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MEMORANDUM

August 10, 2017

To: Interested parties

From: Hayley Potter

RE: Snorkel survey results for adult spring Chinook Salmon and Bull Trout in Icicle Creek, 2017

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 2017, the snorkel survey was conducted on August 9. The weather was sunny but hazy due to a layer of smoke. The water visibility was estimated to be 3.5m and “fair” for all sections of the river with the exception of turbulence/bubbles that obscured viewing in some small areas (ie. 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 198 cubic feet/second (cfs, Table 1), which was average for this time of year. 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)
2006	3-Aug	NA
2007	31-Jul	176
2008	6-Aug	195
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

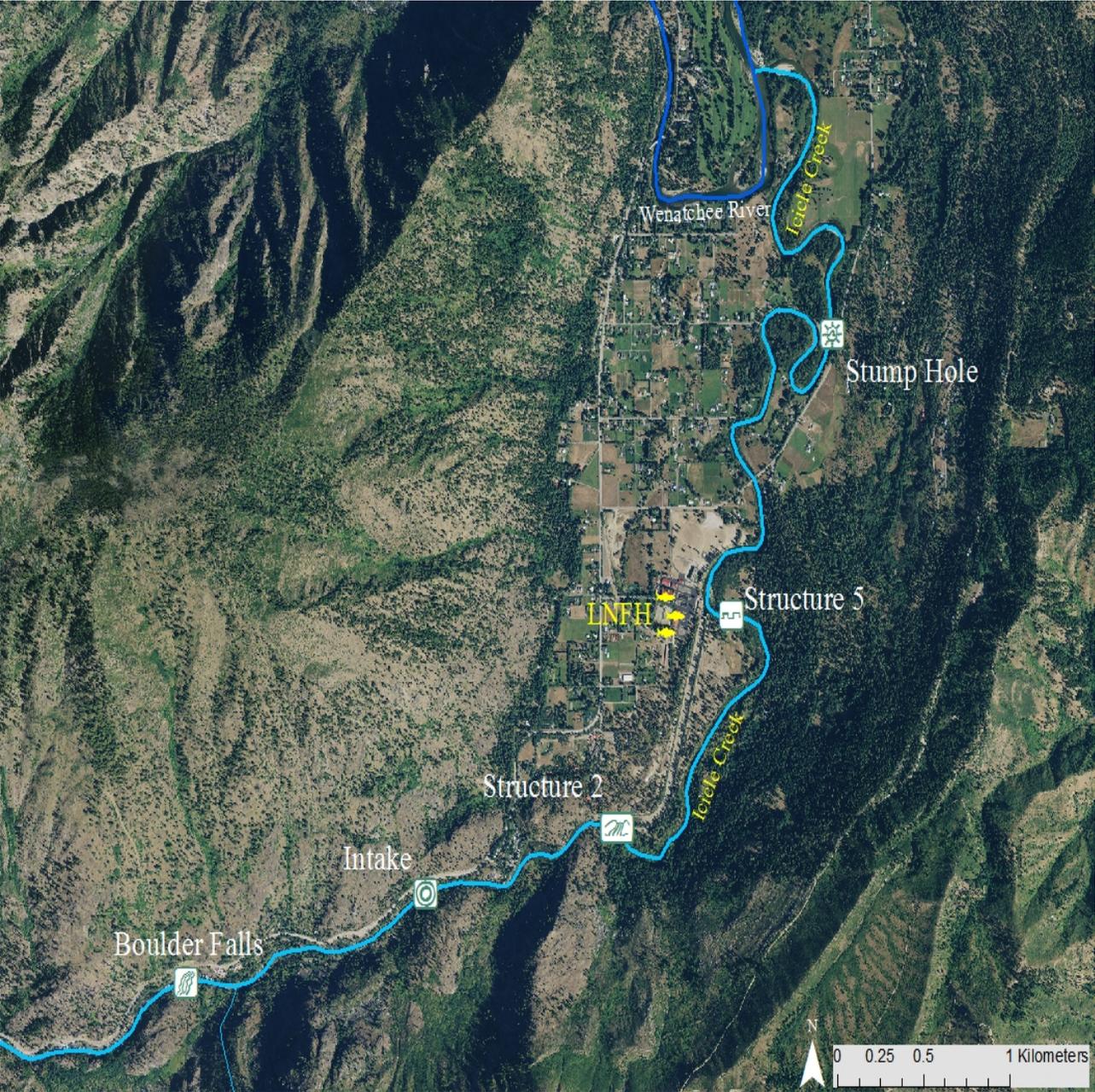


Figure 1. Surveyed segment of Icicle Creek identifying snorkel reach breaks and LNFH.

Table 2. Icicle Creek snorkel counts for spring Chinook Salmon and Bull Trout in 2017.

Reach	Adult Chinook	Bull Trout	Bull Trout Size Range (mm)	# Viewers
Boulder Falls – LNFH Intake	15	4	(190-510)	4
LNFH Intake –S2	24	8	(210-510)	3
S2-Structure 5 (Historic Channel)	28	2	(250-470)	3
LNFH Spillway Pool	0	7	(250-330)	3
Structure 5 – Stump Hole	2	8	(310-630)	3
Stump Hole – Icicle Mouth	0	0		3
Totals	69	29	(190-630)	
2006-2016 Ave	169	54		
2006-2016 Min	26	10		
2006-2016 Max	357	157		

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. The surveyors enumerated a total of 69 adult spring Chinook Salmon and 29 Bull Trout in Icicle Creek (Figure 2). Of these, 15 adult spring Chinook Salmon and 4 Bull Trout were observed above Leavenworth National Fish Hatchery (LNFH) surface water intake (Figure 3).

Of the 29 Bull Trout observed, 21 (82%) were 450mm or less indicating they were juvenile/sub-adult fluvial Bull Trout (M. Nelson pers. comm.). This is similar to previous years, when >80% of observed Bull Trout were classified as juvenile/sub-adult fluvial fish.

The fish ladder at LNFH was opened on May 18th. Due to the predicted low return of spring Chinook to Icicle Creek, the fish ladder remained open until June 29th, when production needs were met. Following June 29th the fish ladder was opened and closed intermittently to minimize strays and to maximize catch opportunity by sport and tribal harvest fisheries. The fish ladder was closed for the season on July 13th. During this time, an estimated 1,162 adult spring Chinook ascended the fish ladder and entered the adult holding pond (Figure 4).

Spring Chinook 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 spring Chinook Salmon and Bull Trout was the primary objective, some additional observations were noted. Rainbow Trout were abundant in most upstream reaches (Boulder Falls- S2). Mountain Whitefish were observed in all six reaches with 14 Mountain Whitefish encountered above the LNFH surface water intake. Five adipose clipped and one adipose intact summer Chinook Salmon were encountered below S2.

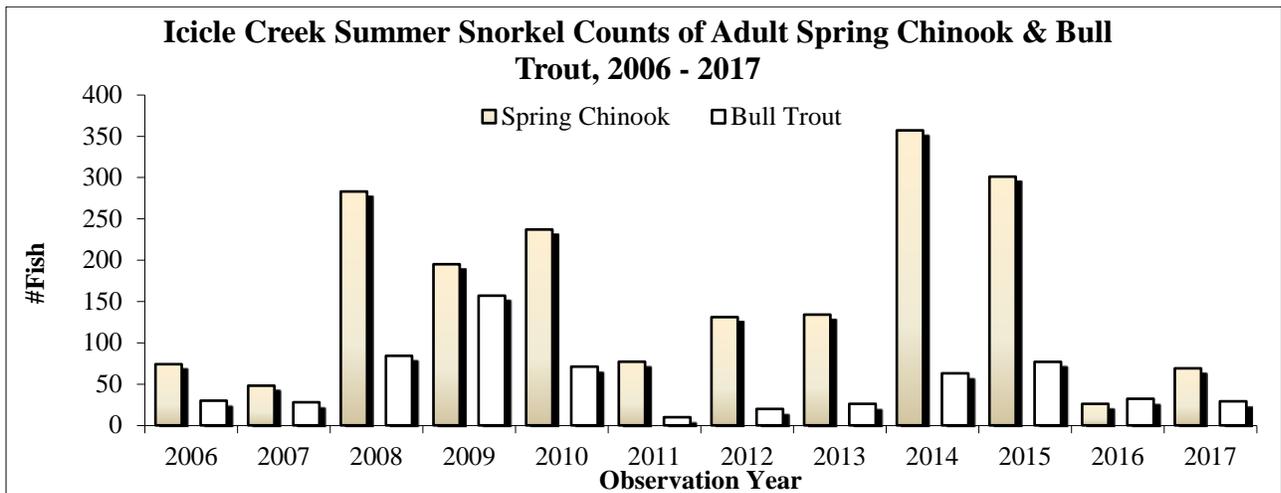


Figure 2. Icicle Creek snorkel survey counts by year.

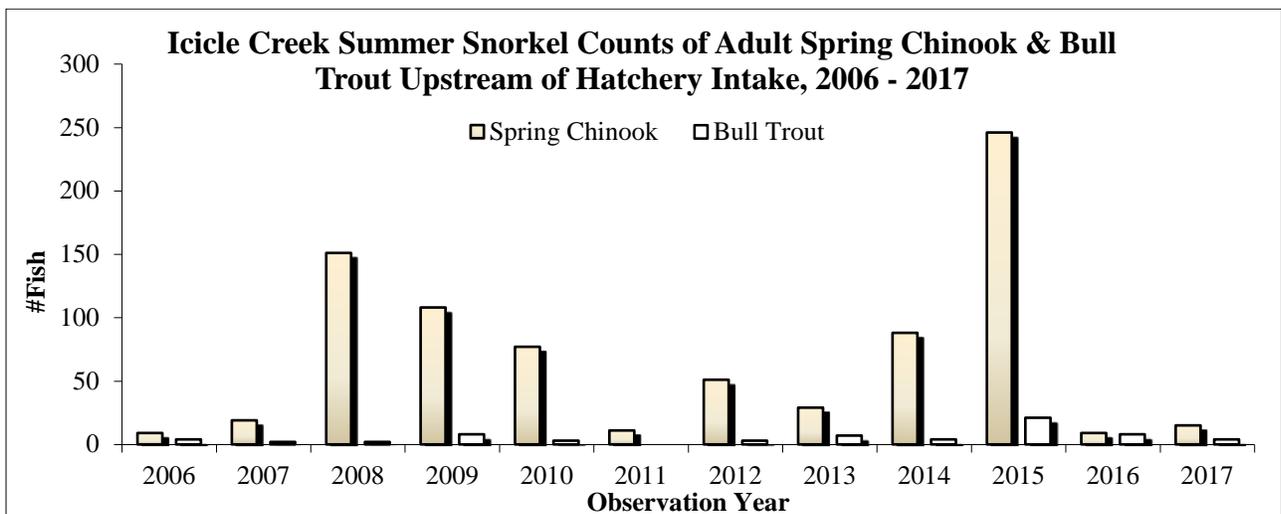


Figure 3. Icicle Creek snorkel survey counts above the Hatchery Intake, by year.

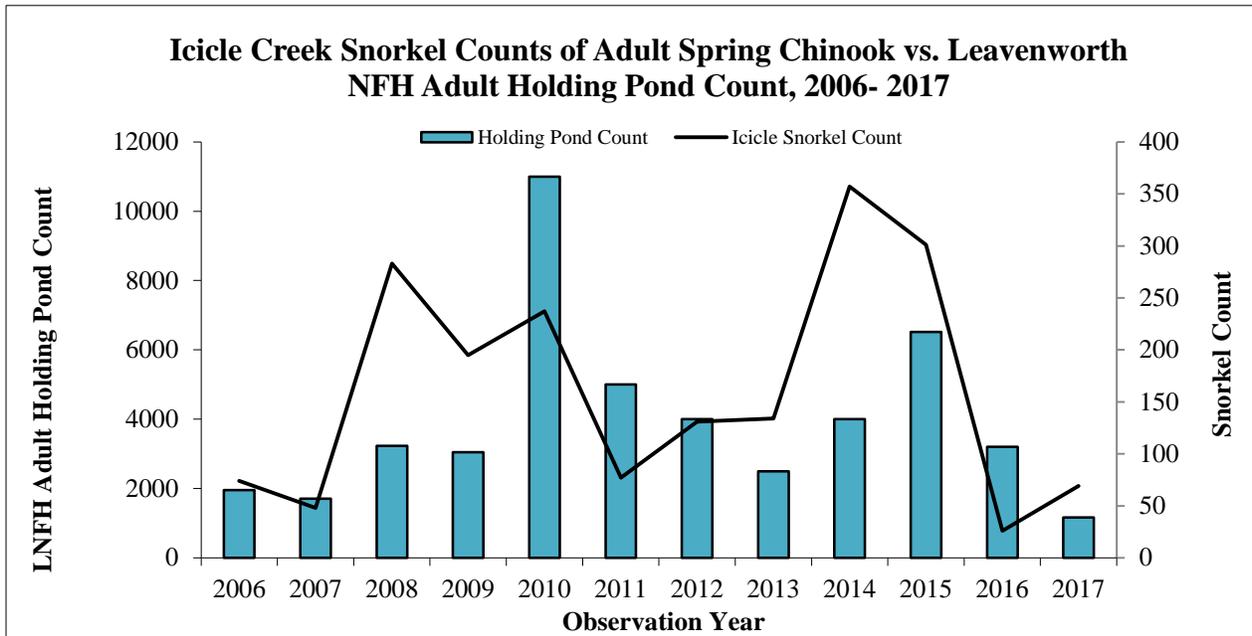


Figure 4. Icicle Creek snorkel counts vs. LNFH adult holding pond counts, by year.

Table 3. Annual snorkel count, the estimated escapement number, and accuracy of snorkel surveys for spring Chinook Salmon found in Icicle Creek 2006-2017.

Year	Snorkel Count	Escapement Estimate	% of Escapement
2006	74	90	82.2
2007	48	32	150.0
2008	283	205	138.0
2009	195	87	224.1
2010	237	422	56.2
2011	77	325	23.7
2012	131	378	34.7
2013	134	187	71.7
2014	357	424	84.2
2015	301	253	119.0
2016	26	132	19.7
2017	69	TBD	TBD

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.