



# Pre-Spawn Mortality Rate of Coho Salmon in Swan Creek

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## Introduction

Near the University of Washington Tacoma campus there is a natural habitat that Coho salmon (*Oncorhynchus kisutch*) spawn in annually called Swan Creek, which can be seen in figure 1. Several coho populations are threatened or endangered due to many factors including pre-spawn mortality (PSM), where salmon die before spawning.

PSM of coho salmon has been linked to 6PPD-quinone, which is a byproduct of the tire antioxidant 6PPD that has reacted with ozone. Other contributing factors include severe erosional downcutting, invasive Japanese knotweed which can destabilize riverbanks, overexploitation for consumption over time, and urban stormwater runoff from developed areas, vehicles, and their tires.



Figure 1. Photograph of pond inlet at Swan Creek near the starting point where PSM rate survey is conducted. 22 Oct. 2024. Author's personal collection.

## Study Site and Methods

- Coho Salmon were monitored weekly from 10/01/2024 to 12/10/2024 at Swan Creek in Puyallup, WA, marked in figure 2.
- Part of ongoing surveys on PSM dating from 2017-Present.
- Species, hatchery or wild, postorbital to hypural plate (POHL) measurement, sex, level of decomposition, signs of injury, and PSM measured were recorded for all salmon surveyed. (PSM can be observed in figure 3)

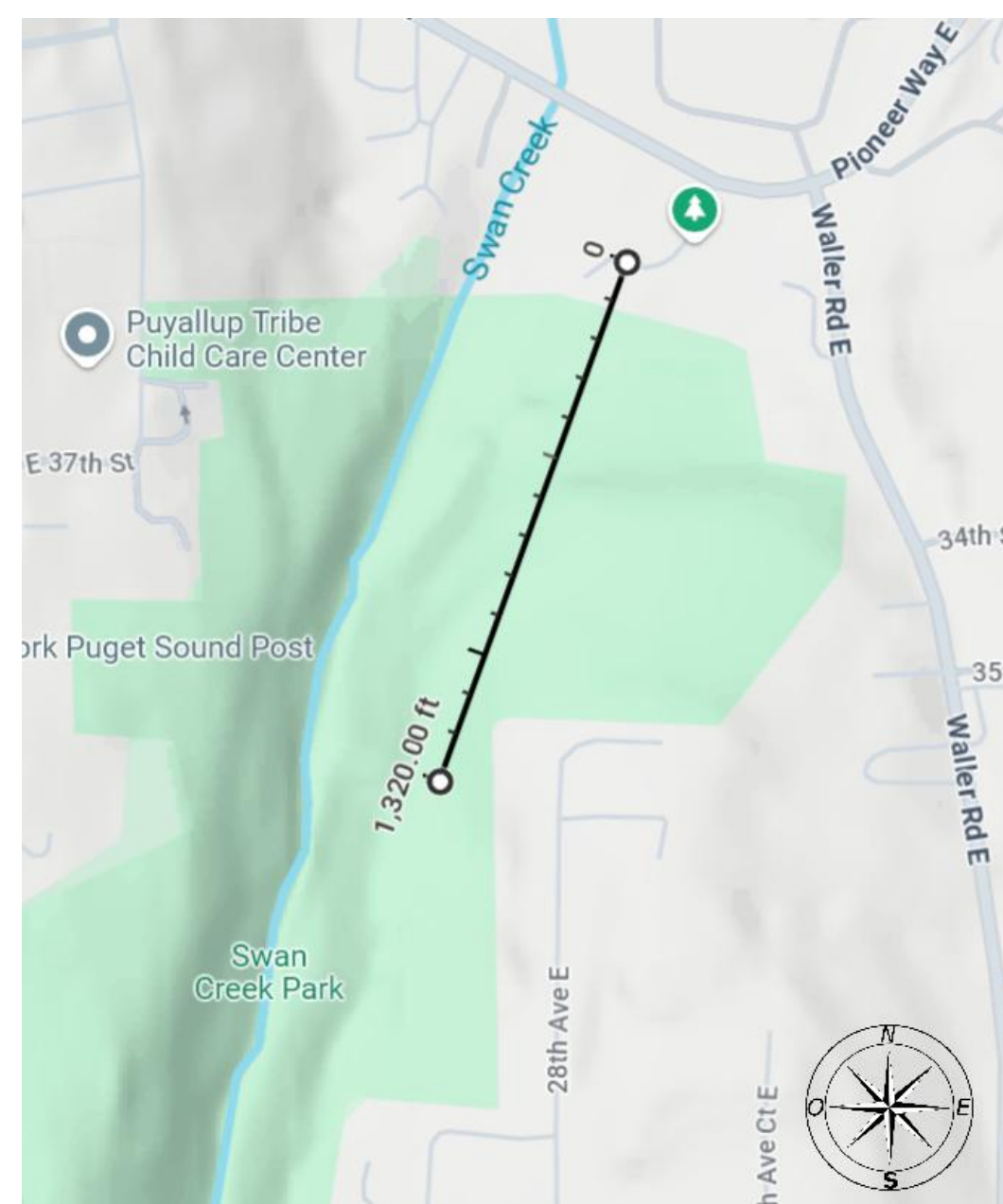


Figure 2. Map of surveyed area at Swan Creek. Google Maps, 2025, maps.google.com.

- To avoid double-counting, the caudal tail is cut off from every surveyed carcass.
- Other salmon species carcasses were additionally counted for external data collection purposes.



Figure 3. Photograph of PSM of a coho salmon at Swan Creek. 12 Nov. 2024. Author's personal collection.

## Goals and Supplemental Information

There was little monitoring of PSM rates for coho salmon being done within the south Puget Sound region. Due to this gap in knowledge, this weekly survey was established in 2017 to occur during coho spawning season, to identify and record the ongoing PSM rates in this region at Swan Creek by Pioneer Road.

By knowing the annual PSM rate of coho salmon, one can consider and understand more about the conditions of the environment in which they live.



Figure 4. Photograph of coho salmon carcasses at Swan Creek's pond inlet. 12 Nov. 2024. Author's personal collection.



Figure 5. Photograph of Puyallup Tribe replenishing Swan Creek with salmon. 28 Oct. 2024. Author's personal collection.

Ongoing efforts to improve the environmental condition of Swan Creek include

- Removal of culverts which block fish passageway.
- Knockdown of invasive Japanese knotweeds.
- Dredging the pond inlet/outlet.
- Replenishment of salmon. (Fig. 5)

## Community Outreach

Efforts to survey salmon at Swan Creek included teaching middle school students at TAF @ Saghalie in Federal Way about salmon, how they are important to the environment, to many cultures, and as a food source on November 14<sup>th</sup>, 2024. Dissection in the classroom helped students see fish anatomy and learn their unique traits, and why it is important to monitor things like PSM.

These lessons helped prepare the students in their classroom for a cooperative field day on this survey, where they had the opportunity to collect all the necessary data on November 18<sup>th</sup>, 2024.

Events were also held with the public, like Salmon Saturdays on December 7<sup>th</sup> and 14<sup>th</sup> where families came to Swan Creek to learn about salmon, their life history, and the importance of monitoring their population and PSM rates.



Figure 6. Photograph of students from TAF @ Saghalie at Swan Creek collecting salmon data on scheduled survey. 18 Nov. 2024. Author's personal collection.

## Results

The PSM rate of coho salmon at Swan Creek in this 2024 survey was calculated to be at 17.39%, with a sample size of 46 female coho salmon carcasses observed.

Date	Live Coho	COHO CARCASSES				Pre-Spawn Mortality
		Male (Hatchery)	Female (Hatchery)	Male (Wild)	Female (Wild)	
10/1/2024	0	0	0	0	0	0
10/8/2024	0	0	0	0	0	0
10/15/2024	0	0	0	0	0	0
10/22/2024	0	0	0	0	0	0
10/29/2024	25	0	0	0	0	0
11/5/2024	32	2	5	1	0	1
11/12/2024	114	7	12	2	4	5
11/19/2024	28	9	15	0	1	0
11/26/2024	15	17	6	1	0	1
12/3/2024	2	11	2	2	0	0
12/10/2024	0	6	1	1	0	1
Total	216	42	41	7	5	8
Total Carcasses		Males 59	Females 46		PSM Rate	17.39%

Figure 7. Coho salmon survey on pre-spawn mortality rate in Swan Creek. 2024. Data derived from author's own spreadsheet.

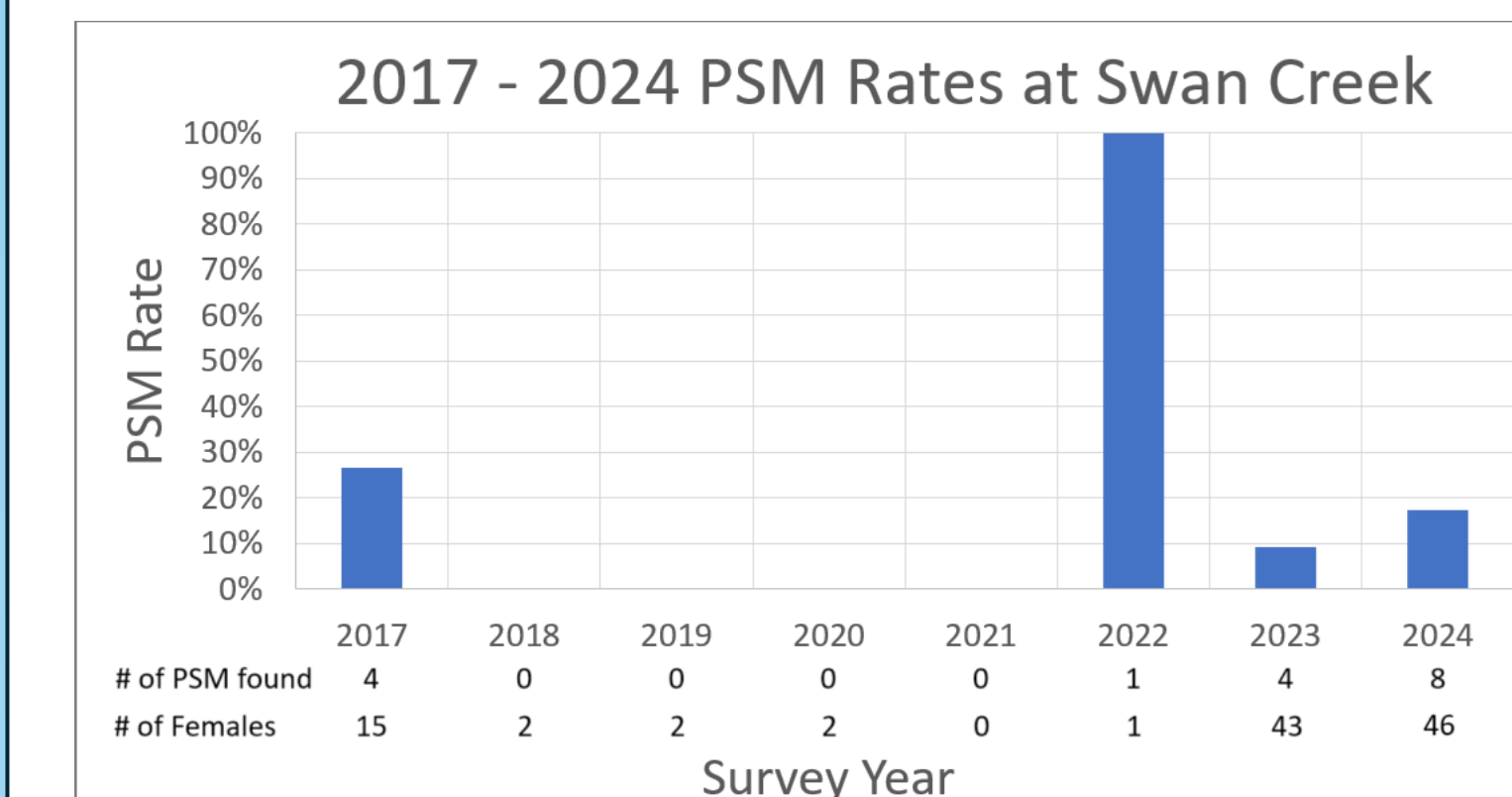


Figure 8. Bar Graph on coho salmon pre-spawn mortality rate in Swan Creek. 2024. Data derived from author's own spreadsheet.

Surveys done on previous years had a large variance in sample sizes, with data between 2018 to 2022 having two or less female coho salmon carcasses observed.

## Discussion

The analysis of collected data brings concern to the current PSM rates of coho salmon at Swan Creek. 2017 PSM rates at Swan Creek were observed and predicted to be between 10-40% (Fiest et al. 2017). This trend continues at a PSM rate of 17.39%. To help consider how urban stormwater contributes to PSM rates, observe figure 9 which shows discharge rates. One can see that after dry days end, rainfall brings a sudden occurrence of PSM among coho salmon. This may be an explanation to why PSM rates are worse in more urbanized places like King County.

A recommended way to combat PSM rates at places like Swan Creek, would be to install green stormwater infrastructure to improve overall water quality (EPA 2025).

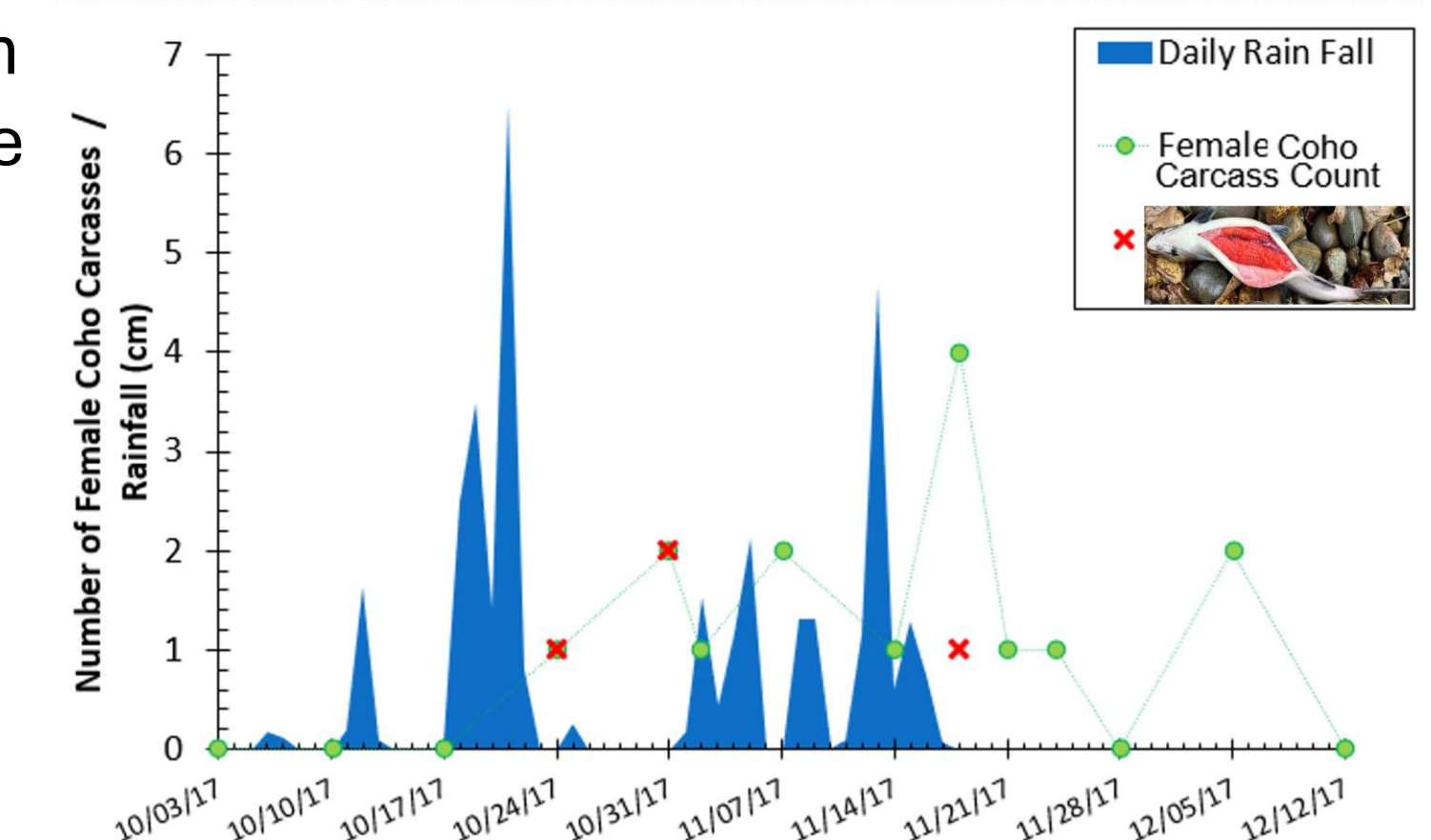


Figure 9. Graph of daily rain data showing female coho carcass count and when PSM in them were found. 2017. Pierce County, piercecountywa.gov

## Acknowledgements

Thank you to the Puyallup Tribe, TAF @ Saghalie in Federal Way, Salmon Saturdays, Pierce County, and the University of Washington for all their efforts, studies, and care for coho salmon in Swan Creek and abroad!

References are in QR Code

