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Snorkel Surveys of the Sauk and Skagit Rivers with Natural Systems Design

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Internship Title: Snorkel Surveys with Natural System Design

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Internship Dates: 05/01/2021 – 02/21/2022

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DATE: 02/21/2022

Snorkel Surveys of the Sauk and Skagit Rivers with Natural Systems Design's Jen O'Neal, Colin Riordan, and Erin Lowery of Seattle City Light

Introduction/Methods

This was a paid internship through Natural Systems Design: a Washington state-based environmental science and engineering company that focuses on bank and coastline stabilization as well as habitat conservation.

This study was conducted in the Skagit River Basin to observe what types of side-channel habitat best support juvenile Chinook and other salmon species (Lowery et al.). The Skagit and Sauk-Suiattle river basins have a total of six independent spawning populations of Chinook Salmon. Chinook salmon have three distinct life histories represented by stream type (subyearling parr and yearling), and ocean type (fry) present within the Skagit River System. Differentiating life stage is used by the 45mm threshold, fish being ≤ 45 mm parr being fry while fish > 45 mm being subyearling and yearling. Scale, otolith, observational and genetic data suggest the presence of three distinct life histories in the Skagit River Basin (SRSC and WDFW 2005, Zimmerman et al. 2015, Lowery et al. 2020).

Snorkel Surveys are an observational scientific technique used to survey fish abundance, distribution, size, and habitat (O'Neal). Surveys take place in side-channel, floodplain channel and backwater areas towards the velocity of the flow. Surveys are done during the night by a two-person crew, a snorkeler, and bank support, while the layout of the site is done the same day before the observation begins. Materials needed for layout consists of dry gear, HACH flowmeter, depth rod, and a range finder. Substrate and habitat features are estimated in representative percentages for the area of the channel being surveyed. Survey lengths differ from site-site but are at a maximum length of 200 m and maximum width of 8 m. Each site is surveyed in thirds where width, depth, and velocity are measured.

The snorkeler uses a variety of gear such as drysuits, fishing boots, dive hood, snorkel, and powerful dive light. The bank support uses waders to follow the snorkeler from a distance and record fish size and habitat data. The snorkeler's job is to keep track of the size and numbers of fish species and the type of habitat cover the fish are using. The bank support along with recording data is responsible for the safety and direction of the snorkeler in the case the snorkeler becomes disoriented.

Skagit Chinook Yearling Study Phase 3 - Fish Sampling Form					Page	of			
Site ID:	Snorkeler: Bank Supp:	Date:	Site Length (m):	H ₂ O temp (°C):	Visibility (0-3):				
Habitat type:	Channel dimensions - Avg width and depth:		Comments:						
Top of site marker GPS:		Bottom of site marker GPS:		Additional site monument info:					
Width 1:	Width 2:	Width 3:	Width 4:	Estimated Area Comments (1)					
Depth 1:	Depth 2:	Depth 3:	Depth 4:	Estimated Area Comments (2)					
Velocity 1:	Velocity 2:	Velocity 3:	Velocity 4:	Estimated Area Comments (3)					
Cover Type and % (1-4)					Substrate (% by Class)				
FA	MA	LWD	SWD	Segment 1	BR	BO	CO	CG	Segment 1
LTR	OV	UB	BO		FG	SA	FN		
AS									
FA	MA	LWD	SWD	Segment 2	BR	BO	CO	CG	Segment 2
LTR	OV	UB	BO		FG	SA	FN		
AS									
FA	MA	LWD	SWD	Segment 3	BR	BO	CO	CG	Segment 3
LTR	OV	UB	BO		FG	SA	FN		
AS									

Number	Species	Size (mm)	Structure	Comments	Number	Species	Size (mm)	Structure	Comments

Figure 1. A blank fish survey for the Skagit Chinook Assessment

Project Background

The Skagit Chinook Salmon recovery plan identified rearing habitat as the limiting factor for declines in Chinook Salmon populations in freshwater. This study consisted of a three-phase study and sought to fill data gaps presented by the recovery plan. This study was funded by Seattle City Light and used research and field data by the following agencies; WDFW, NOAA, NCC, NSD, and the Skagit Cooperative as well as the Salmon Recovery Board.

Timeline and Narrative

I began field work for Natural Systems Design on May 1st 2021 and ended my work on February 22nd. Within this period I worked for three months, those months being May, August and February. While working in numerous sidechannels throughout the Sauk and Skagit rivers I witnessed productive spawning seasons in May, August and February. With each of these seasons I saw all Salmonidae of the *Onchorynchus* and *Salvelinus* family spawning in the pools and riffles (mainly riffles), while *Prosopium* seemed to be using faster moving current in the summer and slower moving current in the spring. This all coincides with the class I took with Jim Helfield (Salmon Habitat and Ecology).



Figure 2 - Me and Robby Dohrn Beginning layout on the Sauk

The most active of the spawning seasons from my observation were in the order of February 2022 showing the most spawning while May 2021 showed the least amount of spawning. Species such as Coho, Chinook and Steelhead were all seen in all 3 months of sampling.

All esci classes I've taken, combined with fieldwork, have added to my knowledge of freshwater science on a major scale.

References

Lowery, E.D., J.N. Thompson, E. Connoe, D. Pflug, B. Donahue, and J.P. Shannahan., 2020.

Seasonal Distribution and Habitat Associations of Salmonids with Extended Juvenile Freshwater Rearing in Different Precipitation Zones of the Skagit River, WA. Report to the NCC Available: <http://www.seattle.gov/light/skagit/docs/Skagit%20Stream-Type%20Juvenile%20Distribution%20and%20Habitat%20Use.pdf>

O'Neal, J. S. (n.d.). *Snorkel Surveys by Jennifer S. O'Neal*. Docest. Retrieved February 28, 2022, from <https://docest.com/snorkel-surveysby-jennifer-s-oneal>

SRSC (Skagit River System Cooperative) and WDFW (Washington Department of Fish and Wildlife). 2005. Skagit Chinook recovery plan. SRSC and WDFW. Available: www.skagitcoop.org. (March 2015).

SRSC (Skagit River System Cooperative). 2018. Skagit River Basin Habitat Status and Trends for Freshwater Rearing Targets. March 28, 2018, 29 p.

Mara S. Zimmerman, Clayton Kinsel, Eric Beamer, Edward J. Connor & David E. Pflug. 2015. Abundance, Survival, and Life History Strategies of Juvenile Chinook Salmon in the Skagit River, Washington, *Transactions of the American Fisheries Society*, 144:3, 627-641, DOI: 10.1080/00028487.2015.1017658.