# From Crisis to Information to Action: A Cowichan Story

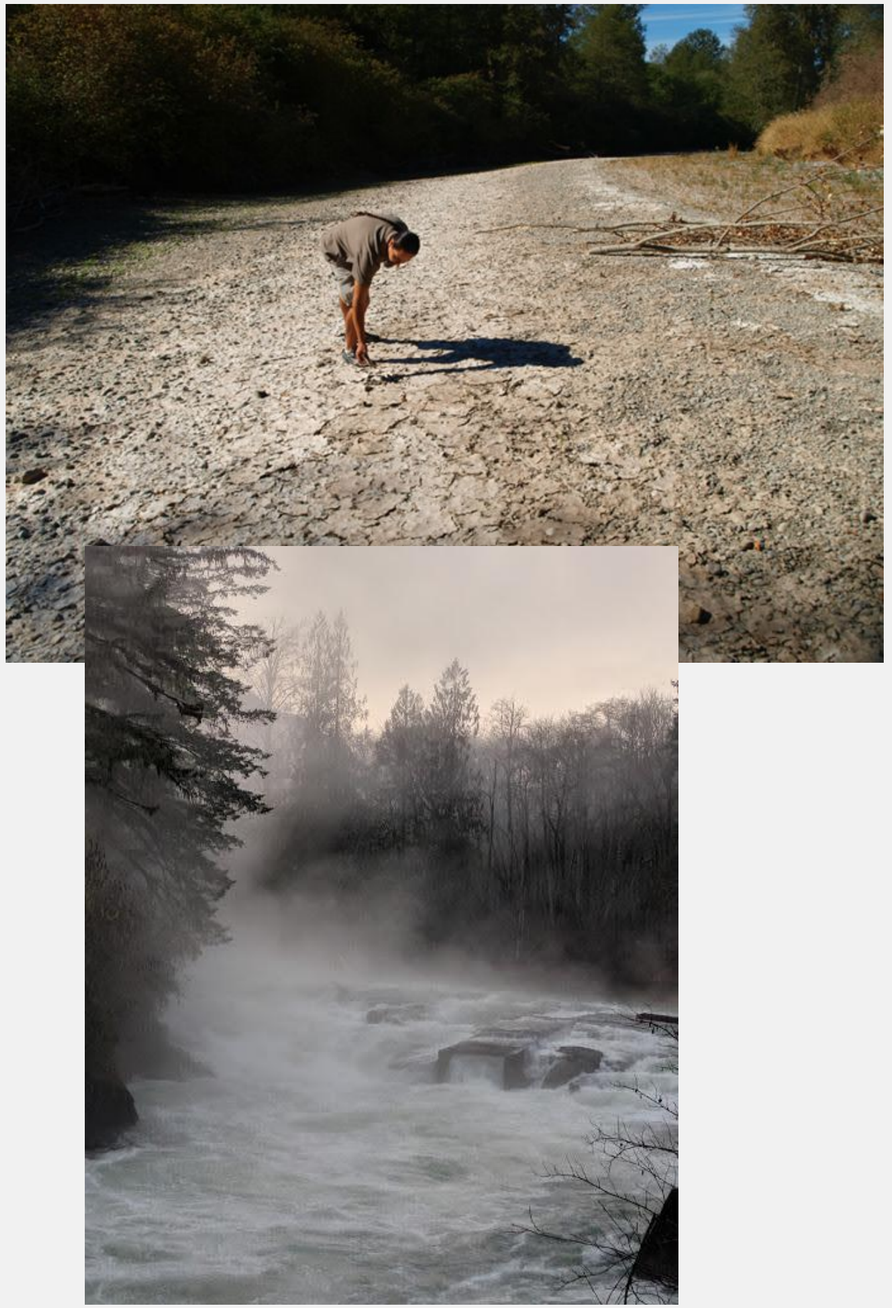
Cowichan Watershed Board
May 26, 2025

# Overview

- 2023/24 Experience…
  - *Responding to a crisis: Pooling knowledge, resources, expertise – the sum is greater than the parts*
- 2025 – Current conditions and outlook – another challenging year…
- Cold Water Refugia
  - *One piece of the puzzle*

# Welcome to Climate Change

- Hotter drier summers, warmer wetter winters
- Increased drought, increased flooding
- Summer low water, high temperature conditions changing water chemistry and threatening our salmon
- Compounded by consequences of a century of land use impacts resulting in significant geomorphologic changes
- We are facing significant climate induced challenges to salmon, water and watershed sustainability



# 2023 Cowichan Fish Mortality Event

- Totally unprecedented extensive mortality event
- 10Km of river (20%) a death zone
- 80+K steelhead fry dead, thousands of coho juveniles as well as adult trout
- No one was prepared for this...

## River system

*Authorities trying to solve mystery of why fish in Cowichan River system died.*

**Carla Wilson** • Victoria Times Colonist

Published Jul 15, 2023 • Last updated Jul 17, 2023 • 4 minute read

Join the conversation

Joe Saysell in the Cowichan River with dead fry. Via Daegan Sheffar jpeg

Hundreds of tiny silver salmon and trout fry have been discovered dead at the bottom of a canyon at the base of Skutz Falls on the Cowichan River system and the cause of the mass die-off is a mystery.

# A “Made in Cowichan” Response

- Who’s job is it to look after our river?

- Build on existing relationships (15 years of
- heavy lifting paying off!)
- Differing organizations bringing different perspectives, skills, expertise & resources

- Established relationships of trust and common commitment

# 2024 Spring Workshop Series: “Look before you leap!”

**Who**

- 2 workshops engaging existing CWB Target Working group members: CT, DFO, WLRS, MOE, Local Govt. CWB, ENGO’s

**What**

- Understand the problem – **what happened and why?**
- A Collaboratively built a **monitoring plan** that would allow us to see the train coming down the tracks….
- A **response plan** Identifying actions that could be taken in the event of worsening WQ conditions (including securing commitments from the responsible parties to carry out those actions)

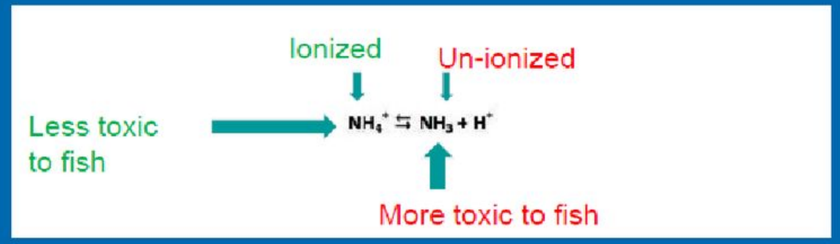
**How**

# 2023 Cowichan Fish Mortality Event – Workshop 1

- **Identifying the problem – bring in the "big guns…"**
- **and the "local experts"!**
  - Fish mortality event caused by a complex series of interactions driven by **low water, high temperatures and unnatural nutrient loading**
  - Three parameters driving this dynamic were **Temperature, Dissolved Oxygen and pH**

- **Create the Monitoring plan**
  - Simple and directed
  - Establish parameters, sample sites and frequency that we need to make informed

**Ammonia nitrogen equilibria in water**




➢ As temperature and pH increase, the more toxic $NH_3$ fraction increases

**Table 3. Percent un-ionized aqueous ammonia solutions for 0-30°C and pH 6-10 (Emerson et al. 1975)**

| Temp (°C) | pH | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | 10 |
| 0 | 0.008 | 0.026 | 0.082 | 0.261 | 0.820 | 2.55 | 7.64 | 20.7 | 45.3 |
| 5 | 0.012 | 0.039 | 0.125 | 0.394 | 1.23 | 3.80 | 11.1 | 28.3 | 55.6 |
| 10 | 0.018 | 0.058 | 0.186 | 0.586 | 1.83 | 5.56 | 15.7 | 37.1 | 65.1 |
| 15 | 0.027 | 0.086 | 0.273 | 0.859 | 2.67 | 7.97 | 21.5 | 46.4 | 73.3 |
| 20 | 0.039 | 0.125 | 0.396 | 1.24 | 3.82 | 11.2 | 28.4 | 55.7 | 79.9 |
| 25 | 0.056 | 0.180 | 0.566 | 1.77 | 5.38 | 15.3 | 36.3 | 64.3 | 85.1 |
| 30 | 0.080 | 0.254 | 0.799 | 2.48 | 7.46 | 20.3 | 44.6 | 71.8 | 89.0 |

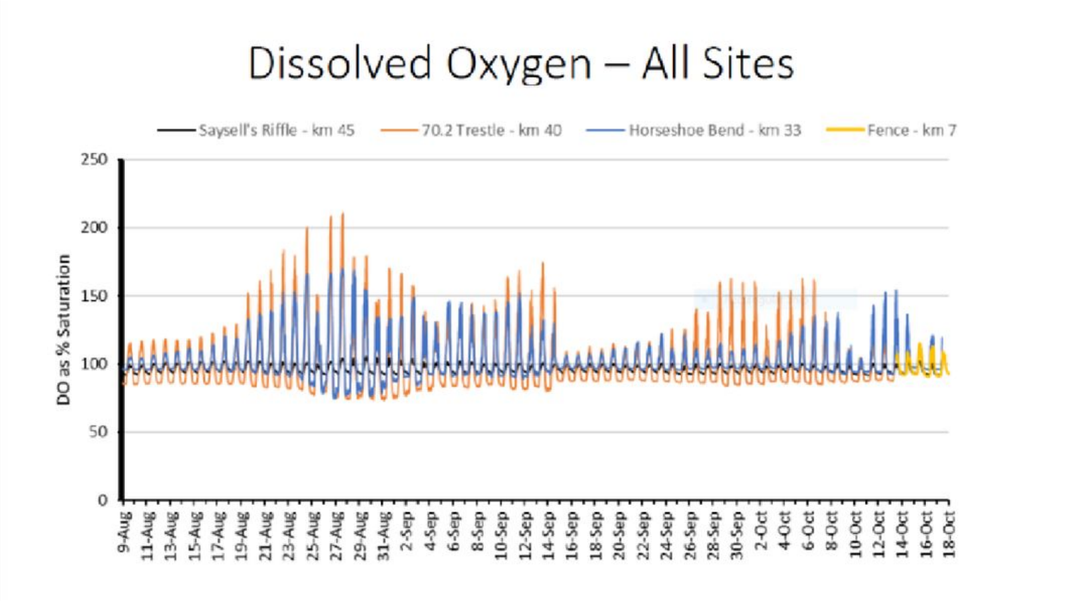
July, 2023

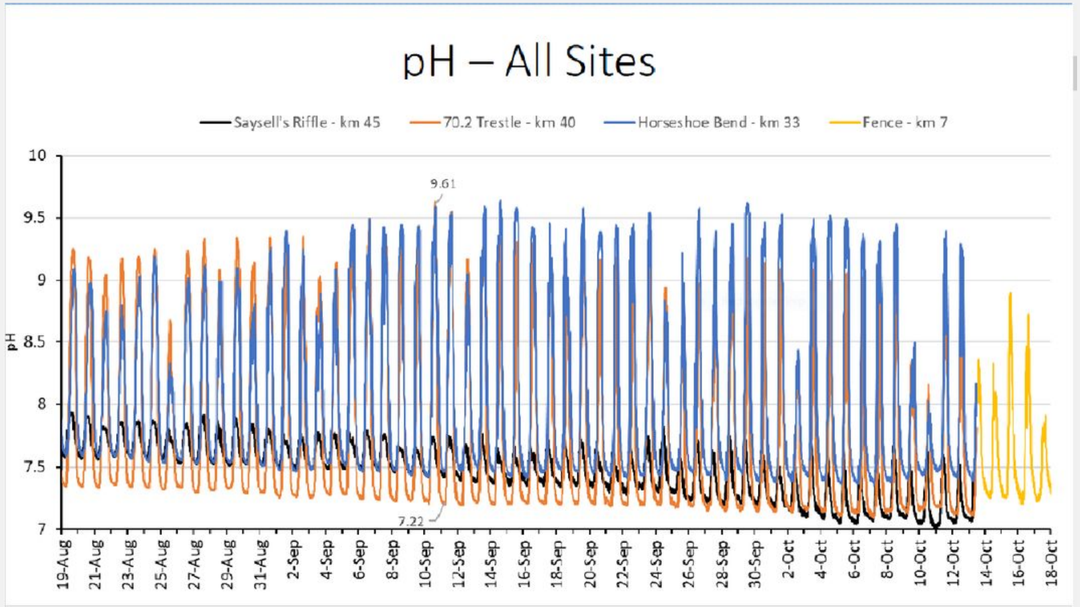
# 2023 Cowichan Fish Mortality Event – Workshop 2

- Not useful to monitor as fish die
- What levers can we pull?
- Different for Different watersheds
- For Cowichan
  - Change our water management strategy (Modify our Eflows to weight maintaining summer base flows)
  - Change our wastewater management practices
    - Short term – utilize infrastructure differently
    - Long term – upgrade infrastructure
  - Change our interactions with the river

# What Happened in 2024 – The Monitoring

- Real time sampling downloaded weekly
- Grab sample analysis results often delayed
- Monday morning situation room meetings
  - Significant diurnal fluctuations and lab analysis timing demonstrate the value of continuous monitoring



# What Happened in 2024 – The Response

- **Water management** – Decision to take a hit early to avoid a disaster later

- **Wastewater management**
  - Formed close working relationship with plant managers
  - Used third lagoon to store effluent during hi risk circumstances
  - OK Falls tour – local government engaged and prioritizing infrastructure upgrades

- **Fishing** – closures

- **Cold water Refugia**
  - Research driven by traditional and local knowledge to identify priority areas
  - Initiatives with property owners to better protect these streams
  - Engagement with agencies to pilot restoration works to maximize benefits

- Challenging conditions – significant fish mortality event avoided

| Categories | Right Now | In Season | Long Term | Caution/Triggers |
|---|---|---|---|---|
| **ToLC Sewage Treatment** | Repair/replace all surface aerators, install alum injection system | Reduce/curtail P and NH3 discharges in June, July + Aug | Modern Okanagan BNR WWPT | Caution - reduce NH3 and P @ 8 m3/s in June<br>Trigger - curtail NH3 and P @ 6 m3/s in July+Aug |
| **Cowichan Flows and Temperature Management** | Monitor Cowichan Lake level and river flows | Manage storage/discharges in May + June to allow 6 m3/s in July + Aug | Refire weir siphon pipe size with modelling, build weir, and include hypolimnetic siphon for temperature manangement | Maintain July flow > 6 m3/s<br>Maintain Aug flow > 6 m3/2 |
| **River Use Management** | Prepare Directors order for Angling closure | Close angling in July-Aug if flows < 4/5 m3/s and water temp > 22C | | Caution - flows < 6 m3/s<br>Trigger flows < 4.5 m3/s<br>Caution - temp > 20 C<br>Trigger temp > 22C |
| **Habitat Protection** | Identify cold water refugia and critical riparian areas facing developmental pressures | Water use restrictions in June-Sept | Enact WMAs on cold water refugia and critical riparian zones, enhanced riparian protection, convert houses on riparian septic systems to sewer collection | |
| **Monitoring** | Ongoing | Twice monthly in July and Aug, WWTP outfall weekly in July and Aug | TBA | As per Cowichan River monitoring plan |

# Teachable Moments – Lessons Learned…

- No one Nation, govt. agency, ENGO has the resources to do this work unilaterally
- Collaborative partnerships, shared expertise and resources are the key to moving from disaster, to focused monitoring to actively changing behaviours to increase salmon survivability
- For supporting in season decision making, Continuous monitoring capability is worth the investment (and could be a bargain in terms of current lab costs)
- A good monitoring design is key – if you don't look you don't know but… it's important to look in the right place in the right way
- Building a long term data set is useful but monitoring for the sake of monitoring is not the answer – working towards using the information gathered to change behaviour is key…..

# This Year – 2025 Monitoring Program

- **Increased continuous monitoring stations to 6**
  - Three upriver (Saysells's; 70.2 mile trestle; Skutz)
  - Three down river (Above JUB, DS of JUB, North/South arm bifurcation)

- **Weekly "situation room" calls 0830 Mondays**
  - Previous weeks data reviewed, decisions made

- **Bi-weekly grab sampling**
  - Detailed nutrient information

- **Equipment and support from:**
  - CVRD, Cowichan Tribes, Feds, Province, BCCF

# This Year – Current River Conditions

- **River currently running at summer base flow of 7CMS**
  (Current Eflow is 15CMS)
  - Modest snowpack – lake well below full storage, slowly responding to reduced flow levels

- **Dissolved Oxygen and Temperature levels DS of TOLC outfall good**

- **Significant Algal growth and problematic pH levels (diurnal fluctuations up over 9)**

- **Approx. 20,000 cubic meters of storage capacity in TOLC treatment plant (~ 20-25 days)**

- **Outlook not good unless we get significant precipitation**

# Cold Water Refugia - 2025

- Last years work identified 11 important sites and measured the scope and scale of their impacts
  - Building a data driven case for changing behaviours to protect these areas

- DFO/Cowichan Tribes/CWB partnership in 2025 working with Cowichan tribes and CWB
  - Short listing to 5 priority sites for further work
  - Testing 3 methodologies for gathering cold water refugia data
  - Creation of map product to support engagement and education
  - Developing concepts for habitat manipulations to increase salmon and ecosystem benefits of cold water inputs
  - Explore tools for protecting these areas – different tools for different land tenure…

# Huy tseep q’u Siem – Thank you!