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MEMORANDUM

August 9, 2019

To: Interested parties

From: Hayley Muir

RE: Snorkel survey results for adult spring Chinook Salmon and Bull Trout in Icicle Creek, 2019

The Mid-Columbia Fish and Wildlife Conservation Office has conducted an annual summer snorkel survey in Icicle Creek since 2003, with the primary objective of enumerating adult spring Chinook Salmon and Bull Trout. The current survey methodology has been in place since 2006. The surveyed area begins at the Boulders Falls on Icicle Creek (~River Mile 5.6) and continues downstream to the Icicle Creek/Wenatchee River confluence (Figure 1).

In 2019, the snorkel survey was conducted on August 7th. The water visibility was estimated to be 3.0 m and “fair” for all sections of the river with the exception of turbulence/bubbles that obscured viewing in some small areas (eg. hatchery ladder, Structure 2 (S2), boulder pockets). The estimated flow at the Department of Ecology gauge (River Mile 2.2), located at the Icicle Bridge on East Leavenworth Road, was 78 cubic feet/second (cfs, Table 1), which was below average for this time of year and the lowest flow on record for the annual snorkel. All Bull Trout lengths indicated were visually estimated to the nearest odd centimeter. For consistency all lengths are expressed in millimeters.

Table 1. Annual Icicle Creek snorkel dates and associated discharge, measured at Department of Ecology gauge at River Mile 2.2.

Year	Date	Discharge (cfs)
2009	5-Aug	150
2010	12-Aug	300
2011	10-Aug	530
2012	9-Aug	366
2013	16-Aug	160
2014	31-Jul	300
2015	29-Jul	103
2016	10-Aug	179
2017	9-Aug	198
2018	8-Aug	121
2019	7-Aug	78

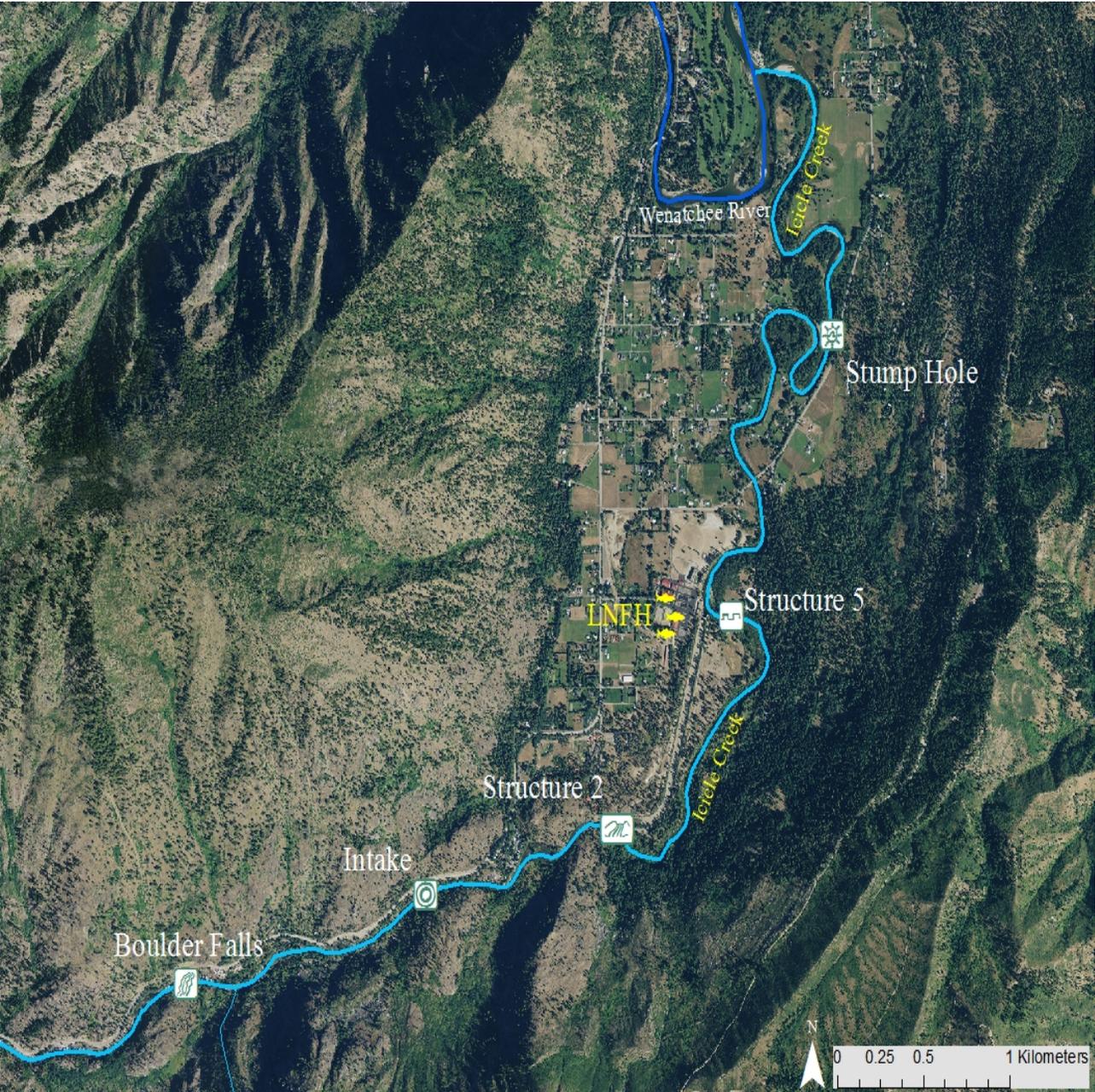


Figure 1. Surveyed segment of Icicle Creek identifying snorkel reach breaks and LNFH.

Table 2. Icicle Creek snorkel counts for spring Chinook Salmon and Bull Trout in 2019.

Reach	Reach Length (Meters)	Adult Chinook	Bull Trout	Bull Trout Size Range	# Viewers
Boulder Falls – LNFH Intake	<u>1,400</u>	0	1	290	4
LNFH Intake – S2	<u>1,220</u>	0	4	300-350	3
S2-S5 (Historic Channel)	<u>1,760</u>	3 ^a	0	0	3
LNFH Spillway Pool	<u>83</u>	2	26	300-450	3
S5 – Stump Hole	<u>2,900</u>	3	2	300	3
Stump Hole – Icicle Mouth	<u>2,100</u>	0 ^b	0	0	3
<u>Total</u>		8	33	290-450	
<u>Ave (06'-18')</u>		149	52		
<u>Min (06'-18')</u>		8	10		
<u>Max (06'-18')</u>		357	157		

^a One age-3 “jack”

^b One carcass in reach

The survey was broken into six reaches (Figure 1) and was conducted in a downstream manner with snorkelers evenly spaced across the stream. The number of adult spring Chinook Salmon and Bull Trout observed (live and carcasses are combined) and the number of snorkelers utilized per reach are in Table 2. Of the live fish observed, surveyors enumerated seven adult spring Chinook Salmon, one age-3 “Jack” sized Chinook Salmon, and 33 Bull Trout in Icicle Creek (Figure 2). Of these, no live adult spring Chinook Salmon and one Bull Trout were observed above Leavenworth National Fish Hatchery (LNFH) surface water intake (Figure 3). One Chinook carcass was observed near the mouth of Icicle Creek.

All Bull Trout observed were 450mm or less indicating they were juvenile/sub-adult fluvial Bull Trout (M. Nelson pers. comm.). This is a slight increase to previous years, when approximately 80% of observed Bull Trout were classified as juvenile/sub-adult fluvial fish. One potential hybrid Bull Trout x Brook Trout was observed upstream of the LNFH Intake.

The fish ladder at LNFH was operated from May 22nd until July 2nd. During this time, an estimated 1,142 adult spring Chinook Salmon ascended the fish ladder and entered the adult holding pond. Pickets were installed at Structure 5 on May 22nd, blocking passage of Chinook Salmon until June 24th when pickets were removed.

Spring Chinook Salmon redd surveys are conducted annually in Icicle Creek. The escapement number is calculated as: one plus the male-to-female ratio from sampled broodstock at LNFH times the observed number of redds (Table 3, (Hillman, 2017)). Annual variation between snorkel count and estimated escapement could be attributed to seasonal movements of Chinook Salmon into and out of Icicle Creek prior to spawning or undocumented redd superimposition.

Although enumeration of adult spring Chinook Salmon and Bull Trout was the primary objective, some additional observations were noted. Rainbow Trout and Cutthroat Trout were abundant in most upstream reaches (Boulder Falls- S2). Mountain Whitefish were observed in all six reaches with 50 Mountain Whitefish encountered above S2. Two Sockeye Salmon were observed below S2, however, one of these was a pre-spawn mortality.

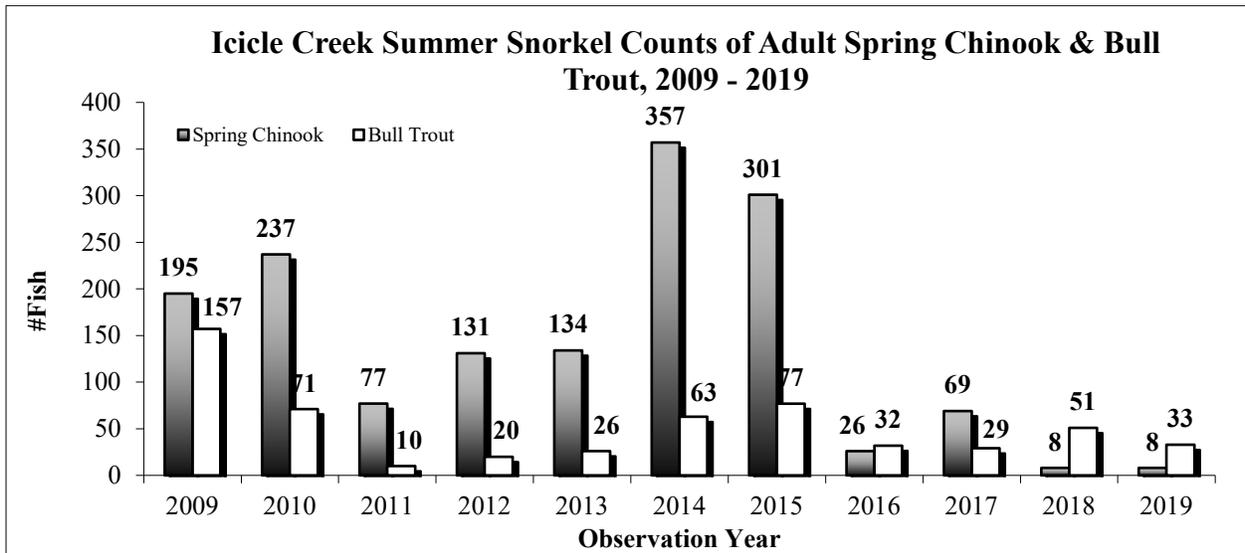


Figure 2. Icicle Creek snorkel survey counts by year.

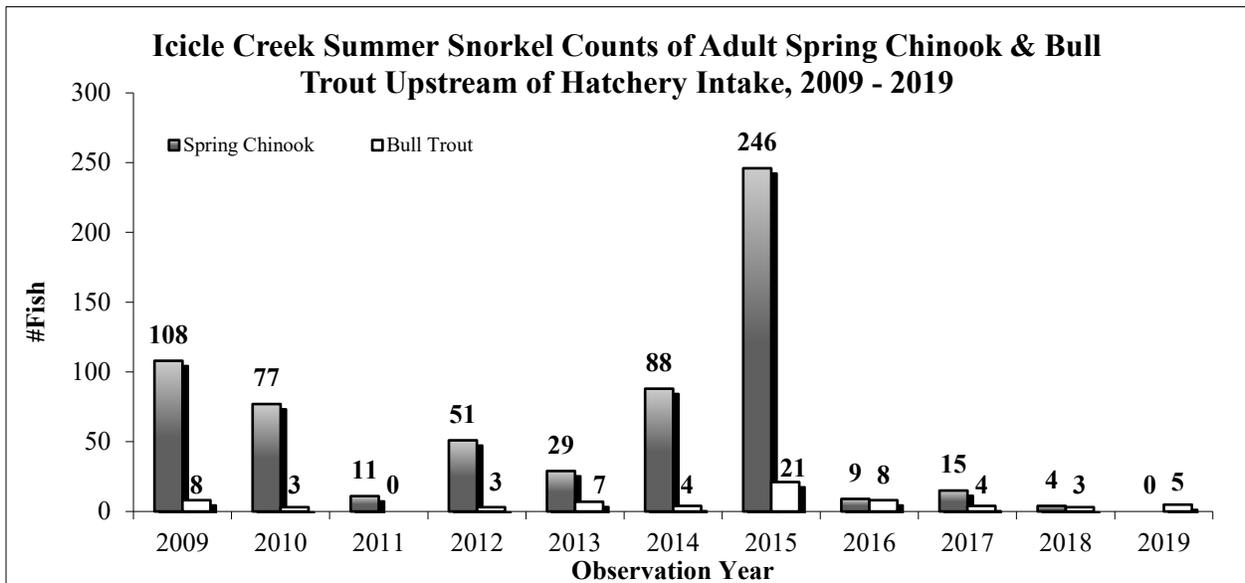


Figure 3. Icicle Creek snorkel survey counts above the Hatchery Intake, by year.

Table 3. Annual snorkel count and the estimated spawning escapement for spring Chinook Salmon found in Icicle Creek 2009-2019.

Year	Snorkel Count	Estimated Spawning Escapement
2009	195	87
2010	237	422
2011	77	325
2012	131	378
2013	134	187
2014	357	424
2015	301	253
2016	26	132
2017	69	75
2018	8	5
2019	8	TBD



2019 snorkel crew and support staff

Literature Cited

Hillman, T., M. Miller, M. Johnson, C. Moran, J. Williams, M. Tonseth, C. Willard, S. Hopkins, B. Ishida, C. Kamphaus, T. Pearsons, and P. Graf. 2017. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2016 annual report. Report to the HCP and PRCC Hatchery Committees, Wenatchee and Ephrata, WA.