



Somenos Watershed – 2022 Fisheries Inventory and ‘Salmon Watch’ Monitoring Report



by
Gina Hoar, R.P.Bio, Aquatic Stewardship Specialist
for
Somenos Marsh Wildlife Society

Purpose

Somenos Marsh Wildlife Society (SMWS) is in the process of refining a Fisheries Monitoring Program for the Somenos Watershed. The monitoring program ties into the 5-year Restoration Plan of Averill, Raphael, Bings, Menzies, and Richards Creek. Aquatic Habitat Assessments were completed for these creeks in 2020-2021 and various problem areas and solutions to improve fish habitat were identified.

These improvements require additional baseline aquatic species surveys, and regular monitoring of restored areas to determine changes of fish and fish habitat over time.

In 2022, two aquatic surveys were the focus of our monitoring program. These were:

1. monitoring of the fall migration of salmonids and to determine when they move into the watershed. The results will help identify what is the cause of delays in migration timing by measuring potential barriers to movement, such as: Somenos Creek low temperature, dissolved oxygen, and the timing of Parrot's feather break up in fall.
2. minnow trapping inventory in August to October was completed to identify fish presence and absence in a few unnamed channels and named creeks in the watershed. Locations chosen were based on where SMWS restored fish habitat, impacted areas, and channels with limited data.

Methods

Salmon Watch

A call-out was sent to our SMWS volunteers list in the community to ask for them to contact us when and where they see spawning fish in the fall of 2022. The purpose was to help identify the timing of spawning activity, locations, species, and timing of the salmon migration. This helps us identify if there are any delays in spawning due to anoxic conditions or barriers in Richards and Somenos Creeks.

Priority objectives include:

- Email volunteers on our internal database for participation
- Post a Mailchimp campaign on social media (Facebook and Instagram) to obtain community assistance
- Create a map to include in the campaign mailout that indicates recommended monitoring locations
- hyperlink SMWS emails embed them into the campaign to make it easy for volunteers to click and contact the Society with their observations.
- Contact property owners on Richards, Bings, and Averill directly who reached out during last year's salmon watch for sighting updates.
- SMWS to complete creek checks of spawning salmon while doing routine weekly water quality sampling in Bings, Averill, Richards, Somenos Creeks with YSI Multiprobe. Additional data will be collected at the Lakes Road bridge with a new Temperature and DO probe logging every 10 minutes.
- Add additional sightings to a final map of fish observations.

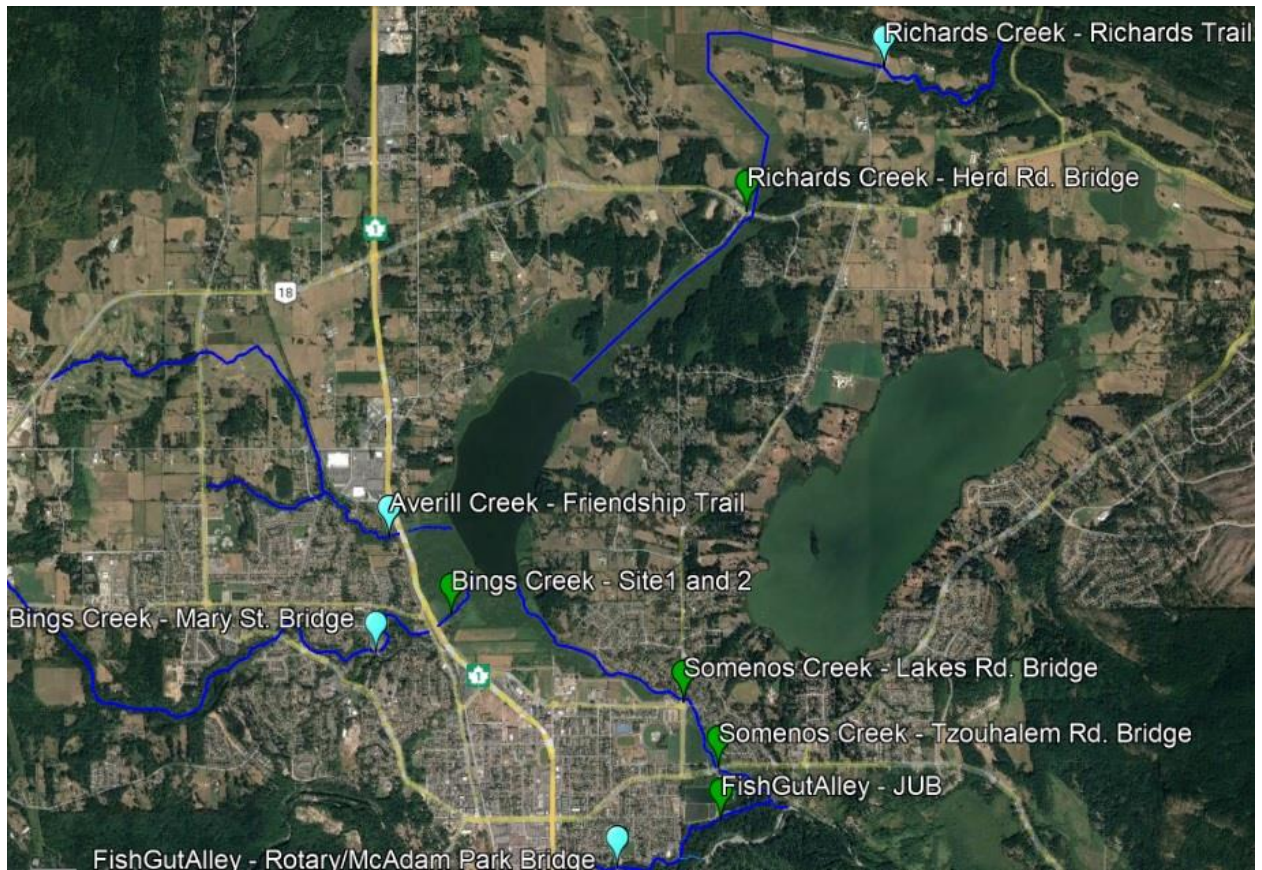


Figure 1: Monitoring Stations for Salmon Spawning Activity in the Somenos Watershed

Note: Blue monitoring sites are good locations for the public to look for spawning activity. Green monitoring sites are checked by SMWS weekly in the fall.

Fish Inventory Study

The purpose of the fish inventory study this year was to look at data gaps of our historical vs current knowledge in the watershed. Specifically, fish species, life stages, locations, and seasons they are found in the Somenos Watershed. There are some unnamed watercourses that have not been studied before, thus it is important to fill those data gaps, and to better understand where fish are living in the watershed. Our focus is on salmonids (trout/salmon), other species of interest (e.g.: peamouth chub, cutthroat trout), and the diversity in each watercourse. This data will help SMWS update the fisheries baseline in the watershed and to track changes over time from anthropogenic impacts or restoration activity.

Sites chosen for minnow traps in each creek were based on:

- new restoration sites (Bings and Averill Creek),
- where SMWS observed fish, but were unconfirmed (Richards, Chesterfield creek, and Sportsplex),
- unknown fish presence: Firehall ditch/unnamed channel.

Each site had multiple minnow traps set to increase fishing time and were set overnight for at least 24 hours. Each trap was baited with a handful of strong scented marshmallows bought at Canadian tire. Locations of each minnow trap were recorded with GPS software and are seen in Figure 2.

- Bings Creek: four minnow traps were set in three restoration sites (two at site 4, one at site 5, and one at site 6).
- Averill Creek: eight minnow traps were set at the new restoration site, including pools immediately upstream and downstream.
- Richard Creek: three minnow traps were set at Richards Creek at Richards Trail upstream and downstream of the culvert.
- Chesterfield Creek: three minnow traps were set at the culvert downstream Lakes Road.
- Sportsplex pond: two minnow traps were set in the pond.
- Sportsplex unnamed creek: three minnow traps were set throughout the creek.
- Firehall ditch/unnamed channel: two minnow traps were set by the culvert.

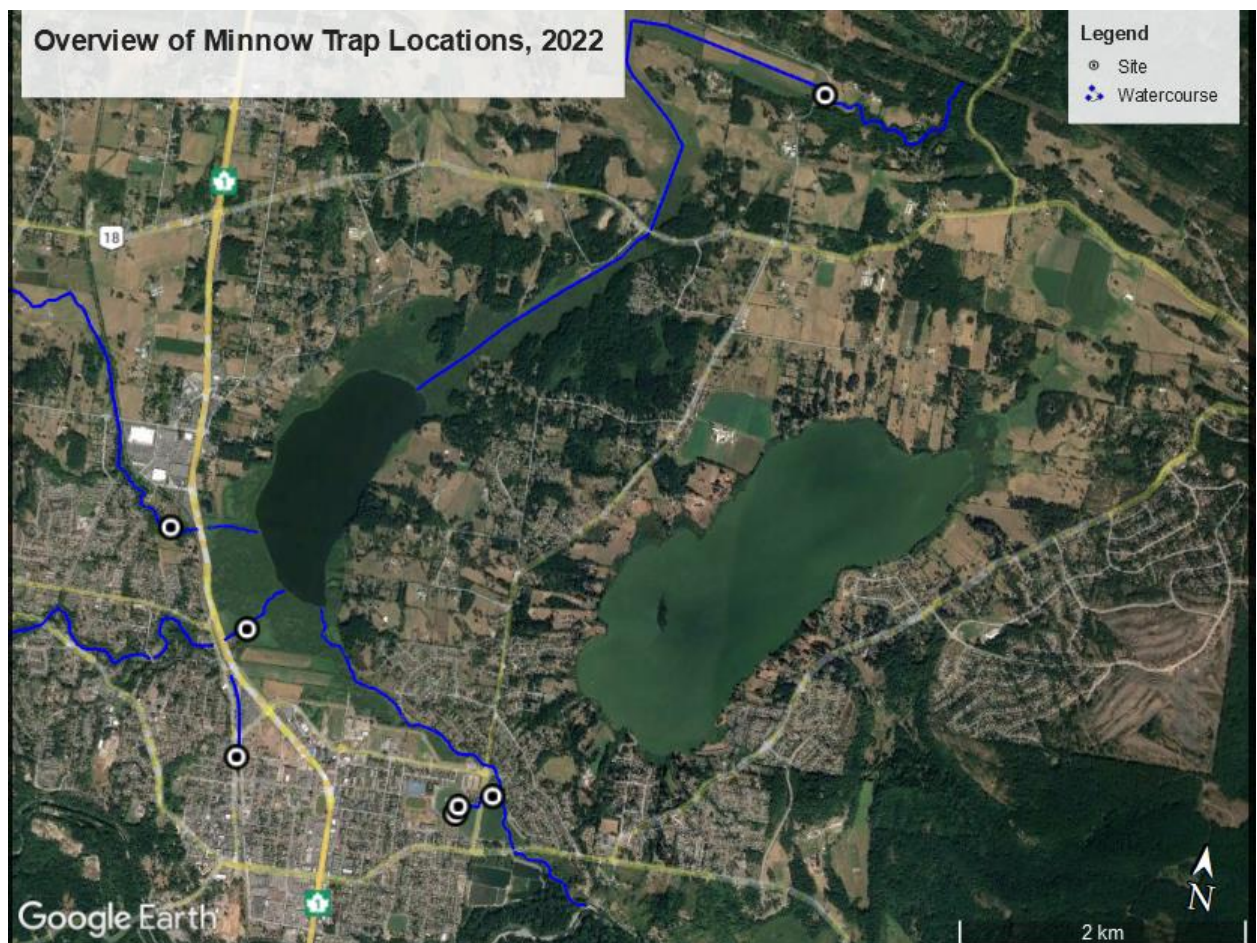


Figure 2: Overview of Minnow Trap Sites in 2022

Results

Salmon Watch

Weekly water quality (WQ) checks of dissolved oxygen and temperature were completed in December to determine the start of salmon spawning migration. During the weekly WQ checks (Dec. 5th, 12th, 19th 2022) salmon observations were recorded. In addition, known spawning areas were checked and spawning fish recorded.

All locations include: Bings Creek (Restoration Sites 1-4, Westwood Estates, Mary/Phillips St.), Averill Creek (Downstream Falls, Restoration Site 1), Richard Creek (Herd Road, Richards Trail, Innisvale-Rice Road, Todd Williams – near Osbourne Bay Road), Somenos Creek (Lakes Road, Tzouhalem Road) Somenos Lake (dock), Fish Gut Alley.

SMWS closely monitored the dissolved oxygen in Somenos creek at Lakes Road and Richards Creek at Herd road. Somenos Creek was below optimum migration levels (<6mg/L) until December 5th, making it difficult for fish to migrate into the lake and upstream into the tributary creeks before this date (Figure 3). However, dissolved oxygen at Richards Creek at Herd road did not recover to fish migration level until December 12. Another potential spawning barrier in December was that the water temperatures dropped between 0.6-2.4°C (Figure 3). Coho spawning migration normally occurs above 4.4°C and thus likely caused spawning fish to slow and wait until conditions warmed (pers comm. Dave Priekshot, MNC). Flow levels were also still low at this time and may have been a factor in slowing migration timing. It was not until late December when precipitation increased, raising flows as seen at the Bings Creek water station (Figure 3), that temperatures began to rise in Somenos tributaries. Spawning salmon were not observed by SMWS members until Jan. 5, 2023. This date is indicated by the vertical yellow line in Figure 3.

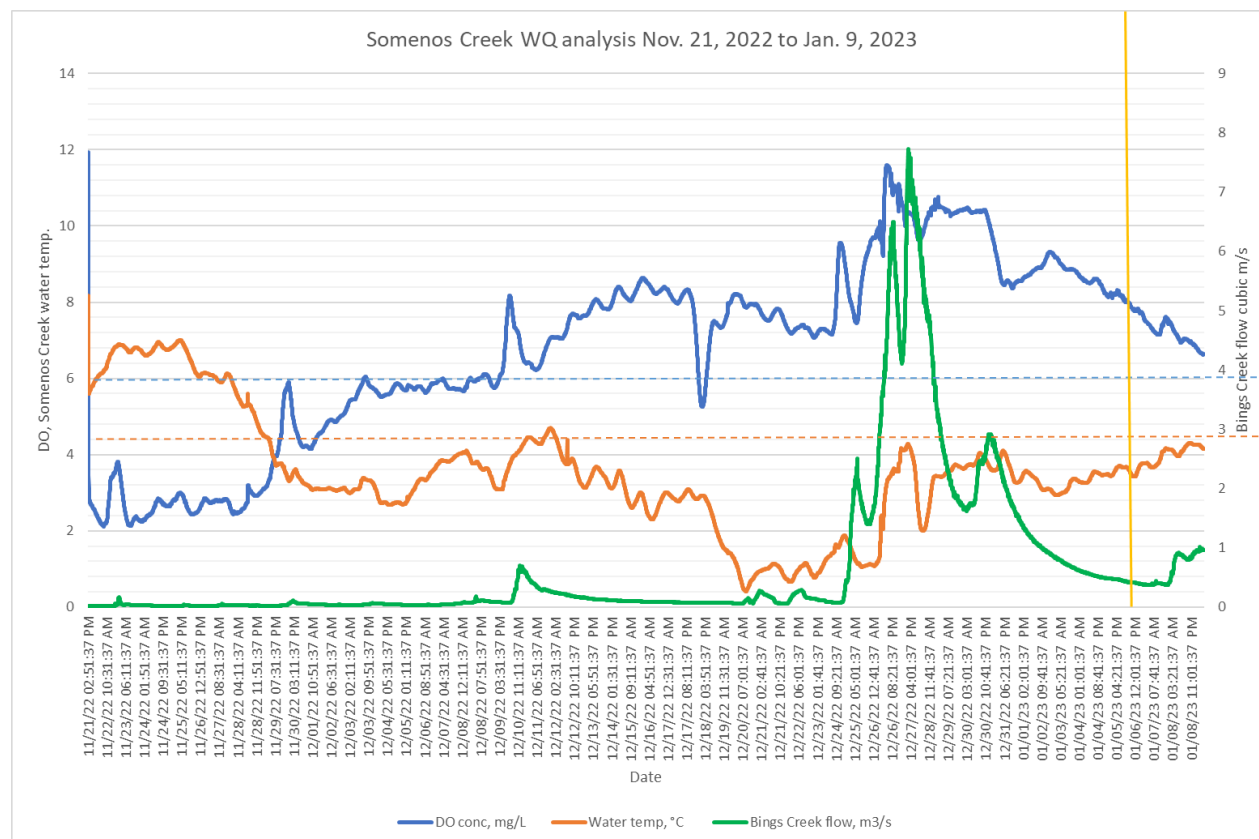


Figure 3: Somenos Creek Water Quality Analysis of Temperature, dissolved oxygen and a comparison with Bings creek flows.

The results of the weekly fish monitoring observations recorded in December 2022 into January 2023 are as follows:

Bings creek:

- Westwood Estates in Reach 3
 - o Dec. 19 - found 1 fresh adult salmon tail which may have been left by an eagle sitting upstream. No spawning salmon observed.
 - o Jan. 12 – 3 spawning fish observed resting beneath undercut banks.
- WQ station in Reach 2
 - o Dec.5, 12, 19, 2022; Jan4, 16 2023 - Mary/Phillips st. Bridge - no spawning fish observed
- Restoration Sites in Reach 1
 - o Dec.5, 12, 19, 2022; Jan4, 2023 – Restoration sites 1 and 2 – no spawning observed
 - o Jan 16, 2023 - We were not able to get volunteers to monitor this location due to flooding, low clarity and high-water depth (over banks).

Averill creek:

- New restoration site 1
 - o Jan. 5 – 3 spawning fish observed
- Immediately downstream of the Falls
 - o Jan. 12 – 3 spawning fish observed resting in pools (1 making a redd)
 - o Jan. 16 – no fish. Water levels, flows, and turbidity were too high to observe anything.

Richards creek:

- Herd Road – staff checked weekly during water quality sampling. No fish observed.
- Richards Trail – staff checked weekly during water quality sampling. No fish observed.
- Todd Williams property – he did not observe any fish this year
- Innisvale – Jan 16, no fish observed.

Somenos Creek:

- Lakes Road – staff checked weekly during water quality sampling. No fish observed.
- Tzouhalem road – staff checked weekly during water quality sampling. No fish observed.

Someons Lake:

- dock / residents - no fish observed or reported

Fish Gut Alley:

- Joint Utilities Board – James Robinson updated us weekly, and no fish were observed.

Figure 4 shows the spawning salmon observation sites for 2022-2023. The blue locations are where fish were observed, the red locations had no spawning fish observations.

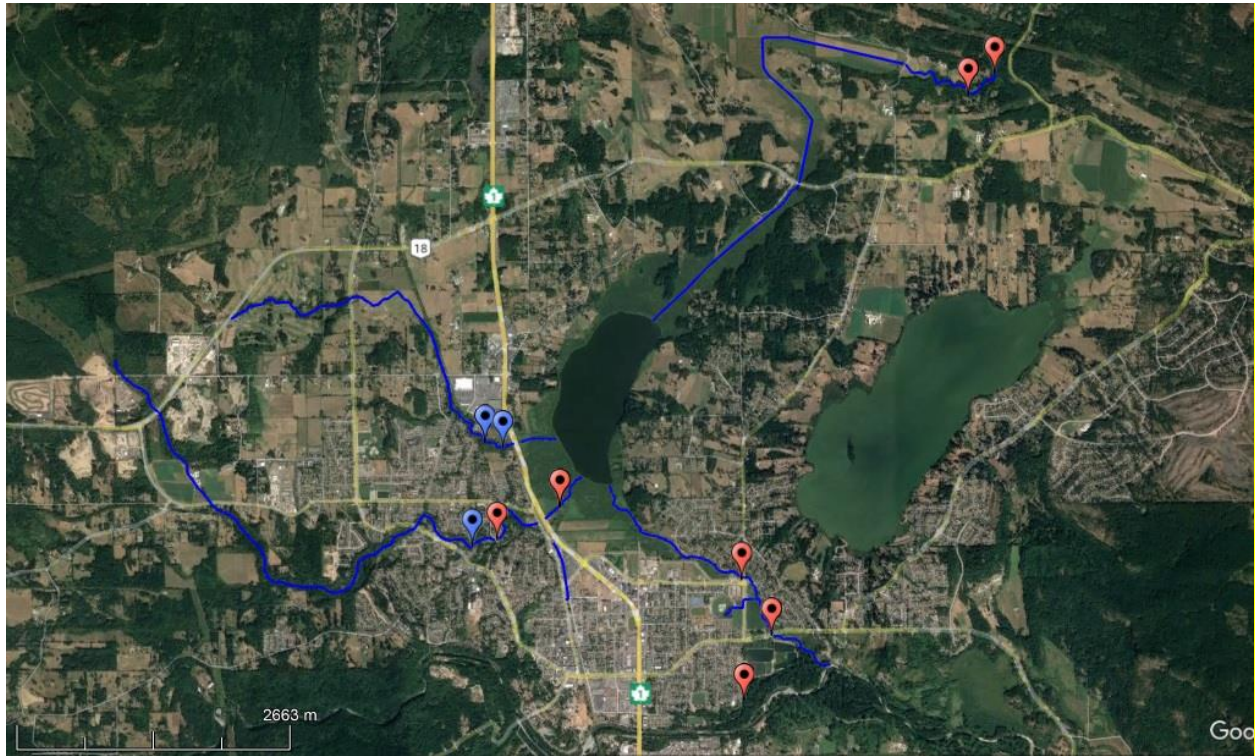


Figure 4: Spawning observation sites. 2022-2023

Historical Literature Review

Somenos Lake fish catch results in the FDIQ database were obtained by gill netting at the outlet, in May (1980), July (1985) and October (2005) (see Table 1). Unknown methods were used in January (1931, 1993), February (1999), and the fall of 2011 and 2019.

The Somenos Lake spring catch results included Threespine stickleback (1980), Sculpin (general) (1980), immature Rainbow and Cutthroat trout (1980). Summer catch results (1985) included immature Rainbow trout and Coho salmon. The fall results (2005) included all immature fish or unknown maturity of Brown catfish, Pumpkinseed, Coho salmon, Rainbow trout (2019), Prickly sculpin, and a mixture of mature and immature Cutthroat trout (2011) at the outlet. In winter, data includes Brown trout (1993) and Brook trout (1931).

Table 1: Historical Summary of Fish Species recorded in FDIQ in Somenos Watershed Waterbodies, (accessed database in 2022).

Species	Averill Creek	Bings Creek	Menzies Creek	Richards Creek	Somenos Creek	Somenos Lake
Coastal Cutthroat Trout	●	●	-	-	●	-
Coho Salmon	●	●	●	●	●	●
Cutthroat Trout	●	●	●	●	-	●
Chum Salmon	●	●	-	●	●	-
Steelhead	●	●	●	●	●	-
Brook Trout	●	-	-	-	-	●
Brown Trout	-	●	-	-	●	●
Brown Trout (Anadromous)	-	●	-	-	-	-
Rainbow Trout	-	-	●	●	-	●
Stickleback (General)	-	●	-	-	●	●
Lamprey (General)	-	●	-	○	-	-
Pumpkinseed	-	-	-	-	●	●
Sculpin (General)	●	●	-	-	-	●
Prickly Sculpin	-	-	-	-	-	●
Brown Catfish (formerly Brown Bullhead)	-	-	-	-	-	●
Threespine Stickleback	-	○	-	-	-	●
Peamouth Chub	-	-	-	-	-	●

Note: There is no data for Raphael Creek, tributary to Averill Creek in FDIQ.

○ = observations, ● = captured, '-' = no data.

Fish Inventory Study, 2023

Fish have been observed rearing in summer the shallow tributaries that enter Somenos Lake such as Bings, Averill, and Richards. However, data on what species and where they go late summer is limited. We know that fish have been observed in the Sportsplex wetland, unnamed creek, and Chesterfield Creek, which drains into Somenos Creek. Therefore, it is another rearing refuge for fish to escape the low oxygen and high summer temperatures in Somenos Creek. The unknowns are what species are present there which are presented in this report.

Bings, Averill, and Richards Creek

The Richards Creek inventory was completed upstream and downstream of Richards Trail, near the culvert. This location is one of our water quality sites where we see fish regularly over the year. It is also upstream of Herd Road where oxygen is below survivability of fish for most of the summer. Results concluded in finding cutthroat trout and coho salmon fry living in the same habitat (Table 2). Observations have also included brook lamprey at this site. Threespine stickleback were found at all locations except Richards Creek. Figure 5 shows the minnow trap sites on either side of Richards Trail.



Figure 5: Richard Creek Minnow Traps 2022

Bings Creek results showed a lot of diversity with observed brook lamprey, sculpin, crayfish, and rainbow trout schooling in the same habitat as coho salmon fry (Table 2). Minnow trap locations are shown in Figure 6.

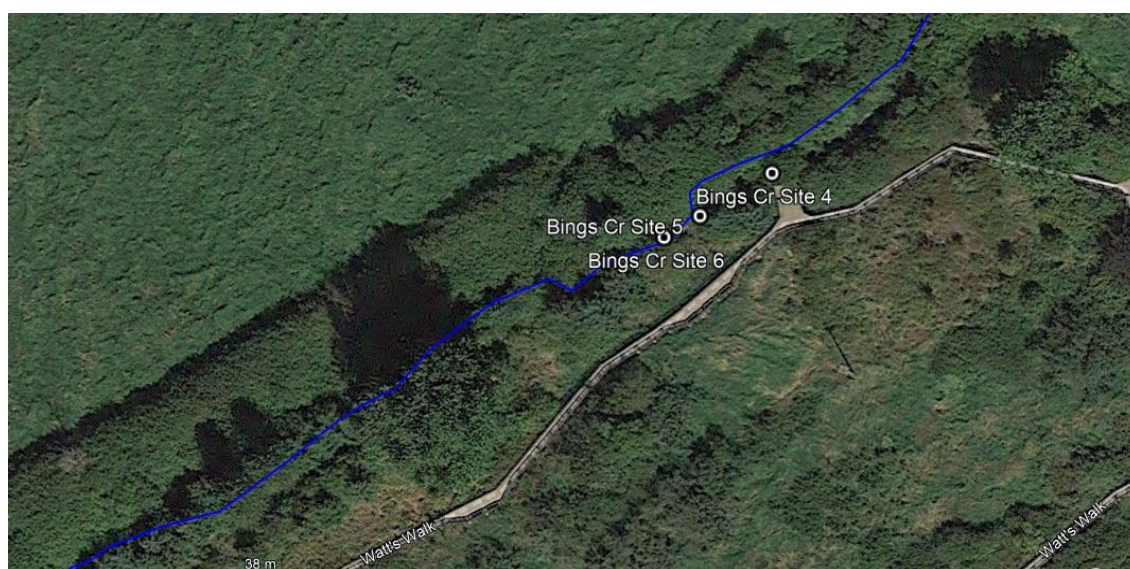


Figure 6: Bings Creek Minnow Traps 2022

Most of the fish captured in Averill Creek were Coho salmon fry, along with a few crayfish and sculpins. The trapping locations were positioned at the new salmon spawning restoration site created in 2022. This data may be used as a baseline for the restoration work. Results can be seen in Table 2, and minnow trap locations in Figure 7.

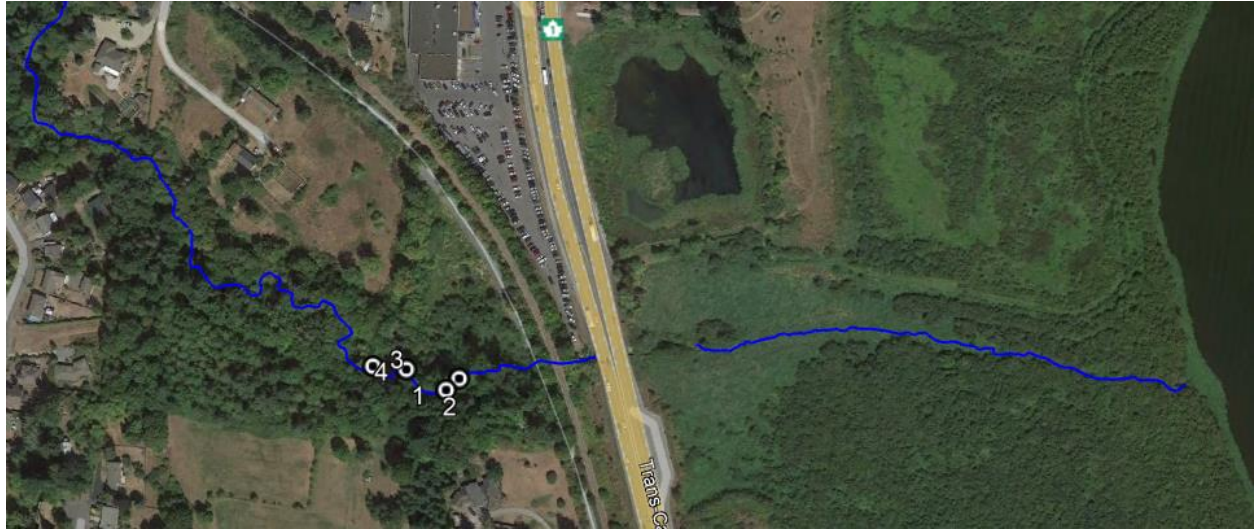


Figure 7: Averill Creek Minnow Traps 2022

The firehall ditch is a drainage of an unnamed channel of unknown origin. On Google earth and visual inspection, it looks like it could flow from Centennial Park; but this has yet to be verified (Figure 8). This drainage flows under Canada Avenue into a ditch across from the firehall. This is where the minnow traps were set (Figure 9). It then flows towards the pumping station that is used during flooding, from Bings Creek. The diverse population of fish found in the firehall ditch was surprising, however if there is a connection with Bings Creek during high flows this diversity of fish makes sense. Species found were Coho salmon fry, Threespine stickleback, an unidentified minnow, and freshwater crayfish.

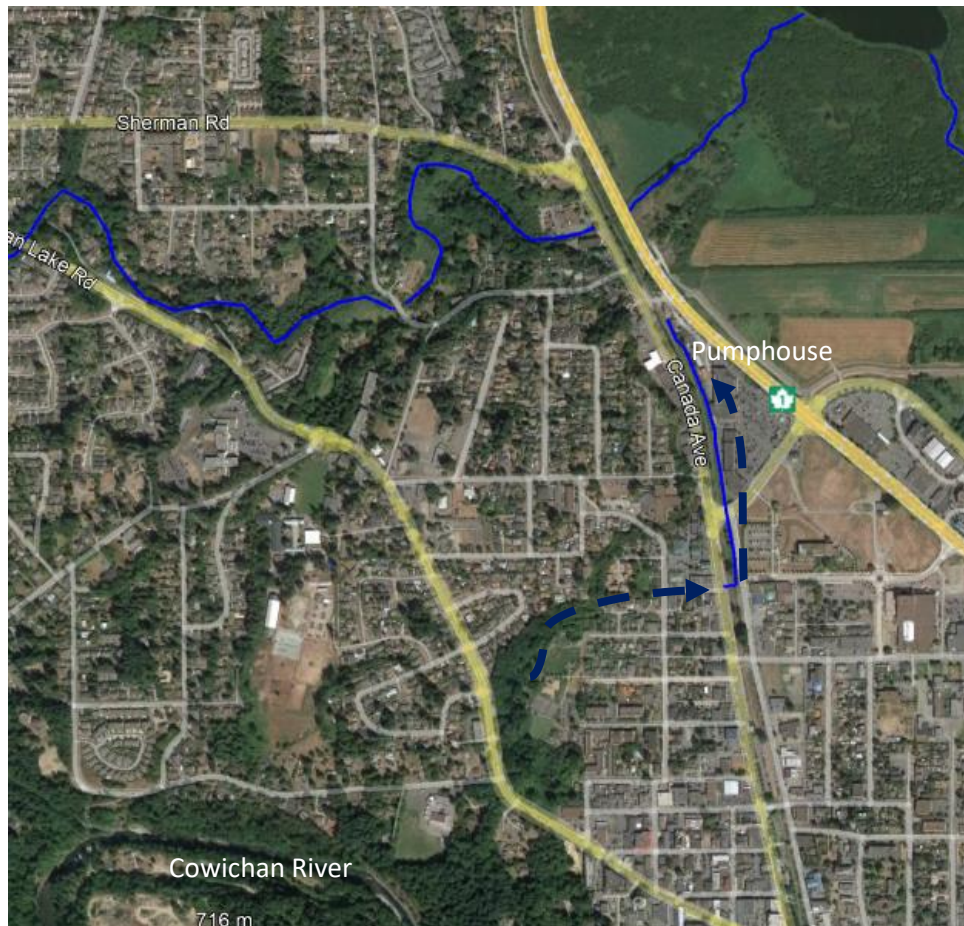


Figure 8: Overview of the Firehall ditch location and its drainage pattern.

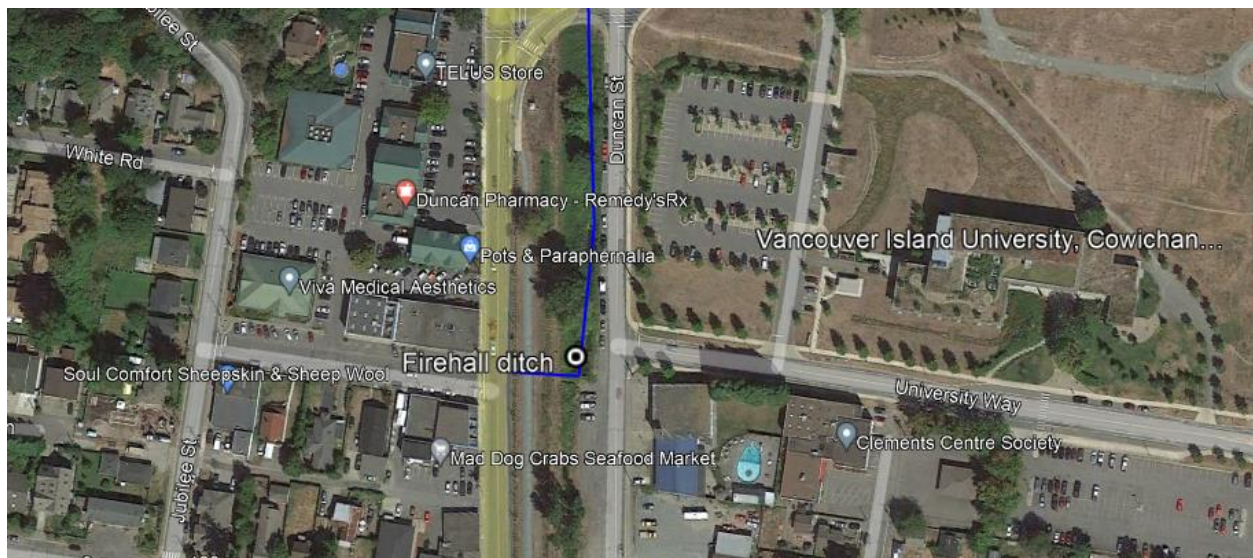


Figure 9: Firehall ditch Minnow Traps 2022

Sportsplex Wetland, Unnamed creek, & Chesterfield Creek

There is limited information available for the wetland (pond) and unnamed creek that drain from the Sportsplex. This creek flows through the pond and enters a ditch man-made ditch that is pumped under Lake Road into Chesterfield creek when it floods, eventually meeting Somenos Creek

(Figure 10). Most of the time this pump station is blocked by a one-way valve until flood waters rise - which usually occurs between fall and spring. Thus, it was surprising that Sportsplex creek has coho salmon fry which indicates spawning has occurred upstream of the road in this area, even though it is blocked. Future investigation is required to answer these new questions.

In the Sportsplex Pond we found many Threespine stickleback and one American bullfrog tadpole. The Sportsplex creek, upstream of the pond, contained Threespine stickleback and Coho salmon fry. Chesterfield creek, below Lakes Road contained Threespine stickleback, Coho salmon fry, and sculpin. This confirms that Chesterfield creek is a refuge for coho salmon in the summer when oxygen in Somenos Creek, hovers below 1 mg/L. A summary of fish caught in the creeks is in Table 2.



Figure 10: Chesterfield Creek and Sportsplex Minnow Traps 2022

Conclusions & Future Recommendations

- The Salmon Watch count in 2022 resulted in no observations of spawning fish in 2022 when they normally would. It was only until the first week in January 2023, 5 coho spawners were observed in Averill creek and 3 were observed in Bings Creek. These are very low numbers if compared to previous years, and they are usually finished spawning by this time. Therefore, due to the delay in spawning, it may be important to set traps for young of the year salmon in the spring/summer of 2023 to see what creeks they had successfully spawned in.
- Further investigation of the firehall ditch drainage system and how it connects upstream
- Establish upper extents to where coho salmon spawn and where fry are found in each tributary.
- Look for cutthroat trout and collect DNA samples to send to the province (BCMOE) to determine species uniqueness.
- Expand the Salmon Watch Program to include an underwater camera system to count migrating salmon and track the timing of the run in the fall.
- In addition to fish population studies, it will be important to study the invertebrates and algae which play a big part in being water quality indicators. All these factors will help SMWS provide an estimate of biological condition of the watershed and be able to determine changes overtime.

Table 2: Fish Inventory Results, 2022

Local Name	Date Set	Site #	Minnow Trap #	Temperature (°C)	Conductivity (µS/cm)	Sampling Time (hours)	Species	Stage	Total Number		Fish Activity	Comments		
Bings Creek	August 29, 2022	4	1	16.6	309	2.6	Rainbow Trout	fry	3	50	rearing			
	August 29, 2022					2.6	Coho Salmon	fry	3		rearing			
	August 29, 2022		2			2.6	Threespine Stickleback	juvenile	1		rearing			
	August 29, 2022					2.6	Coho Salmon	fry	2		rearing			
	August 29, 2022	5	3			2.6	Threespine Stickleback	juvenile	6		rearing			
	August 29, 2022					2.8	No Fish Caught	-	0		-			
	August 29, 2022	6	4			3.0	Rainbow Trout	fry	16		rearing			
	August 29, 2022					3.0	Threespine Stickleback	juvenile	17		rearing			
	August 29, 2022					3.0	Western Brook Lamprey	juvenile	2		unknown			
Averill Creek	September 21, 2022	2	1	12.3	244	24.5	No Fish Caught	-		10	-			
	September 21, 2022	1	2			24.6	Coho Salmon	fry	3		rearing			
	September 21, 2022		3			24.4	Coho Salmon	fry	4		rearing			
	September 21, 2022	3	4			24.4	Coho Salmon	fry	1		rearing			
	September 21, 2022		5			25.1	No Fish Caught		0		-			
	September 21, 2022		6			25.1	Prickly sculpin	adult	1		rearing			
	September 21, 2022		7			25.2	No Fish Caught	-	0		-			
	September 21, 2022	8	25.2			Threespine Stickleback	adult	1	rearing					
Chesterfield Creek	September 27, 2022	1	1			23.9	Threespine Stickleback	juvenile	51	188	rearing			
	September 27, 2022					23.9	Prickly sculpin	adult	3		rearing			
	September 27, 2022	2	2			51.2	Threespine Stickleback	juvenile	63		rearing			
	September 27, 2022	3	3			51.4	Threespine Stickleback	juvenile	69		rearing			
	September 27, 2022					51.4	Coho Salmon	fry	2		rearing			
Unnamed Trib to Bings Creek (Firehall)	September 27, 2022	1	1	13.4	202	24.1	Coho Salmon	fry	9	93	rearing	crayfish		
	September 27, 2022					24.1	Fish Unidentified Species	juvenile	1		rearing	unknown minnow		
	September 27, 2022					24.1	Threespine Stickleback	juvenile	41		rearing			
	September 27, 2022	2	2			24.5	Coho Salmon	fry	11		rearing			
	September 27, 2022					24.5	Threespine Stickleback	juvenile	31		rearing			
Chesterfield/Sportsplex pond	October 6, 2022	3	3	13.6	137	21.9	Threespine Stickleback	juvenile	172	313	rearing			
	October 6, 2022	4	4			22.0	Threespine Stickleback	juvenile	141		rearing	1 bulltrout tadpole		
Chesterfield/Sportsplex creek	October 6, 2022	1	1	13.5	139	20.9	Threespine Stickleback	juvenile	60	173	rearing			
	October 6, 2022					20.9	Coho Salmon	fry	11		rearing			
	October 6, 2022	2	2			21.0	Coho Salmon	fry	11		rearing			
	October 6, 2022					21.0	Threespine Stickleback	juvenile	67		rearing			
	October 6, 2022	5	3			23.3	Coho Salmon	fry	3		rearing			
	October 6, 2022					23.3	Threespine Stickleback	juvenile	21		rearing			
Richards Creek	September 29, 2022	1	1	10	200	26.0	Coho Salmon	fry	1	30	rearing			
	September 29, 2022					26.0	Cutthroat Trout (General)	parr	2		rearing			
	September 29, 2022	2	2			26.1	Coho Salmon	fry	5		rearing			
	September 29, 2022	3	3			26.2	Coho Salmon	fry	22		rearing			

