2019 Bull Trout Redd Monitoring in the Wallowa Mountains

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ABSTRACT

This report summarizes Bull Trout redd counts from surveys conducted in the Grande Ronde and Imnaha subbasins in 2019 and compares those with prior years. Streams surveyed in 2019 included: South Fork Wenaha River, Milk Creek, Butte Creek, Lostine River, Bear Creek, Goat Creek, Big Sheep Creek, and Lick Creek. In most surveyed streams, redd counts were average to slightly below average compared to previous years. Observed redd densities in 2018 and 2019 on the South Fork Wenaha River reflect a healthy population. We suggest using the surveyed reaches of the South Fork Wenaha River as an index reach for future monitoring of that system. We plan to continue long-term population monitoring via redd counts in priority streams in the future, though some surveys will not be conducted on an annual basis but rather on an interval schedule (e.g., 5-10 year intervals). Starting in 2020, additional monitoring strategies (e.g., eDNA, electrofishing, and/or snorkeling) will be deployed to fill information gaps on distribution and relative abundance of bull trout and brook trout, especially in basins where hybridization is a primary threat.

ACKNOWLEDGMENTS

We acknowledge the 20-year effort put forth by the U.S. Fish and Wildlife Service (USFWS) and its many partners to conduct bull trout spawning ground surveys in the Wallowa Mountains of Northeast Oregon. In 2019, the Nez Perce Tribe took on the role of coordinating some of these surveys and building on that long-term data set. This project would not have been possible without the dedication, hard work, funding, and assistance provided by all partners. We would like to thank the following partners who assisted in 2019: the USFWS, Oregon Department of Fish and Wildlife (ODFW), United States Forest Service (USFS), Oregon Watershed Enhancement Board (OWEB), and Grande Ronde Model Watershed (GRMW). Special thanks to staff who walked the streams, helped schedule surveys and surveyors, provided access to private property, helped with planning, assisted with grants, produced maps, or summarized data. These included: Gretchen Sausen (USFWS); Adam Capetillo, Lynne Price, Aaron Maxwell, Lora Tennant, Brian Simmons, Jon Rombach (NPT); Sarah Brandy (USFS); and private property landowners on the Lostine River.

INTRODUCTION

Bull trout were listed as threatened under the Endangered Species Act in 1998 due to declining populations. In response to listing and to inform recovery efforts, population monitoring has occurred through extensive efforts in NE Oregon and SE Washington (Howell et al. 2018 and references therein; Sausen 2019). Bull Trout spawning ground surveys (redd counts) have been a principal part of that monitoring, and redd counts have been conducted annually on selected Grande Ronde and Imnaha River streams from 1999 to 2019. Surveys pertinent to this report occurred within the Wallowa River/Minam River and Imnaha River bull trout core areas. In addition, surveys were also conducted within the Lookinglass/Wenaha bull trout core area in 2018 and 2019.

Objectives of this long-term monitoring included:

- Locate bull trout spawning areas.
- Determine redd (spawning nest) characteristics.
- Determine bull trout timing of spawning.
- Collect spawning density data.
- Map the location of the bull trout spawning reaches.
- Assess population trends for local bull trout populations.
- Use the information to help assess long-term recovery of bull trout.

In this report, we summarize Bull Trout spawning surveys conducted in the Grande Ronde and Imnaha subbasins in 2019 and compare those with prior years. This report addresses one of the high priorities of the Northeastern Oregon/Southeastern Washington monitoring strategy (Howell et al. 2018), to continuing long-term redd counts in designated streams.

METHODS

The Nez Perce Tribe and multiple partners conducted bull trout spawning surveys in 2019 on selected streams in the Grande Ronde and Imnaha Sub-Basins. These streams were located within the Lookingglass/Wenaha, Wallowa River/Minam River and Imnaha River bull trout core areas. Streams surveyed in 2019 for bull trout redds included; the South Fork Wenaha River, Milk Creek, Butte Creek, Lostine River, Bear Creek, Goat Creek, Big Sheep Creek, and Lick Creek (Figure 1).

This project is part of a larger effort in NE Oregon and SE Washington that occurs during September through October, the bull trout spawning period. Surveyors walk rivers and streams through selected "index areas" and other suspected bull trout habitat to locate bull trout redds. Index areas in this report refer to known bull trout spawning reaches that have been surveyed in the same consistent locations on an annual basis for approximately 20 years.

Survey protocol was consistent with past monitoring efforts (Sausen 2019) and included: 1) visits to known bull trout redds and review of survey form prior to redd count survey (for inexperienced surveyors, when needed); 2) experienced bull trout redd count surveyor(s) paired with less experienced surveyor (on-the-job training); 3) bull trout redds measured, data recorded, and redds flagged during survey; and 4) all stream flagging removed during the last survey of the year.

Data recorded during bull trout spawning surveys included: 1) date of survey; 2) stream location; 3) GPS location of each redd; 4) size of redds; 5) visibility of redds; 6) number of redds; and 7) approximate number and sizes of bull trout observed during surveys.

Bull trout redds were measured using the same methodology from 2004 through 2019 (Sausen 2019). Since redd size is directly related to the size of the fish that created it, redd size can be used to estimate the proportion of smaller resident bull trout from larger fluvial (migratory) bull trout (Howell & Sankovich 2012; Sausen 2019). We categorized redds < 1 m in length as

resident redds and redds $\geq$ 1 m in length or a total area $\geq$ 0.4 m^2 as fluvial redds. The size criteria were selected based on personal communications with Gretchen Sausen, USFWS, and data presented in Howell et al. (2018), page 12.

Based on past monitoring data, Bull Trout spawning in the study area typically occurred from approximately September 1 through October 15, and as early as August 15 in the Imnaha River system (Sausen 2019). In 2019, surveys were conducted twice (mid and late bull trout spawning season) on the Lostine River, Big Sheep Creek, Bear Creek and Goat Creek. One-time surveys were conducted on the South Fork Wenaha River, Milk Creek, Butte Creek and Lick Creek from September 24th – September 27th, presumably after the majority of spawning had finished.

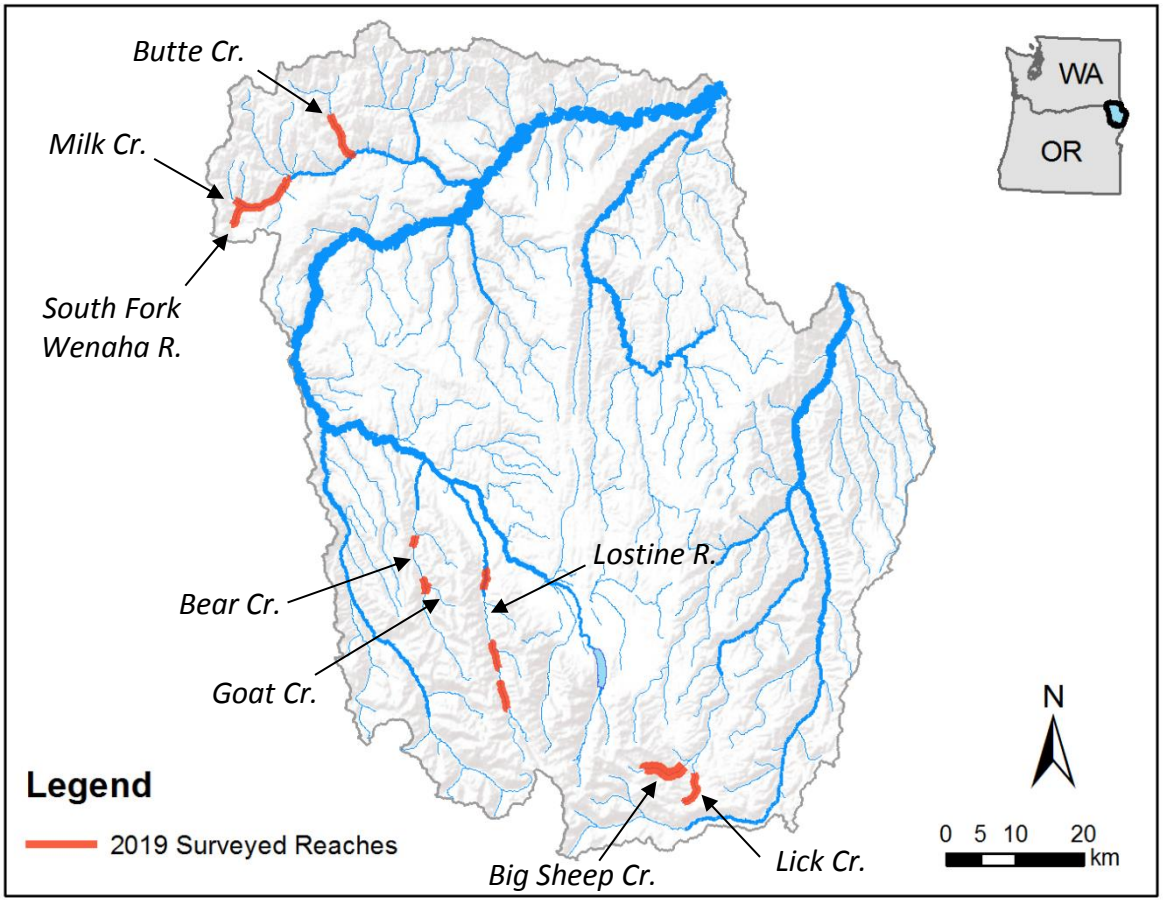

Figure 1. Location of bull trout spawning ground surveys in 2019.

RESULTS & DISCUSSION

Lostine River

The Lostine River has been considered a moderately-strong population within the Grande Ronde Subbasin (Buchanan et al. 1997). The index reaches (8.1 miles) on the Lostine River have been surveyed annually from 1999 – 2019, with index reach counts ranging from 19 to 70 redds (Figure 2). In 2019, 45 redds or 5.6 redds/mile were documented during index reach surveys in the Lostine River. These counts were similar to 2017 and 2018 and above the annual average of 38 redds per year in index reaches (1999-2018). The Lostine River has both resident and fluvial populations of bull trout. In 2019, we estimated 91% of the redds were made by fluvial fish and 9% by resident fish (Figure 3). See Appendix Table 1a for annual summary data from 1999-2019 of redds per reach and miles surveyed.

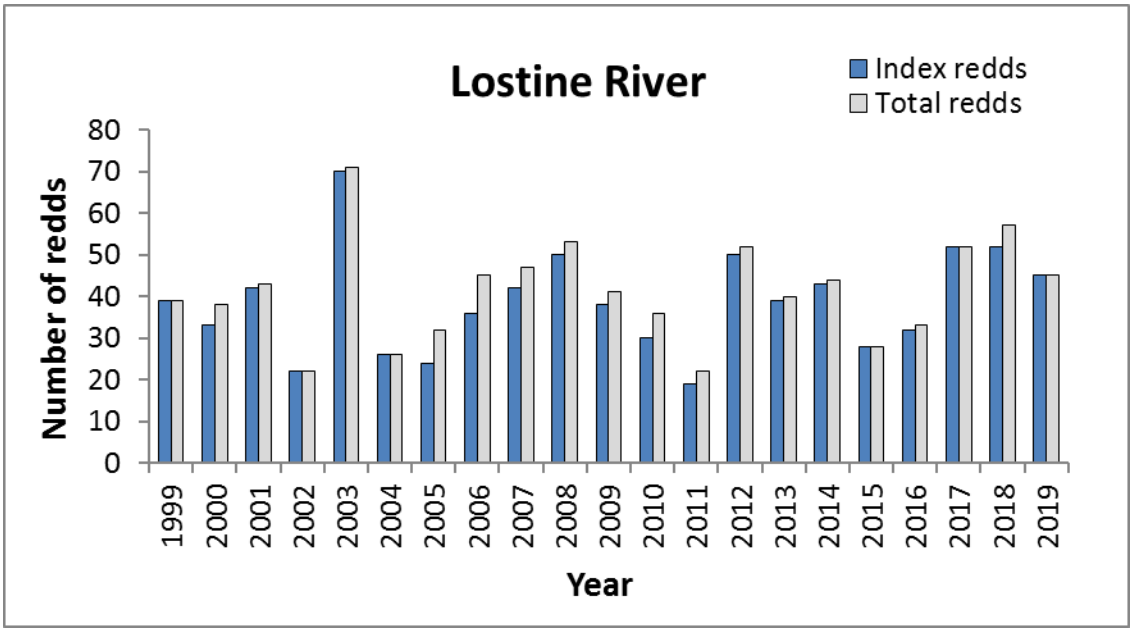

Figure 2. Total bull trout redds (grey bars) and index redds (blue bars) observed during spawning ground surveys from 1999 through 2019 in the Lostine River.

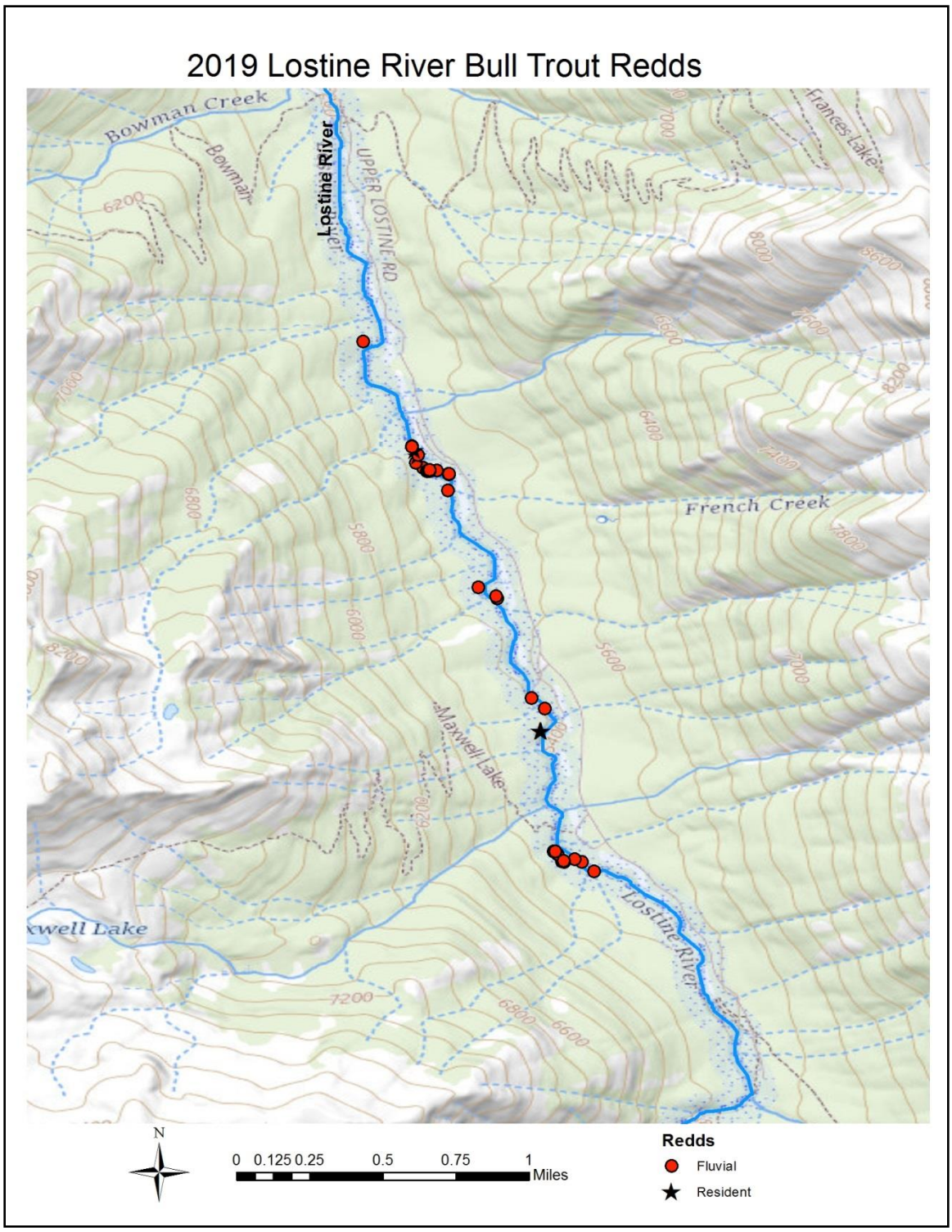

Figure 3. Location of bull trout redds observed on the Lostine River in 2019.

Bear/Goat Creek System

The 1.9 miles (1 mile Bear Cr, .9 miles Goat Cr) of index reaches on the Bear/Goat Creek system have been surveyed annually from 1999 - 2019. Bull Trout have persisted in this system, but in some years zero redds have been documented in the Bear Creek index reach. In 2019, nine redds (zero on Bear Cr) were documented on the index surveys or 4.7 redds/mile (Figure 4). From 1999 to 2018 the average redd count for the index reaches was 10 redds or 5.3 redds/mile for the Bear/Goat Creek system. Index reach redds have ranged from 2 to 19. In 2019, we estimated 44% of redds were made by fluvial Bull Trout and 56% by resident Bull Trout (Figure 5). The extent of available spawning habitat in Goat Creek appears to be limited but may provide the best available spawning habitat for fluvial fish in the Bear/Goat Creek system during drought years (Sausen 2019). Further monitoring and research is needed to better understand the resident and fluvial life histories of bull trout in this area as well as the potential threat of hybridization with brook trout (Howell et al. 2018). See Appendix Table 1b for annual summary data from 1999-2019 of redds per reach and miles surveyed.

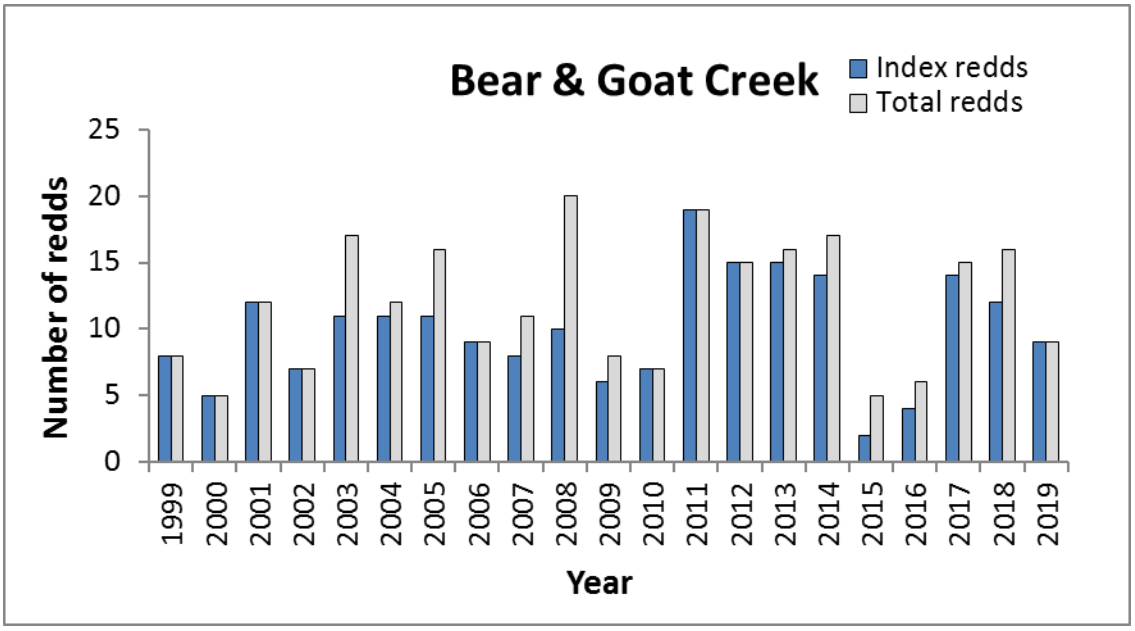

Figure 4. Total bull trout redds (grey bars) and index redds (blue bars) observed during spawning ground surveys from 1999 through 2019 in the Bear/Goat Creek System.

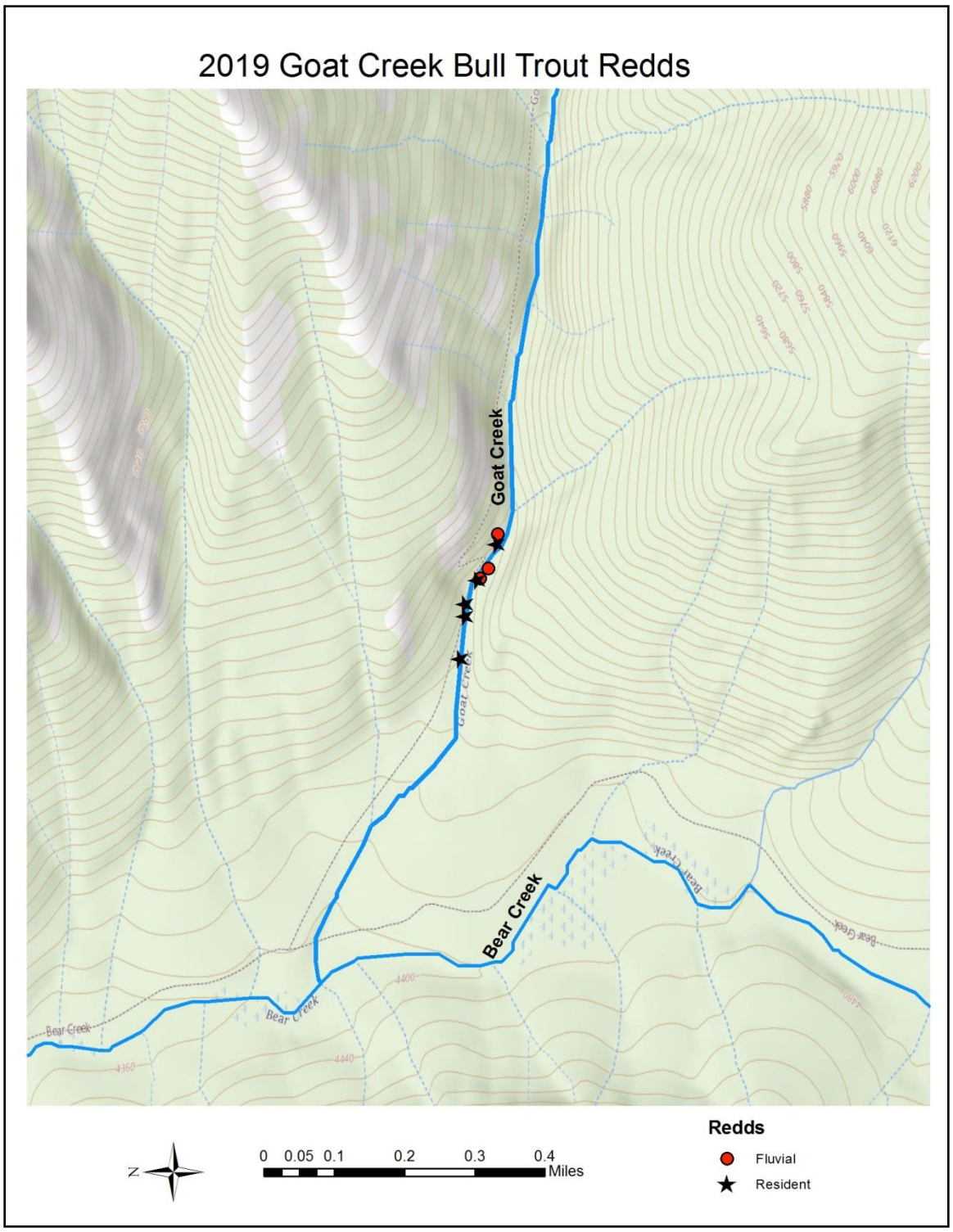

Figure 5. Location of bull trout redds observed in Goat Creek in 2019. No redds were observed in the Bear Creek survey reach.

Big Sheep Creek

The index reach (1.9 miles) on Big Sheep Creek has been surveyed annually from 1999 – 2019, though the frequency of surveys has varied somewhat (see details in Appendix Table 1c). In 2019, surveys were conducted twice, mid and late spawning season. In 2019, 5 redds or 2.6 redds/mile were documented during the index surveys (Figure 6). From 2000-2018 the average redd count for the index reaches was 8.3 redds or 4.3 redds/mile. Big Sheep has both resident and fluvial populations of bull trout. In 2019, we estimated 79% of redds were made by resident fish and 21% by fluvial fish (Figure 7). The majority of redds (11 of 16) in 2019 were documented upstream of the Wallowa Valley Improvement Canal which is upstream of the index reach. See Appendix Table 1c for annual summary data from 2000-2019 of redds per reach and miles surveyed.

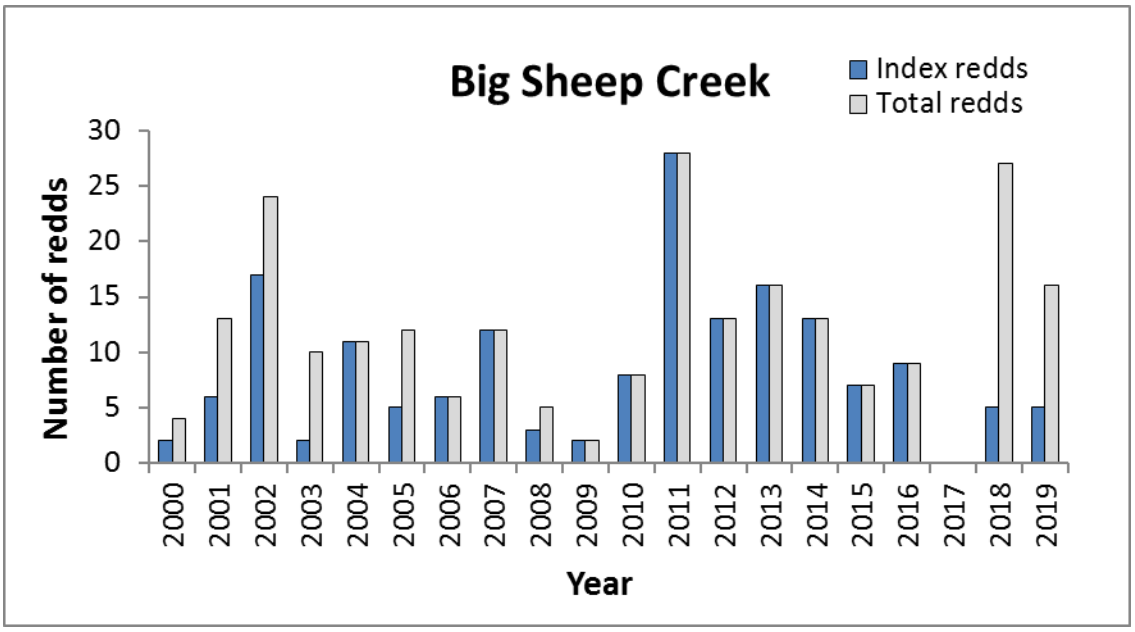

Figure 6. Total bull trout redds (grey bars) and index redds (blue bars) observed during spawning ground surveys from 1999 through 2019 in Big Sheep Creek. The Big Sheep Creek index reach was surveyed in 2017, but no redds were found.

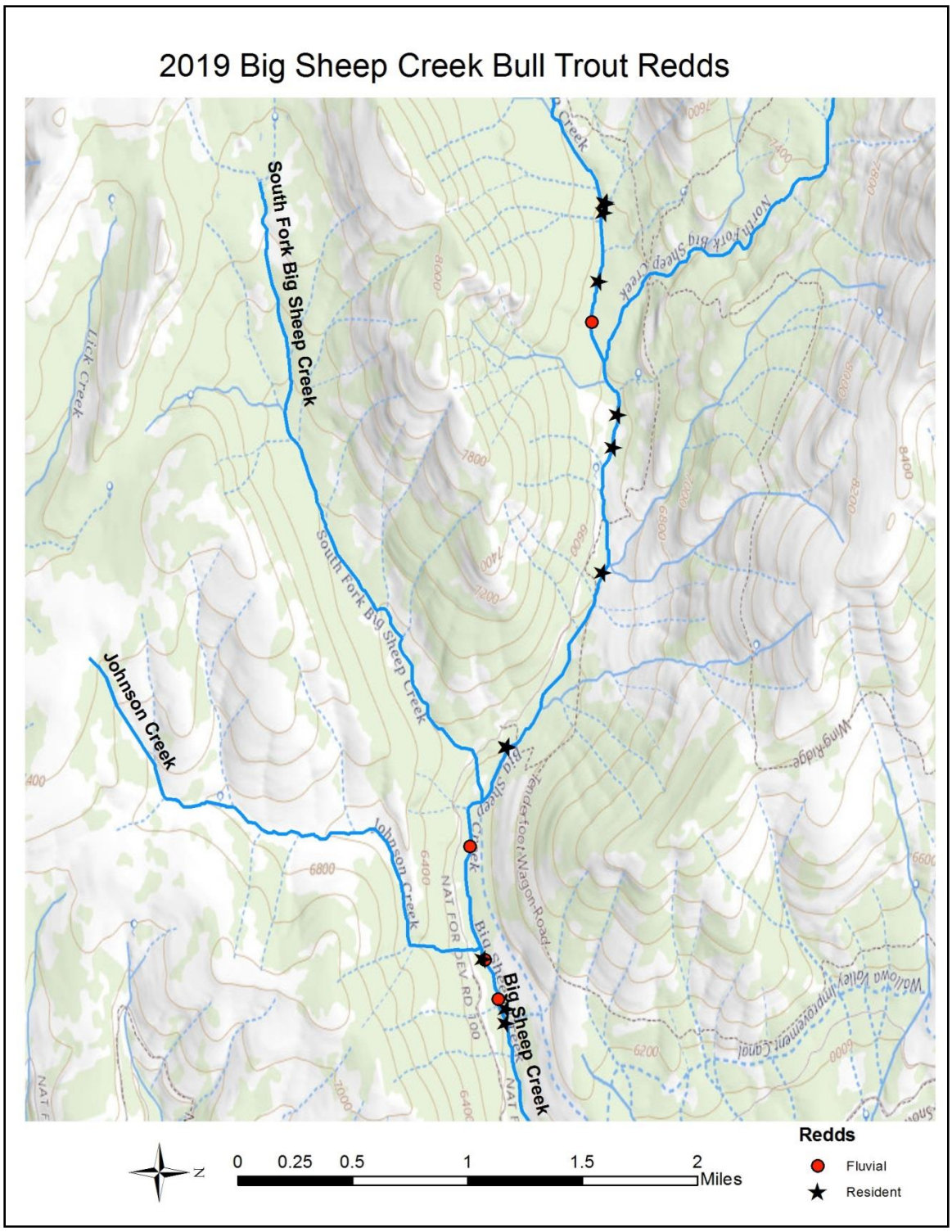

Figure 7. Location of bull trout redds observed in Big Sheep Creek in 2019.

Lick Creek

Index reaches (3.7 miles) were surveyed on Lick Creek from 2000-2017 and in 2019. A limited survey was conducted on Lick Creek in 2018, therefore, the 2018 survey wasn't directly comparable to the rest of the time series. Only index reaches have been surveyed in Lick Creek over this time period (2000-2019) with the exception of 2008. In 2019, 2 redds were documented or 0.5 redds/mile (Figure 8). In comparison, the average for index reaches from 2000-2017 was 10 redds or 2.7 redds/mile. Both redds in 2019 were from resident fish (Figure 9). See Appendix Table 1d for annual summary data from 2000-2019 of redds per reach and miles surveyed.

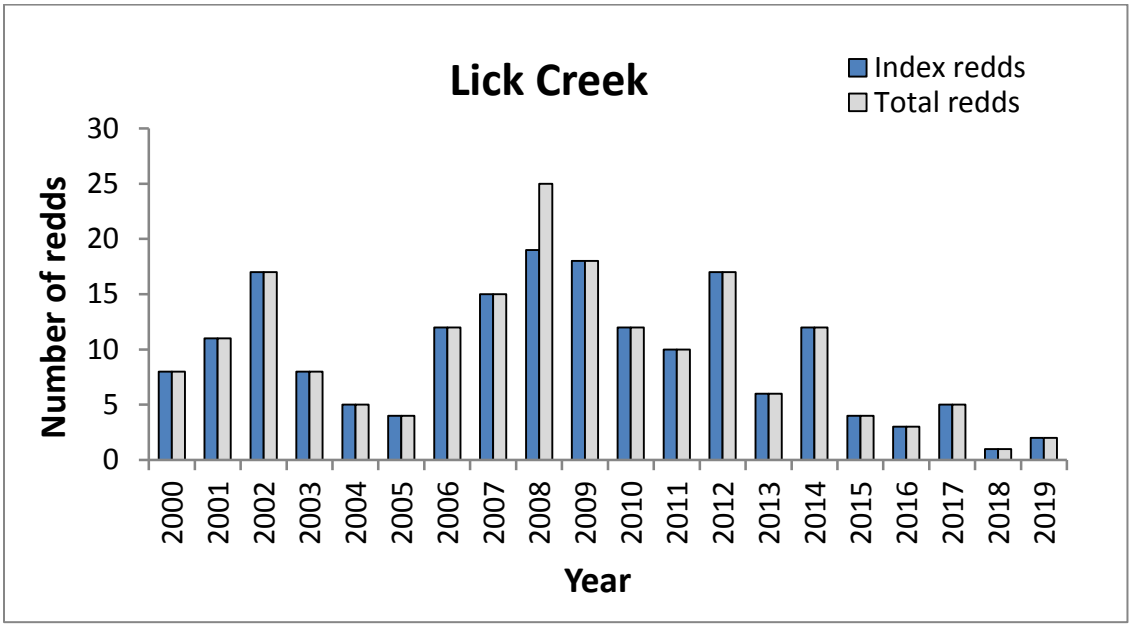

Figure 8. Total bull trout redds (grey bars) and index redds (blue bars) observed during spawning ground surveys from 2000 through 2019 in Lick Creek. Survey efforts were limited to a single survey in one reach in 2018, so no index data were available for that year.

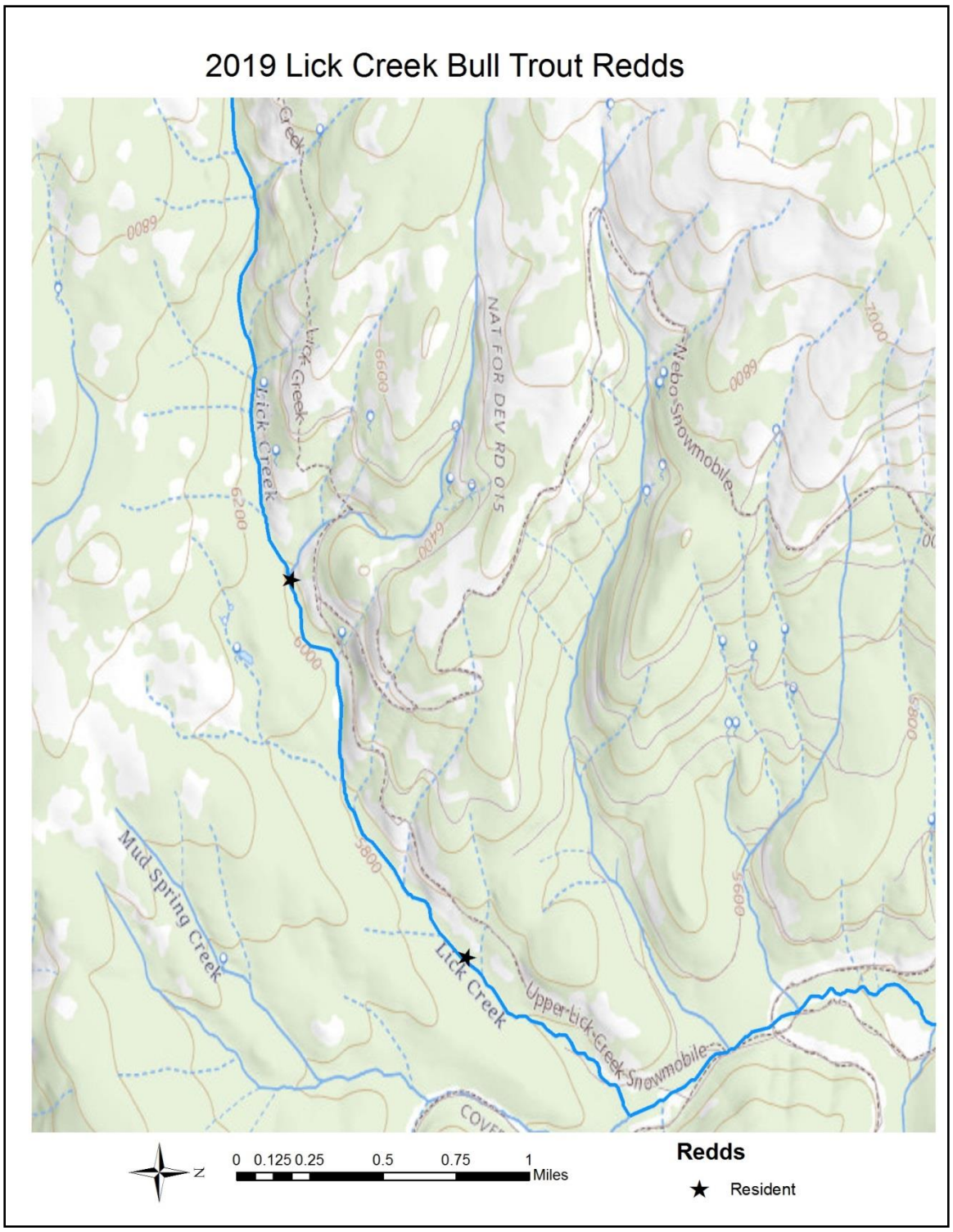

Figure 9. Location of bull trout redds observed Lick Creek in 2019.

Wenaha River

The Wenaha River system was assumed to contain a healthy population of bull trout, but relative to the other streams in this report limited spawning survey data has been collected in the system, in large part due to its remoteness. However, an extensive survey was conducted in 2018 in the North Fork, South Fork, and upper mainstem of the Wenaha River, and redd density reflected a healthy population (Sausen 2019). We were unable to repeat the North Fork and mainstem Wenaha surveys in 2019 due to funding and staff constraints, but much of the South Fork Wenaha and downstream portion of Milk Creek were again surveyed. The goal for 2019 was to expand our knowledge of known bull trout habitat and develop an index reach for the South Fork Wenaha system.

In 2019, surveys were conducted on the South Fork Wenaha River, Milk Creek, and Butte Creek. Butte Creek was an exploratory survey and the lower 4.5 miles of the creek to the confluence with the Wenaha River was surveyed and no bull trout redds were observed. Redd surveys from 2005, 2006 and 2011 documentedbull trout presence in Butte Creek upstream of our 2019 survey . Redd densities for the South Fork Wenaha reaches, including Milk Creek, decreased from 14.4 redds/mile in 2018 to 11.6 redds/mile in 2019. In all reaches surveyed in the Wenaha River, 91% of redds were categorized as fluvial (Figure 10). We suggest using these reaches as an index reach survey for future monitoring of the South Fork Wenaha River. See Appendix Table 1e for annual summary data from 2018 and 2019 of redds per reach and miles surveyed.

Of note, bull trout redds were often observed alongside or on top of chinook redds. The Wenaha system has chinook surveys conducted annually in August and September, prior to these Wenaha bull trout surveys. Flagging was left up along the stream in Chinook survey reaches subsequently surveyed for bull trout. The flagging in addition to the visibility of redds aided surveyors in differentiating fluvial Bull Trout redds and chinook redds.

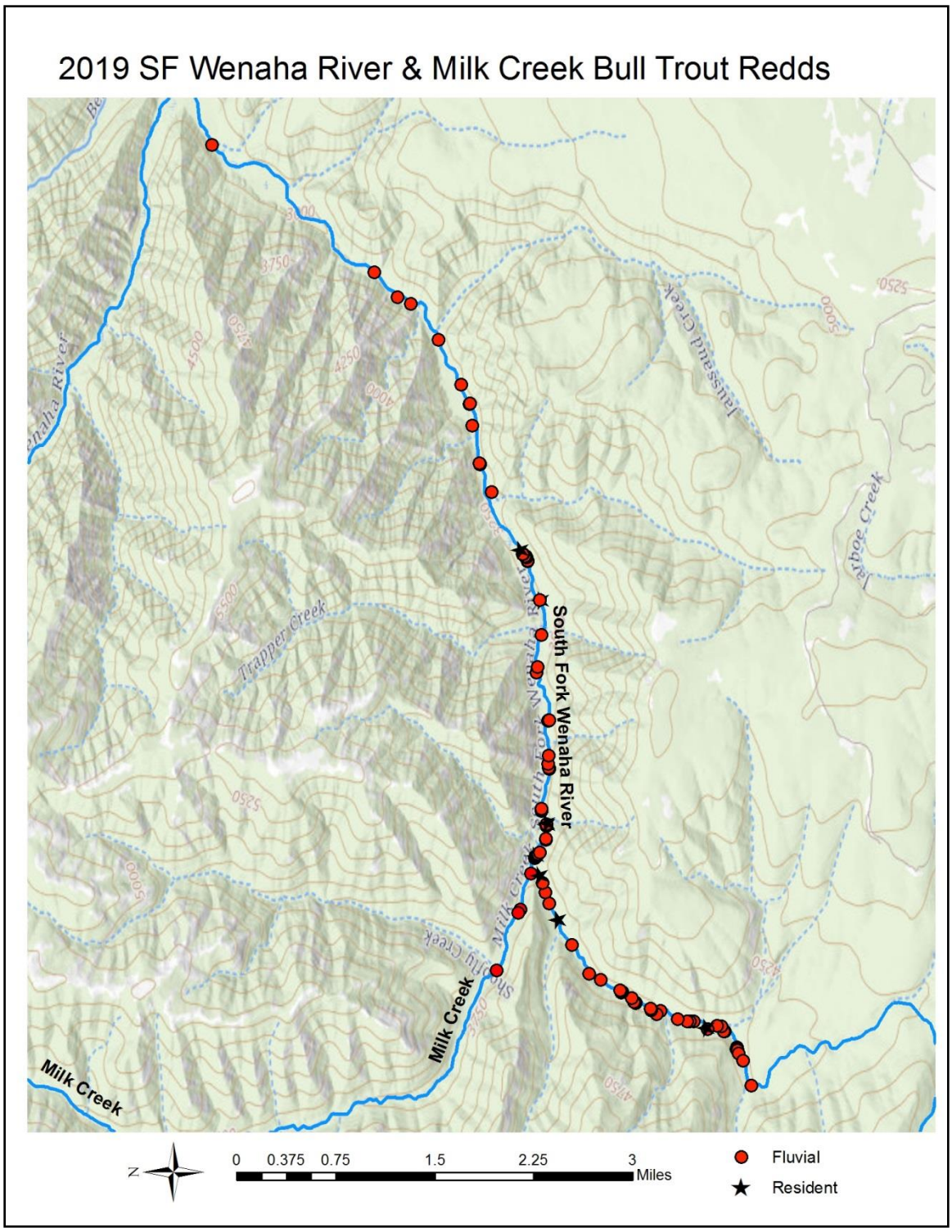

Figure 10. Location of bull trout redds observed in South Fork Wenaha River and Milk Creek in 2019.

CONCLUSIONS & FUTURE WORK

A unique and valuable long-term Bull Trout redd count dataset has been collected for this area of NE Oregon; 20 years on the Lostine River and Bear Creek; 19 years on Big Sheep Creek; and 18 years on the Imnaha River. As a whole, 20 years of redd surveys within the Imnaha and Wallowa/Minam cores areas has documented persistent and relatively stable bull trout populations. These long-term data are limited in bull trout recovery units, including the Mid-Columbia Recovery Unit, and we support continuing to build on this long-term dataset. Consistently collected redd data is useful for determining relative abundance and distribution trends in bull trout populations, especially those populations with fish expressing fluvial life history strategies. These spawning survey data are also useful for monitoring the effects of and informing actions to address potential threats (e.g., climate change, hybridization, and catastrophic disturbance).

We plan to continue long-term monitoring via spawning ground surveys (redd counts) in priority streams, as outlined in the Northeastern Oregon/Southeastern Washington monitoring strategy (Howell et al. 2018). Some of those redd surveys will be conducted annually, while others will be conducted on an interval schedule (e.g., 5-10 year intervals), barring a dramatic change in the basin's environment (e.g., forest fire or debris flow).

Starting in the summer of 2020, NPT along with partner agencies will start to fill in information gaps on distribution and relative abundance of bull trout and brook trout, especially in basins where hybridization is a primary threat by collecting eDNA samples, electrofishing, and/or snorkeling. These monitoring strategies will add to the monitoring data established with the long-term redd counts and increase our knowledge and understanding of the populations as a whole within the core areas. NPT will coordinate with partner agencies (USFWS, Oregon Department of Fisheries and Wildlife, US Forest Service, and others) prior to field efforts to strategize the collective Bull Trout monitoring effort in this area of NE Oregon and SE Washingtom. Project results will continue to be disseminated annually in a written report to the USFWS Project Officer and the Grande Ronde-Imnaha Bull Trout Recovery Workgroup.

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APPENDIX

Table 1a. Bull Trout spawning survey results for the Lostine River from 1999 through 2019.

Lostine River	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Index reach name (length)																					
Lostine River Ranch to 6 Mile Bridge (2.8 miles)	1	0	2	3	3	5	0	5	4	5	0	1	1	1	1	1	0	0	0	2	0
Williamson to Walla Walla (2.2 miles)	0	2	1	0	6	1	3	0	2	13	8	2	0	3	1	7	2	0	0	2	0
Bowman to French Camp (1.6 miles)	18	19	16	11	18	3	9	9	5	12	7	6	3	18	10	14	11	17	25	23	20
French Camp to Shady Falls (1.5 miles)	20	12	23	8	43	17	12	22	31	20	23	21	15	28	27	21	15	15	27	25	25
Redd totals																					
Index redds	39	33	42	22	70	26	24	36	42	50	38	30	19	50	39	43	28	32	52	52	45
Total redds	39	38	43	22	71	26	32	45	47	53	41	36	22	52	40	44	28	33	52	57	45
Survey reach length																					
Index reach survey miles	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Total survey miles	9.8	13.7	14.4	10.7	10.5	8.5	10.5	10.5	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	8.1
Redd density																					
Index redds/mile	4.8	4.1	5.2	2.7	8.6	3.2	3.0	4.4	5.2	6.2	4.7	3.7	2.3	6.2	4.8	5.3	3.5	4.0	6.4	6.4	5.6
Total redds/mile	4.0	2.8	3.0	2.1	6.8	3.1	3.0	4.3	4.7	5.2	4.1	3.6	2.2	5.1	4.0	4.4	2.8	3.3	5.1	5.6	5.6

Notes: The Lostine was surveyed three times in 1999 and 2000. The Lostine was surveyed twice in survey years 2001-2019 (except Shady Campground and Turkey Flat areas were surveyed three times in 2005, 2006, and 2008, and Turkey Flat was surveyed three times in 2009). The Lostine River Ranch (OC Ranch) has been surveyed once (October) in recent years due to lack of access to this private land during hunting season. Pole Bridge to 6 Mile Bridge (included in the total redd numbers and total miles) was surveyed once in 2018. Dates of Lostine bull trout spawning surveys generally commenced as early as the second or third week in September and the last survey was conducted in the first or second week in October.

Table 1b. Bull Trout spawning survey results for Bear and Goat Creeks from 1999 through 2019.

Bear & Goat Creeks	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Index reach name (length)																					
Bear Creek: Goat Confluence to Wilderness Boundary (1 mile)	0	2	3	1	2	3	5	0	1	6	1	1	4	3	0	2	0	1	5	4	0
Goat Creek: Mouth to Falls (0.9 miles)	8	3	9	6	9	8	6	9	7	4	5	6	15	12	15	12	2	3	9	8	9
Redd totals																					
Index redds	8	5	12	7	11	11	11	9	8	10	6	7	19	15	15	14	2	4	14	12	9
Total redds	8	5	12	7	17	12	16	9	11	20	8	7	19	15	16	17	5	6	15	16	9
Survey reach length																					
Index reach survey miles	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Total survey miles	1.9	1.9	2.3	2.3	3.8	2.3	2.8	1.9	7.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	4.2	4.2	3.2	4.2	4.2
Redd density																					
Index redds/mile	4.2	2.6	6.3	3.7	5.8	5.8	5.8	4.7	4.2	5.3	3.2	3.7	10.0	7.9	7.9	7.4	1.1	2.1	7.4	6.3	4.7
Total redds/mile	4.2	2.6	5.2	3.0	4.5	5.2	5.7	4.7	1.5	6.3	2.5	2.2	5.9	4.7	5.0	5.3	1.2	1.4	4.7	3.8	2.1

Notes: These surveys were conducted once from 1999-2006, usually late in the spawning season, the first or second week in October, except in 1999, surveys were conducted in September (on 9/7 and 9/22). In 2007, the surveys included several additional "experimental" miles and were conducted twice in the spawning season, once in mid-September and once in early October. In 2008 – 2014, and 2017, the surveys were conducted twice in the spawning season and an additional 1.4 miles of Bear Creek was surveyed upstream of the comparable reach. In 2015, 2016, 2018, and 2019 the surveys were conducted similar to years 2008-2014 and 2017, but with a one-mile reach added.

Table 1c. Bull Trout spawning survey results for Big Sheep Creek from 1999 through 2019.

Big Sheep Creek	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Index reach name (length)																				
Canal to 39 rd. (1.9 miles)	2	6	17	2	3	5	6	12	3	2	8	28	13	16	13	7	9	0	5	5
Redd totals																				
Index redds	2	6	17	2	3	5	6	12	3	2	8	28	13	16	13	7	9	0	5	5
Total redds	4	13	24	10	11	12	6	12	5	2	8	28	13	16	13	7	9	0	27	16
Survey reach length																				
Index reach survey miles	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Total survey miles	2.5	2.5	3.6	3.6	1.9	2.9	1.9	2.9	3.6	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	6.5	4.3
Redd density																				
Index redds/mile	1.1	3.2	8.9	1.1	1.6	2.6	3.2	6.3	1.6	1.1	4.2	14.7	6.8	8.4	6.8	3.7	4.7	0.0	2.6	2.6
Total redds/mile	1.6	5.2	6.7	2.8	5.8	4.1	3.2	4.1	1.4	1.1	4.2	14.7	6.8	8.4	6.8	3.7	4.7	0.0	4.2	3.7

Notes: Survey frequency varied by year, surveys were conducted once in mid to late October in years 2000 and 2001, surveys were conducted twice, once in September and once in October in years 2002-2016 and years 2018-2019 with the exception of 2004 and 2017 it was only surveyed once.

Table 1d. Bull Trout spawning survey results for Lick Creek from 1999 through 2019.

Lick Creek	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Index reach name (length)																				
Meadow to 39 rd. (1.5 miles)	0	6	3	0	1	3	5	3	4	5	7	4	4	3	5	0	0	0	1	0
39 rd. to Quartz Creek (2.2 miles)	8	5	14	8	4	1	7	12	15	13	5	6	13	3	7	4	3	5	N/A	2
Redd totals																				
Index redds	8	11	17	8	5	4	12	15	19	18	12	10	17	6	12	4	3	5	1	2
Total redds	8	11	17	8	5	4	12	15	25	18	12	10	17	6	12	4	3	5	1	2
Survey reach length																				
Index reach survey miles	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	1.5	3.7
Total survey miles	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	4.0	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	1.5	3.7
Redd density																				
Index redds/mile	2.2	3.0	4.6	2.2	1.4	0.7	1.1	4.1	5.1	4.9	3.2	2.7	4.6	1.6	3.2	1.1	.8	1.4	.7	.5
Total redds/mile	2.2	3.0	4.6	2.2	1.4	0.7	1.1	4.1	6.3	4.9	3.2	2.7	4.6	1.6	3.2	1.1	.8	1.4	.7	.5

Notes: Survey frequency varied by year, surveys were conducted once in mid to late October in years 2000 and 2001, and surveys were conducted twice, once in September and once in October in years 2002-2016. In 2017 and 2019, surveys were conducted once in October. In 2018 Lick Cr was only surveyed once in September and was limited to the lower reach.

Table 1e. Bull Trout spawning survey results for South Fork Wenaha River and Milk Creek in 2018 and 2019.

S. Fork Wenaha River & Milk Creek	2018	2019
Index reach name (length)		
SF Wenaha: Trail Crossing to Confluence with Milk Cr. (2 miles)	29	38
SF Wenaha: Confluence with Milk Cr. To SF3 (2.7 Miles)	54	52
SF Wenaha: SF3 to Elk Flat Trail Crossing (3.3 miles)	37	10
Milk Cr: Confluence SF Wenaha upstream 1 mile (1 mile)	10	4
Redd totals		
Index redds	130	104
Total redds	130	109
Survey reach length		
Index reach survey miles	9.0	9.0
Total survey miles	9.3	9.7
Redd density		
Index redds/mile	14.4	11.6
Total redds/mile	14.0	11.2

Notes: 2018 and 2019 surveys were both completed in October.