Improving** DO trends:
 - Centre Creek, Craig Creek & Nanoose at Matthew X.
- DO relationships:
 - Lower when flows are lower.
 - Declines as temperature increases.
 - Other factors: Biological Oxygen Demand, physical stream characteristics, water turbulence.
- Field notes have helped interpret DO data.

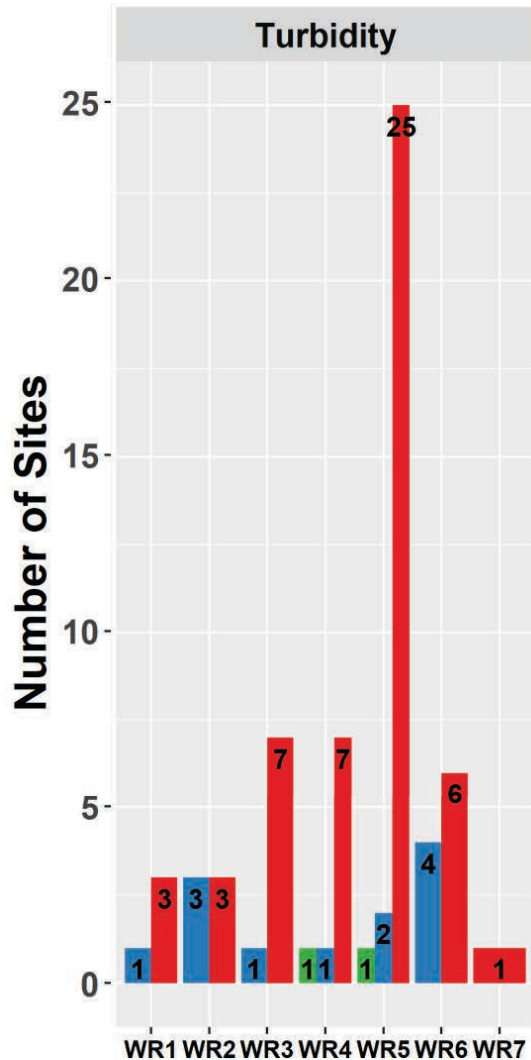
Improving Stable Declining Exceeding



Trend Categories Temperature

- Many sites in WR 4, 5, 6 have **Exceeded** WQG (17°C) in sampling history.
- 58% of sites analyzed exceeded temperature WQG.
- 41% of sites displayed **Stable** temperature trends, including all sites in WR1.
- 1 site in WR 3 with **Declining** trends/increasing temp:
 - Beach Creek at Hemsworth.
- Temperature relationships:
 - Affects metabolic rates of aquatic organisms.
 - Can alter physical and chemical properties of water.
 - Cooler refuges support aquatic life.
- Physical stream assessments have helped interpret data.

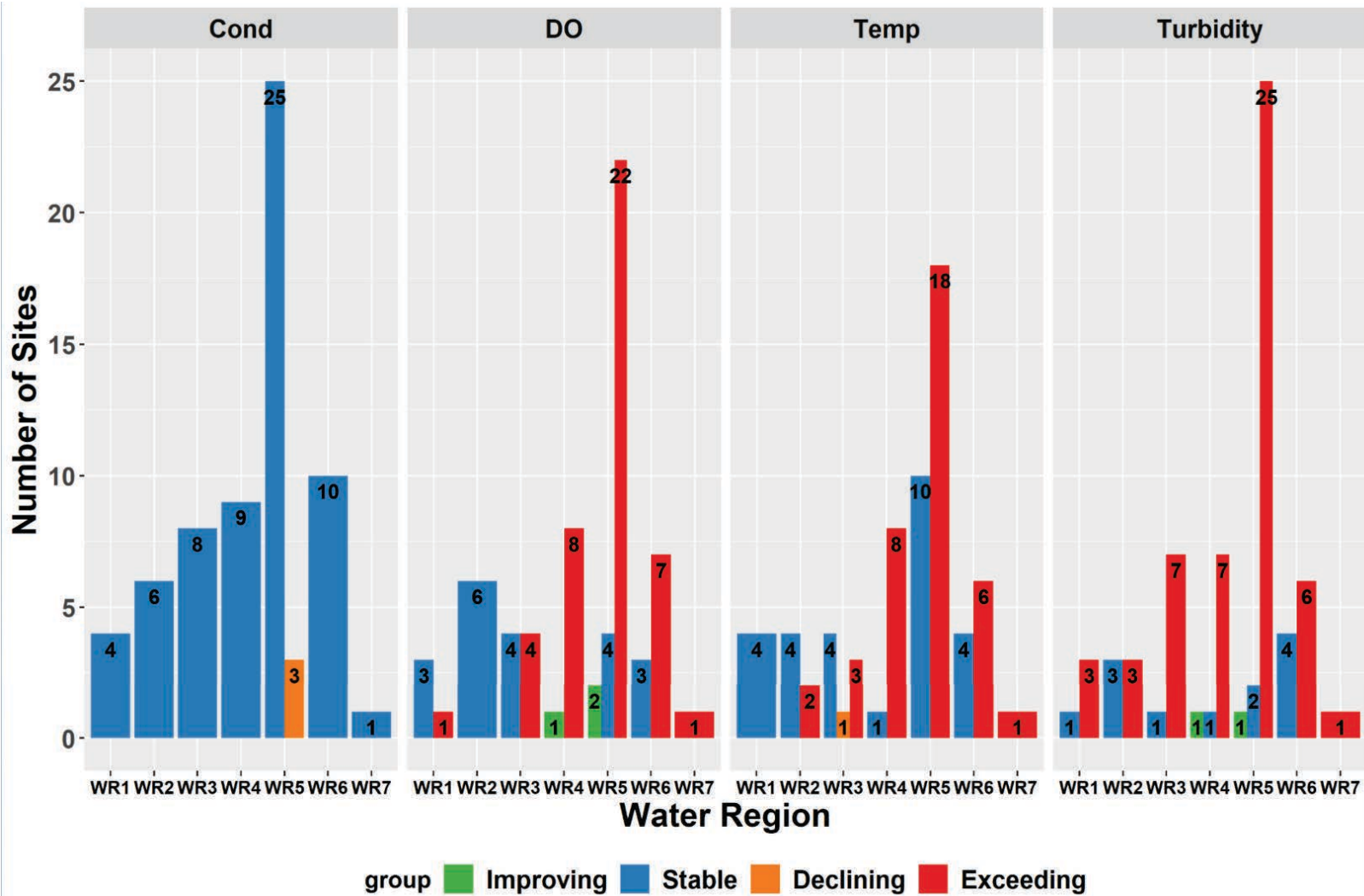
■ Improving
 ■ Stable
 ■ Declining
 ■ Exceeding



Trend Categories Turbidity

- 79% of sites analyzed **Exceeded** turbidity WQG (2 NTU or 5 NTU) at some point in the sampling history.
- 18% of sites displayed **Stable** turbidity trends.
- 2 sites in WR 4 & 5 with **Improving** turbidity trends:
 - Shelley Creek at Hamilton & Joseph's Creek (DCS Stn 2).
- Turbidity relationships:
 - Amount of suspended particles in water.
 - Strongly related to rain events: inputs of stormwater & erosion.
- Addressing erosion through stream bank & riparian restorations.





- Some **Improving** (DO & turb).
- One **Declining** (temp increasing but still below WQG).
- Turbidity highest percent of WQG **Exceeding.**

↓
Points to need for stormwater management and stream restorations.

Next Steps

- Overlapping jurisdictions require collaborative partnerships (like CWMN) to initiate actions.
- Focus on agricultural and stormwater management.
- Continue monitoring and sharing data to expand knowledge and data sets for future analysis and support interventions and policy advocacy.



Stewardship Support

With **multiple years of data** we can **identify sites** that have consistent water quality concerns, and **support community actions** to address those concerns.

This includes **prioritizing sites for restoration and enhancement works** undertaken by stewards, and **providing funding partnerships and tools** for these efforts.

Additional monitoring, including physical stream assessments using Urban Salmon Habitat Program methodology, is also something we have supported to help direct **restoration efforts**.

Stewardship
Seed
Funding

Tool
Lending
Library

rdn.bc.ca/dwwp-reports

Stewardship Seed Funding



- RDN's DWWP program supports efforts of stewardship groups to take community-level action to monitor, restore and enhance local waterways.
- Funding priority given to non-profit organizations that participate in CWMN.
- Since 2016, 15 projects have been supported across the region.
- In 2020, eligible projects can apply for \$1000 - \$5000 per project.
- Two projects have been allocated funding in 2020, one rolled forward from 2019.



Photo credit: Walley Creek Streamkeepers (2017)

**Funding Available
Apply Now:**

rdn.bc.ca/stewardship-seed-funding

Tool Lending Library

- DWWP program has a tool kit to help with your streamside projects!
- Borrow items for your restoration and enhancement projects.
- Dibbler, loppers, shears, rakes, trowels, shovels, extractigator jr., hose, etc.
- **Is there a tool or equipment you would like to see in the library?**

send requests & ideas to:
watermonitoring@rdn.bc.ca



Photo credit: of NALT & Alder Environmental




Photo credit: Island Waters Fly Fishers (Millstone River 2019)

rdn.bc.ca/cwmn



Stream Restoration Tool Lending Form



2020
Monitoring
Continuing the
CWMN with
COVID-19
Precautions



Annual
Training
Session

Summer &
Fall
Sampling

Annual Training

July Training

- Dates being scheduled for week of July 27 - 31.
- Mandatory for participants completing 2020 sampling.

Small Group Sessions

- Maximum of 8 participants & 2 RDN staff.
- Outdoor, stream-side locations: French Creek and Millstone River.
- Face masks required.
- All equipment sanitized.

Focused

- Video content will be sent for mandatory viewing & sign-off before in-person training.
- In-person training session will focus on:
 - 1) Equipment Calibration
 - 2) Sampling Procedure





CWMN Sampling - August to November



- Will continue to collect water quality samples, with added precautions:
 - 2 volunteers min./max.
 - Division of tasks to minimize cross-handling of equipment.
 - If not in same "bubble", separate vehicles encouraged.

Will adhere to any updated guidance from BC Health Officer, subject to change at any time.

We value our dedicated volunteers; safety and comfort is paramount!



REGIONAL
DISTRICT
OF NANAIMO

THANK YOU FOR YOUR PARTICIPATION!

We will now address questions that have been typed in the meeting chat box. Alternatively, hit the 'raise hand' icon and we will call on you & turn your microphone on so you may ask a question verbally.

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