White Salmon Subbasin Steelhead Spawner Survey Summary, 2012-2019

for White Salmon Technical Workgroup

Yakama Nation Fisheries Program
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Objectives: To document recolonization, spatial distribution, and relative abundance of anadromous salmonids in the White Salmon River subbasin following the removal of Condit Dam, focusing on steelhead spawners in White Salmon tributary streams, using spawner surveys/redd counts. While spawner surveys typically do not yield robust spawner abundance estimates, relative abundance in various tributaries, geographical distribution, and potentially spawner origin (hatchery/wild, basin of origin) can be determined.

Methods: Spawner survey methods generally followed those of Gallagher et al. (2007) with some modifications. Wading surveys were conducted within the known or likely geographic range for steelhead in White Salmon tributary streams, starting where possible above or near complete or partial passage barriers and moving downstream. Access due to land ownership limited survey coverage in some areas. Surveys were generally conducted every two to three weeks in each stream reach, depending on stream flows and visibility, with most reaches surveyed 2 to 4 times per season (Table 1 shows number of survey passes by stream and year). Surveys generally started in late March and ended in early or mid May. Exceptions (usually due to high flow and/or poor visibility) include mid-April starts in 2012, 2013, and 2017, and a late April end in 2015. The White Salmon River mainstem was not surveyed due to generally high flows and limited visibility. Individual redds were counted and their locations recorded using handheld GPS units. Due to inherent uncertainties associated with steelhead redd identification, redds were recorded as possible, probable, and definite redds during these surveys. Possible redds had typical redd morphology (pit and crown) with unlikely hydraulic causes, but may have had complicating hydraulic factors or coloration preventing more certain identification. Probable redds had typical redd morphology and coloration with hydraulic causes being very unlikely. Definite redds had probable redd characteristics with a fish present on or very near. Counts of live fish and carcasses were also recorded. Carcasses were examined for adipose fin and other external marks. Genetic tissue samples were also collected from carcasses for analysis and determination of basin/population of origin.

Results: Survey/stream reach mileage increased each year during 2012 to 2014 as additional access permission was sought and granted. Surveys in 2012 covered the lowermost 3.0 miles of Rattlesnake Creek (including habitat above a possible partial barrier falls at RM 1.6) and the lowermost 0.1 miles of Indian Creek. Surveys in 2013 covered the same reaches of Rattlesnake and Indian creeks as well as the lowermost 3.9 miles of Buck Creek (including habitat above a possible partial barrier falls at RM 3.6). Surveys in 2014 covered the same reaches as 2013 as well as the lowermost 0.3 miles of Mill Creek (below a partial barrier culvert) and the lowermost 0.6 miles of Spring Creek (below a barrier small

dam). Surveys in 2015 through 2019 covered the same reaches as 2014. Figure 1 shows a map of observed redds.

Table 1 (below) shows counts of redds, live adults, and carcasses observed in each year of the surveys by stream. Figure 2 shows the trend observed to date in redd counts in consistently-surveyed reaches in all four streams.

No redds, live fish, or carcasses were observed in the 2012 surveys. In the 2013 surveys, a total of 7 possible redds and 4 probable redds were observed. Two possible redds and 3 probable redds were recorded on Rattlesnake Creek; five possible redds and 1 probable redd were recorded in Buck Creek; and no redds were observed in Indian Creek. In addition, one live steelhead (in Buck Creek) and two steelhead carcasses (one each in Rattlesnake and Buck creeks) were observed. Of the carcasses observed, one had an intact adipose fin and one was too decomposed to determine adipose fin presence. Genetic samples were collected from carcasses but all tissue samples were unfortunately too degraded for genetic analysis.

In the 2014 surveys, a total of 3 possible redds and 9 probable redds were observed. One possible redd and 4 probable redds were recorded on Rattlesnake Creek; 2 possible redds and 5 probable redds were observed in Buck Creek; and no redds were observed in Indian, Mill, or Spring creeks. One live steelhead was observed in Rattlesnake Creek (jumping unsuccessfully at the RM 1.6 falls). No carcasses were observed and no genetic tissue samples were collected.

In the 2015 surveys, a total of 11 possible redds and 11 probable redds were observed. Three possible redds and 4 probable redds were recorded on Rattlesnake Creek; 5 possible redds and 7 probable redds were observed in Buck Creek; 1 possible redd was observed in Spring Creek; 2 possible redds were observed in Mill Creek; and no redds were observed in Indian Creek. No live steelhead or carcasses were observed and no genetic tissue samples were collected.

In the 2016 surveys, a total of 10 possible redds, 11 probable redds, and 2 definite redds were observed. Four possible redds and 3 probable redds were recorded on Rattlesnake Creek; 4 possible redds, 5 probable redds, and 1 definite redd were observed in Buck Creek; 1 possible redd and 1 probable redd were observed in Spring Creek; 1 possible redd, 2 probable redds, and 1 definite redd were observed in Mill Creek; and no redds were observed in Indian Creek. Three live adult steelhead were observed; 1 in Rattlesnake Creek, 1 in Buck Creek, and 1 in Mill Creek. The live steelhead in Rattlesnake Creek was observed near the upstream end of the survey area, at approximately RM 2.6, well upstream of the RM 1.6 falls. The Buck Creek and Mill Creek fish were observed on or very near redds; the Mill Creek steelhead was observed on a redd with a 10-12-inch (likely resident) rainbow trout. One adipose-present carcass was observed in Rattlesnake Creek; a genetic tissue sample was collected but has yet to be analyzed.

In 2017, surveys were precluded prior to mid April due to high flows and higher than normal flows throughout the season limited visibility in some surveys. A total of 13 possible redds and 6 probable redds were observed. Six possible redds and 1 probable redd were recorded on Rattlesnake Creek; 6 possible redds and 5 probable redds were observed in Buck Creek; 1 possible redd was observed in Mill

Creek; and no redds were observed in Spring Creek and Indian Creek. Two live adult steelhead were observed; 1 in Rattlesnake Creek and 1 in Buck Creek.

In the 2018 surveys, a total of 8 possible redds and 5 probable redds were observed. Three possible redds and 1 probable redd were recorded on Rattlesnake Creek; 5 possible redds and 2 probable redds were observed in Buck Creek; 2 probable redds were observed in Mill Creek; and no redds were observed in Spring Creek and Indian Creek. One live adult steelhead and 1 decomposed carcass were observed in Rattlesnake Creek (no genetic tissue sample was collected).

In 2019, high flows and turbidity precluded surveys in late March. A total of 11 possible redds and 2 probable redds were observed. Five possible redds and 1 probable redd were recorded on Rattlesnake Creek; 4 possible redds and 1 probable redd were observed in Buck Creek; 2 possible redds were observed in Mill Creek; and no redds were observed in Spring Creek and Indian Creek. One live adult steelhead was observed in Buck Creek and 1 decomposed carcass was observed in Rattlesnake Creek (no genetic tissue sample was collected).

Observations in the first years of these surveys provided the first known documentation of steelhead spawners returning to White Salmon River tributaries; adult steelhead had been observed and documented in the mainstem White Salmon River beginning in summer 2012 (the first full year following the breaching of Condit Dam in October 2011). Results indicate that steelhead spawners are now recolonizing most accessible streams in the subbasin. These results also suggest a moderately low level of recolonization and fairly low steelhead spawner abundance in these streams to date, with some evidence of increasing numbers of redds in the first few years after dam removal, followed by a general downward trend in more recent years (Figure 2). This pattern generally follows steelhead run size trends in the same years in nearby river subbasins and Columbia basinwide. Possible origins of these fish include stray steelhead from other river basins, large migratory rainbow trout from the White Salmon River or Columbia River, or returning steelhead from previously resident rainbow trout populations in these tributary streams. While steelhead redd counts often do not yield robust spawner abundance estimates, applying a commonly-used fish-per-redd estimate of 2.5 (Gallagher et al. 2007) to all observed redds in the peak years of 2015 and 2016 yields spawner abundance estimates of approximately 55-58 fish in the surveyed reaches of White Salmon River tributaries. Results from these surveys likely represent a minimum spawner abundance level, due to some temporal and visibility limitations (i.e., earlier-returning steelhead spawners may have gone undetected in these surveys).

References:

Gallagher, S.P., P.K.J. Hahn, and D.H. Johnson. 2007. Redd counts. Pages 197-234 in D.H. Johnson, B.M. Shrier, J.S. O'Neal, J.A. Knutzen, X. Augerot, T.A. O'Neil, and T.N. Pearsons. Salmonid field protocols handbook: techniques for assessing status and trends in salmon and trout populations. American Fisheries Society, Bethesda, Maryland.

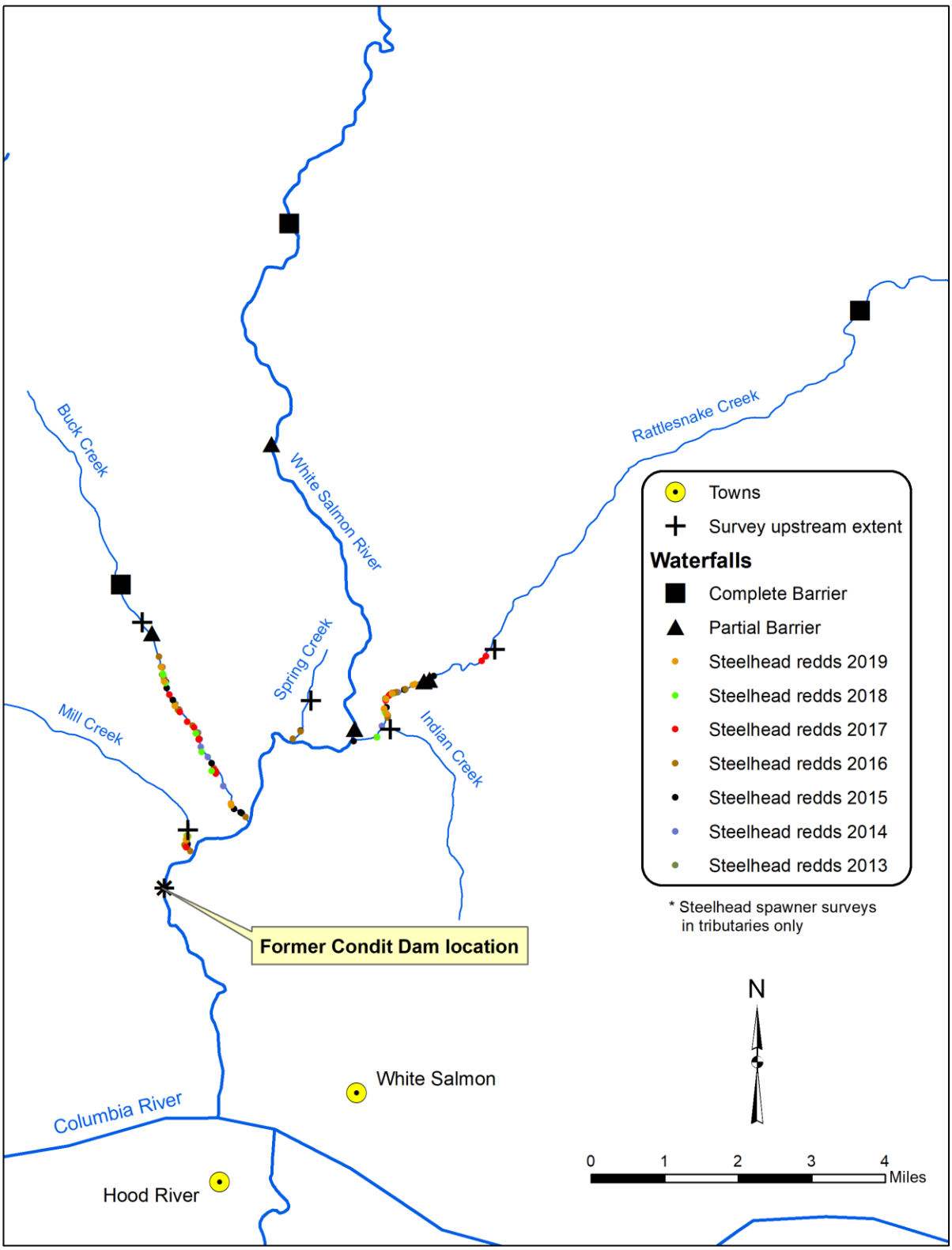

Figure 1. Observed steelhead redd distribution in White Salmon River tributaries 2013-2019. All redds observed (possible, probable, and definite) are shown.

Table 1. Counts of steelhead redds, live adult steelhead, and steelhead carcasses observed in White Salmon River tributaries 2012-2019. Number of survey passes is also shown - stream reaches with 0 or 1 pass and an asterisk (*) had low flow that restricted adult fish passage in that year.

							CARCASSES		
		# of survey	REDDS			LIVES	Adipose clipped	Adipose present	Unk
STREAM	YEAR	passes	Possible	Probable	Definite				
Rattlesnake Creek	2012	3	0	0	0	0	0	0	0
	2013	2	2	3	0	0	0	0	1
	2014	2	1	4	0	1	0	0	0
	2015	2	3	4	0	0	0	0	0
	2016	2	4	3	0	1	0	1	0
	2017	2	6	1	0	1	0	0	0
	2018	3	3	1	0	1	0	0	1
	2019	2	5	1	0	0	0	0	1
Indian Creek	2012	3	0	0	0	0	0	0	0
	2013	1*	0	0	0	0	0	0	0
	2014	2	0	0	0	0	0	0	0
	2015	2	0	0	0	0	0	0	0
	2016	1*	0	0	0	0	0	0	0
	2017	2	0	0	0	0	0	0	0
	2018	0*	0	0	0	0	0	0	0
	2019	2	0	0	0	0	0	0	0
Buck Creek	2013	2	5	1	0	1	0	1	0
	2014	3	2	5	0	0	0	0	0
	2015	2	5	7	0	0	0	0	0
	2016	3	4	5	1	1	0	0	0
	2017	2	6	5	0	1	0	0	0
	2018	3	5	2	0	0	0	0	0
	2019	4	4	1	0	1	0	0	0
Spring Creek	2014	1	0	0	0	0	0	0	0
	2015	2	1	0	0	0	0	0	0
	2016	2	1	1	0	0	0	0	0
	2017	2	0	0	0	0	0	0	0
	2018	3	0	0	0	0	0	0	0
	2019	4	0	0	0	0	0	0	0
Mill Creek	2014	3	0	0	0	0	0	0	0
	2015	2	2	0	0	0	0	0	0
	2016	3	1	2	1	1	0	0	0
	2017	2	1	0	0	0	0	0	0
	2018	3	0	2	0	0	0	0	0
	2019	4	2	0	0	0	0	0	0

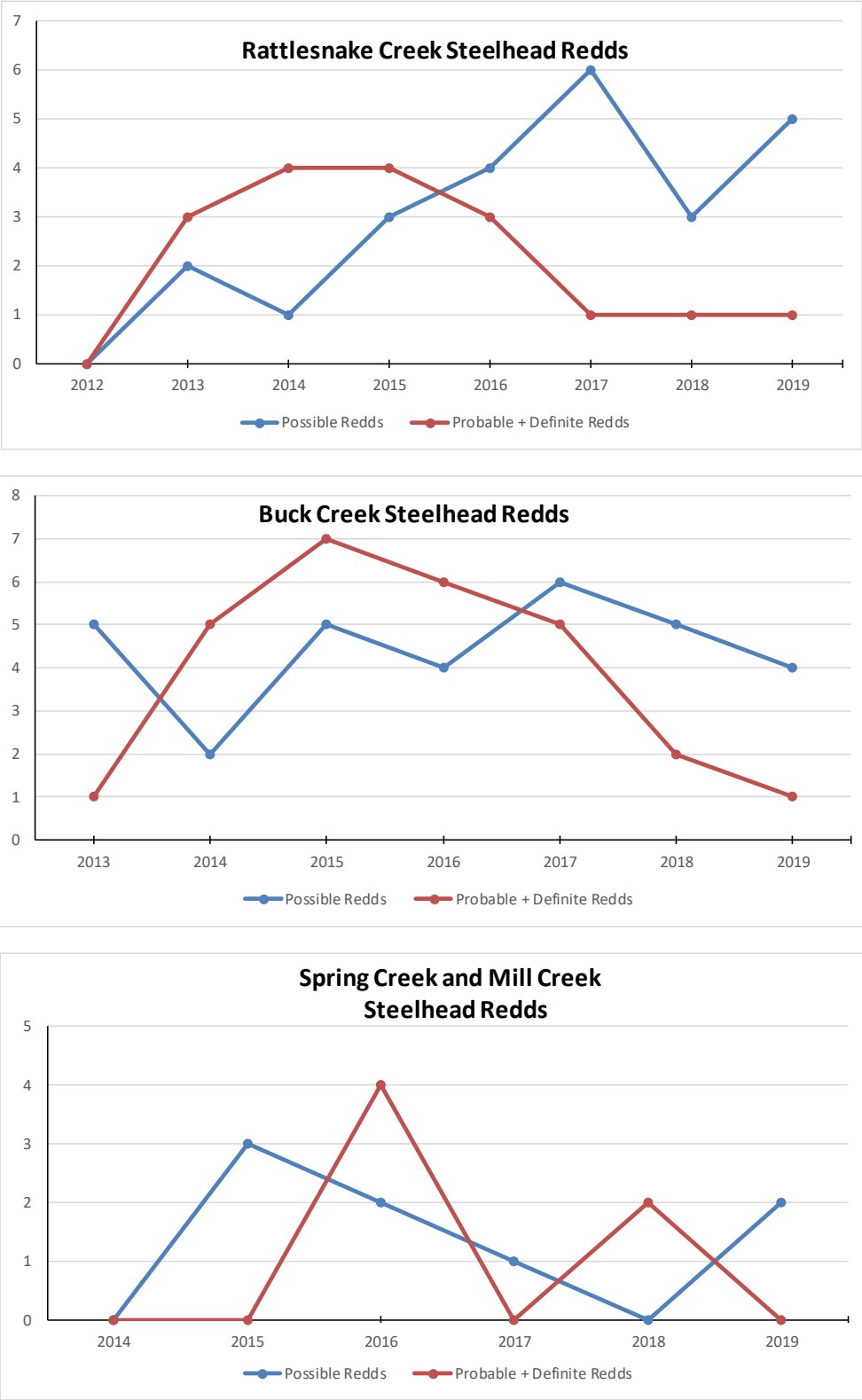

Figure 2. Trends in steelhead redd counts in consistently-surveyed reaches of White Salmon River tributaries following removal of Condit Dam (Spring and Mill Creek redd counts combined).