OWEB
Project Number 207-244
Wallowa Mountains Bull Trout Monitoring
Final Report

Prepared by: Gretchen Sausen
U.S. Fish and Wildlife Service
La Grande Field Office

December 16, 2009

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ABSTRACT

Bull trout were listed as threatened under the Endangered Species Act in 1998 due to declining populations. The U. S. Fish and Wildlife Service (Service) recommends monitoring populations in subbasins where little is known, including the Grande Ronde and Imnaha subbasins. Spawning survey data is important for determining relative abundance and distribution trends in bull trout populations. Without adequate funding, it had been difficult to find sufficient numbers of experienced bull trout surveyors and packers for surveys in the back-country, and to obtain adequate supplies to get the work accomplished. OWEB funding for the project supported the continued survey of bull trout spawning areas in years 2007 through 2009 in the Wallowa Mountains of northeast Oregon. This report summarizes the 2009 bull trout spawning data collected in the Wallowa Mountains of NE Oregon and compares this with past years' data. The report includes a comparison of OWEB funded years (2007-2009) as well as previous year's data. Bull trout spawning surveys have been conducted on similar index areas for selected Grande Ronde and Imnaha River streams from 1999 to 2009. Surveys were conducted by the Oregon Department of Fish and Wildlife (ODFW), U.S. Forest Service (USFS), Service, Nez Perce Tribe (NPT), National Marine Fisheries Service (NMFS), Anderson Perry, Idaho Power, fisheries consultants, and volunteers. Objectives of the survey included; locate bull trout spawning areas, determine redd characteristics, determine bull trout timing of spawning, collect spawning density data, determine and compare the spatial distribution of redds along the Lostine River in 2005 through 2009, and over time use this data to assess local bull trout population trends and the long-term recovery of bull trout. Timing of spawning, total redds, redd sizes, and redd locations are documented in the report. The local bull trout populations were relatively stable for the survey period. The Imnaha population is one of the strongholds within the Imnaha Subbasin. The Lostine River and Bear Creek contain brook trout and hybridization is likely occurring.

ACKNOWLEDGMENTS

The Service has, for the past six years, provided staff time necessary for the coordination, implementation, and analysis and report summarization of this project. Prior to Service support of this project, the Wallowa-Whitman National Forest, Wallowa Mountains Office (WMO) had secured funding and support, and was responsible for the coordination, implementation, and analysis and report summarization.

This project would not have been possible without the dedication, hard work, funding, and assistance provided by all the partners. Due to OWEB funding in 2007-2009; Del Sol Wilderness Adventures provided an invaluable service in 2008 and 2009 by providing a horse/mule packer to pack our gear in and out of the Upper Imnaha to conduct our annual spawning survey in that drainage. The WMO in 2005 through 2007 and other commercial packers in past years provided this service (2007 funding was provided by OWEB). I would like to thank the partners in 2007 - 2009 which included; the WMO, ODFW, OWEB, Grande Ronde Model Watershed, NPT, the Service, NMFS, Anderson Perry and Associates (Anderson Perry), Idaho Power, consultants, and volunteers. In 2009, Brad Smith (retired ODFW District Fish Biologist) volunteered for one day (8 hours) on Lick Creek and two days (16 hours) on the Lostine River. Special thanks to the people who walked the streams (including surveys conducted in 2007-2009), helped with scheduling surveys and surveyors, provided access to private property, packed us into remote areas to survey, assisted with the OWEB grant, assisted in mapping, or summarized the data. These included: Gary Miller (Service), Brad Smith (formerly ODFW), Alan Miller (WMO), John Hollenbeak (WMO – horse/mule packer), Barry Cox and Shay Mann (Del Sol Wilderness Adventures Horse/Mule Packers), Jeff Oveson (Grande Ronde Model Watershed), Coby Menton (Grande Ronde Model Watershed), Mary Estes (Grande Ronde Model Watershed), Ken Bronec (consultant), Peter Cleary (NPT), Everett and Pat Leach (private access to Lostine River Ranch), Nancy Clarke (private access to Lostine River upstream of Six Mile Bridge), Stewart and Susan Coleman (private access to Lostine river near acclimation site), (Jeff Nehls (NPT), Cindy Sloan (NPT), Michelle Cregger (formerly Anderson Perry), Jeff Yanke (ODFW), Ian Wilson (ODFW), Jake Kimbro (ODFW), Shelly Schmidt (Anderson Perry), Nick Albrecht (ODFW), Sue Brady (Anderson Perry), Kyle Bratcher (ODFW), Coty Reuben (student trainee NPT), Jim Trainer (Idaho Power), Jim Chandler (Idaho Power), Ben Reingold (Idaho Power), Dave Bright (NPT), Suzanne Anderson (Service), John Stephenson (Service), Lynne Price (consultant), Mac Huff (consultant), Jim Harbeck (NPT), and Christian Jilek (NMFS).

INTRODUCTION

Bull trout were listed as threatened under the Endangered Species Act in 1998 due to declining populations. The Service recommends monitoring populations in subbasins where little is known including the Grande Ronde and Imnaha subbasins (USFWS 2002). Spawning survey data is important for determining relative abundance and distribution trends in bull trout populations. A minimum of 15 years is needed for determining bull trout population trends (Maxwell 1999). Without adequate funding, it had been difficult to find sufficient numbers of experienced bull trout surveyors and packers for surveys in the back-country, and to obtain adequate supplies to get the work accomplished. OWEB funding for the project supported the continued survey of bull trout spawning areas in years 2007, 2008, and 2009 in the Wallowa Mountains of northeast Oregon. Bull Trout redd counts (spawning surveys) have been conducted annually on the Wallowa Valley, Hells Canyon National Recreation Areas (HCNRA), and Eagle Cap districts of the USFS and along some sections of private property of the Lostine River by the Service, ODFW, USFS, NPT, contractors, and volunteers for the past eight to nine years.

Objectives of the bull trout spawning surveys included:

- Locate bull trout spawning areas.

- Determine redd characteristics.
- Determine bull trout timing of spawning.
- Collect spawning density data.
- Map the location of the bull trout spawning reaches.
- Determine and compare the spatial distribution of redds along the Lostine River in 2005 through 2009. Collect UTM spatial redd data on Big Sheep, Lick Creek, and Middle Imnaha to compare after a few years of data collection.
- Assess population trends for local bull trout populations.
- Use this information for helping assess the long-term recovery of bull trout.

LOCATION

The Service and several partners conducted bull trout spawning surveys in 2009 on selected streams in the Grande Ronde and Imnaha Sub-Basins. Stream systems surveyed in 2009 for bull trout redds included; the Lostine River, Bear and Goat Creeks, the Imnaha River, Big Sheep Creek and Lick Creek (Figure 1). An exploratory survey was conducted on Deer Creek in 2009 and no bull trout redds or fish were documented. The survey location was at the confluence with Sage Creek upstream approximately 1.5 miles on Deer Creek.

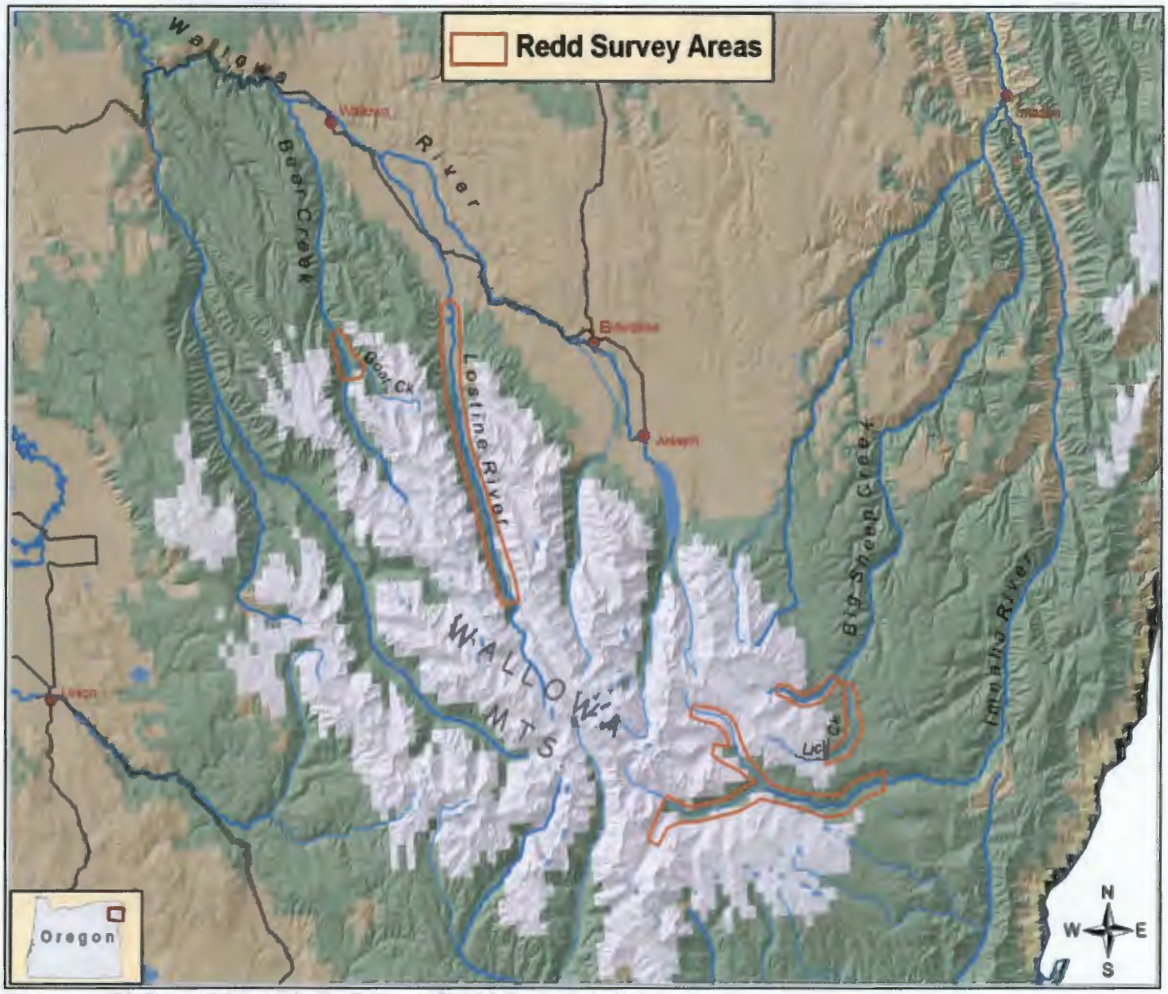

Figure 1. Wallowa Mountain Bull Trout Redd Survey Areas.

METHODS

Spawning surveys for bull trout require as many as ten to twelve people in one day (for complete surveys on large rivers) to complete the surveys during the spawning time. As mentioned above, this project would not be possible without the cooperative effort of partners. Surveyors walk the rivers through the selected "index areas" to locate the bull trout redds.

This project is part of a larger effort in NE Oregon and SE Washington that occurs during spawning (September – October). Due to the lack of available experienced surveyors to conduct these surveys, we have had to increase our survey days on the accessible sections of the Lostine and Imnaha Rivers to two days (conducting half of the survey length one day and the other half the following day). Surveys were conducted twice (mid and late bull trout spawning season) on the Lostine River, Big Sheep Creek, Lick Creek, Middle Imnaha (Blue Hole to Indian Crossing) and Bear and Goat Creeks. One-time surveys were conducted late in the spawning season in 2009, on the Upper Imnaha River and tributaries, due to access and funding limitations. An exploratory survey was conducted on Deer Creek in 2009 for 1.5 miles of survey. Appendix B, Table 1 compares survey data and survey frequency for 1999-2009 bull trout spawning surveys on selected Grande

Ronde and Imnaha River streams. Stream miles surveyed (not including repeat surveys) for the above streams totaled 41.3 in 2007, 46.3 in 2008, and 41.8 in 2009. Total redd numbers are all redds documented, and not necessarily comparable river miles (refer to Appendix B, Table 2a-2d for comparable reaches and redd counts for those sections).

The survey protocol (in addition to repeat surveys, or one-time late surveys where feasible) included; 1) visits to known bull trout redds and review of survey form prior to redd count survey, 2) experienced bull trout redd count surveyor(s) paired with inexperienced surveyor (on the job training), 3) bull trout redds measured, data recorded, and redds flagged during survey, and 4) all stream flagging removed post surveys.

Bull Trout Spawning Trio on Redd, Lostine River (Photo courtesy of USFS).

Data recorded during the bull trout spawning surveys included; 1) date of survey, 2) stream location, 3) size of redds, 4) visibility of redds, 5) number of redds, and 6) approximate number and sizes of bull trout observed during surveys. In past years, reach locations (upstream and downstream boundary UTM coordinates) were documented. In 2009, in addition to the above, bull trout redd UTM locations on the Lostine River, Big Sheep Creek, Lick Creek, and Middle Imnaha within the "index areas" also were documented.

Information collected during the bull trout spawning surveys is compiled by the Service and made available to other agencies (i.e., this report).

Shelly Schmidt and Sue Brady of Anderson Perry, Inc surveying a bull trout redd on the Lostine River, 2008.

RESULTS

Location of Bull Trout Spawning Habitat Areas Surveyed

Bull trout spawning surveys have been conducted on similar index areas for selected Grande Ronde and Imnaha River streams from 1999 to 2009. During these years, bull trout spawning areas have been established (in particular, the Lostine and Imnaha Rivers) for these streams. Redd characteristics also have been measured on these streams. The Middle Imnaha (Imnaha River from the fish weir below Gumboot confluence to Indian Crossing) was not surveyed in 2005 through 2009, (this area was surveyed in 1999 to 2004 and is considered bull trout spawning habitat). This portion of known bull trout spawning habitat on the Imnaha was not surveyed for the past five years because of limited funding, a lack of experienced surveyors, and a minimal number of redds documented in this area in past years. Bear Creek and Goat Creek were surveyed as in past years but the survey area of Bear Creek and Goat Creek increased (1.9-3.8 total miles between 1999-2006 versus 7.2 in 2007) and the survey frequency increased (generally once from 1999-2006 and twice in 2007). Although the survey area increased in 2007, the redd numbers did not increase substantially, especially in the lowermost survey reaches. In 2008 and 2009, 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 for a total of 3.2 miles. In 2009, an exploratory survey for 1.5 miles of stream was conducted on Deer Creek.

Timing of Bull Trout Spawning

Timing of bull trout spawning for our surveyed streams, in general, is approximately September 1 through October 15, and as early as August 15 in the Imnaha River system. The Lostine River has been very consistent or predictable (with commencement of spawning documented in 2006 as early as the first week in September), with the Imnaha (being a much larger system) being less predictable. The above information is based on documentation during bull trout spawning surveys and chinook surveys where bull trout were spawning.

We are not exactly certain of when spawning commences and ends within the Upper Imnaha (within the mainstem, North Fork, South Fork, and Cliff Creek [a resident tributary]). There are questions as to what time of the year, dependent on annual flows, bull trout pass over the falls. Some years we have seen fluvial size bull trout spawning in the South Fork Imnaha in mid-late September/early October and in recent years we have not. ODFW observed large fluvial bull trout spawning in South Fork Imnaha in mid-August 2005 (B. Knox, ODFW, pers. comm., 2005). ODFW has observed fluvial bull trout spawning as early as mid-August (during chinook surveys) below the Imnaha falls and as late as early October (during our bull trout surveys) in several years (B. Smith, ODFW, pers. comm., 2005). More years of observation and survey data are needed to understand bull trout spawning and adult movement in the Imnaha Sub-Basin, and Big Sheep and Bear Creek Watersheds.

Total Number of Bull Trout Redds

Lostine River

Refer to Appendix B, Table 3a and 3b for bull trout redd count summary data for 2009. Fourty-one total bull trout redds for 10.1 miles of survey (including Pole Bridge to Six Mile Bridge) were documented in 2009 on the Lostine River. The Pole Bridge to Six Mile Bridge section has not been surveyed every year. The following data for the Lostine River compares consistently surveyed index areas on the Lostine River (8.5 miles) from 1999 to 2009 excluding the Pole Bridge to Six Mile section (Figure 2). The Lostine River had a low of 22 redds in 2002 to a high of 70 redds in 2003. Redd numbers decreased again in 2004 but had been increasing through 2008. Redd numbers decreased in 2009. The eleven-year average from 1999 to 2009 for the Lostine River is 42 redds, approximately 60 percent of the 2003 total. The highest bull trout redd numbers ("the bread and butter") within the Lostine River has consistently been observed and recorded in the headwaters, from Shady Campground to Bowman [approximately River Mile (RM) 24.5 to RM 22]. In 2009, as in most years, the densities were greatest in the uppermost reach (Shady to French Camp) which is upstream of the chinook spawning index areas.

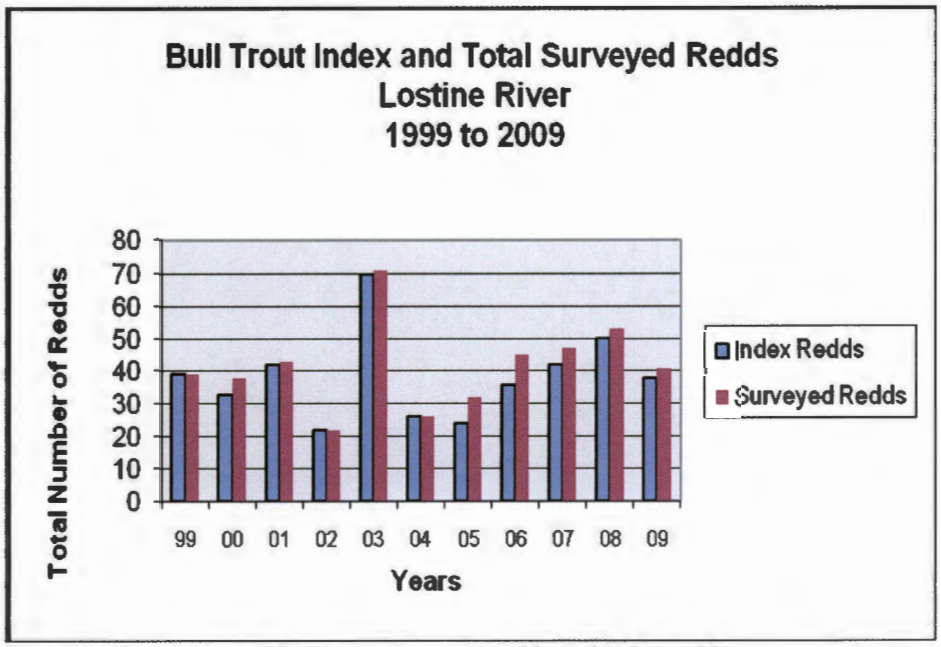

Figure 2. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 1999 to 2009 on the Lostine River.

Imnaha River

Two Hundred and thirty five total bull trout redds for 19.4 miles of survey were documented in 2009 on the Imnaha River (from Indian Crossing to Blue Hole and upstream). Indian Crossing to Blue Hole was surveyed twice (mid to late spawning season) and upstream areas were surveyed once (mid spawning season) in 2009. The following data for the Imnaha River compares consistently surveyed index areas on the Imnaha River (17.5 miles) from 2001 to 2009 (Figure 3). The nine-year average from 2001 to 2009 was 202 redds for the Imnaha River system. Total redd numbers on the Imnaha ranged from 101-262 within that period. The highest bull trout redd counts for the Imnaha River from 2001 to 2009 was recorded in the Upper Imnaha from Blue Hole to Cliff Creek, including Upper Imnaha tributaries. In 2006 and 2007, there was a significant shift in documented spawning distribution from past years. In 2006 through 2008, the majority of the spawning bull trout were located from the Imnaha falls to Indian Crossing, whereas, in past years the distribution had higher numbers above the Blue Hole (two miles upstream of Indian Crossing), as well as in the upper tributary streams (S.F. and N.F. Imnaha). In 2009, Cliff Creek a resident bull trout tributary to S.F. Imnaha had the greatest density of redds at 164 redds. This is 80 percent of the total redds counted on the Imnaha. In 2009, 42 redds (20%) of the redds documented on the Imnaha were fluvial/resident redds as compared to 92 redds (64%) in 2008.

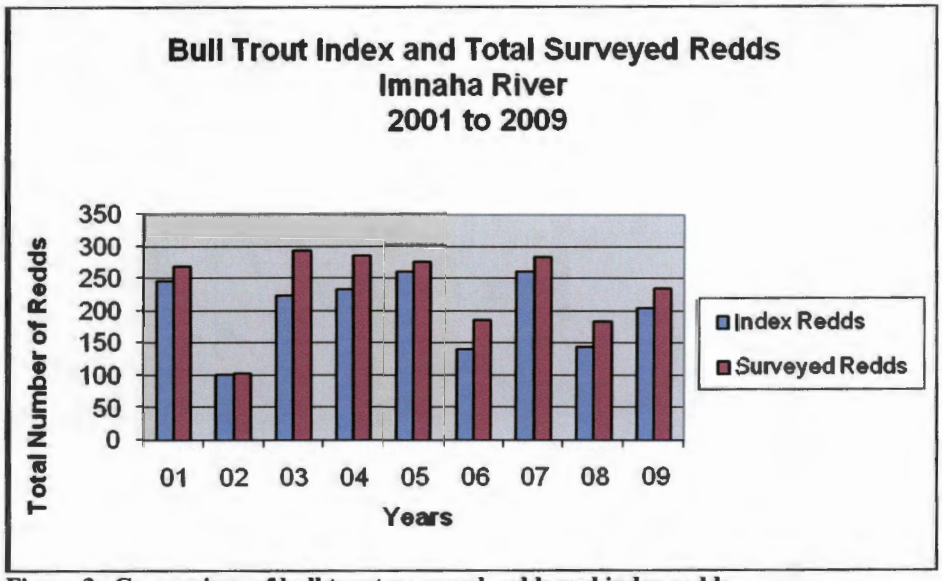

Figure 3. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 2001 to 2009 on the Imnaha River.

Big Sheep Creek

Twenty total bull trout redds for 9.6 miles of survey were documented in 2009 on Big Sheep Creek and Lick Creek. These areas were surveyed twice in 2009, mid to late spawning season. The following data for Big Sheep Creek compares consistently surveyed index areas on Big Sheep and Lick Creek (7.6 miles) from 2000 to 2009 (Figure 4. The ten-year average from 2000 to 2009 was 17 redds for the Big Sheep system. Total redd numbers within the Big Sheep system ranged from 8-34 within that period. Redd surveys for bull trout in the Big Sheep system have been limited in miles of survey (8.4 to 14.1 miles from 2000 to 2009) and in frequency, (2000-2001 surveys were conducted once late season, and in 2002, 2003, and 2005-2009, surveys were conducted twice, mid and late season). In 2004, the survey was conducted once late season for Big Sheep and twice, mid and late season for Lick Creek.

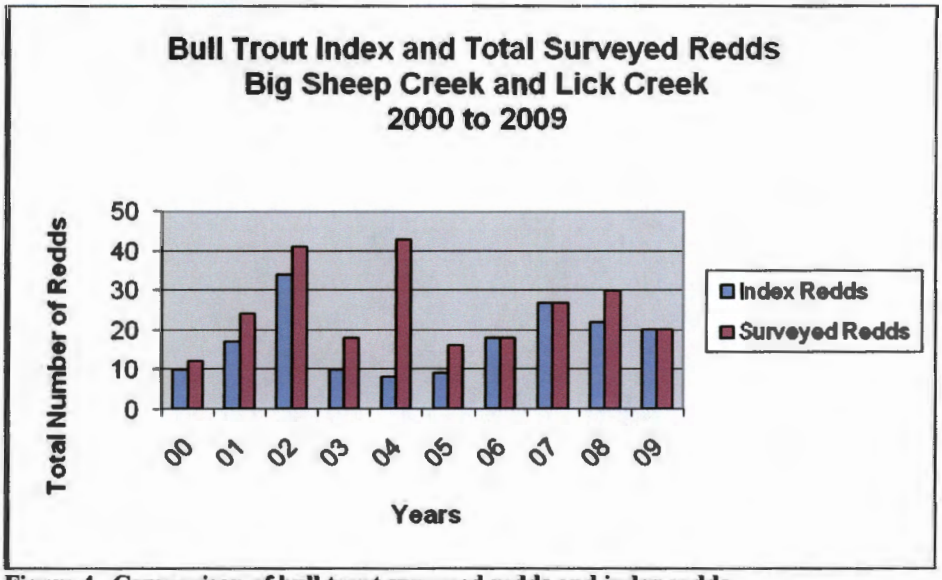

Figure 4. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 2000 to 2009 on Big Sheep and Lick Creeks.

The local bull trout populations in the Imnaha, Big Sheep and Lick Creek appear to be relatively stable for the survey period (2000-2009), with a downward trend in 2009 (except for the resident population in Cliff Creek tributary to the S.F. Imnaha River). A minimum of 15 years is needed to determine population trends.

The Imnaha population is one of the strongholds within the Imnaha Subbasin as it has multiple age classes, contains fluvial fish, has an anadromous prey base, has connectivity with the Snake River, and bull trout are distributed throughout the habitat. Primary spawning activity on the Imnaha River has been documented to occur in the headwaters which lie within wilderness. Both fluvial and resident life history forms are present. The Imnaha River is rated at low risk of extinction, and Big Sheep is rated "of special concern" (Buchanan et al. 1997).

Bear Creek

Eight total bull trout redds for 3.2 miles of survey were documented in 2009 on Bear Creek (including Goat Creek). The following data for Bear Creek compares consistently surveyed index areas on Bear Creek and Goat Creek (1.9 miles) from 1999 to 2009 (Figure 5). Redd counts on Bear Creek and Goat Creek had a low of 5 redds in 2000 to a high of 12 total redds in 2001, and decreasing to 6 redds in 2009. The eleven-year average from 1999 to 2009 is 9 redds for Bear and Goat Creeks. Bear Creek/Goat Creek spawning data collected from 1999 to 2006 is restricted in scope due to access and funding limitations, and 2007 was expanded to help identify total spawning area for bull trout in Bear and Goat Creeks. Although the survey area increased in 2007, the redd numbers did not increase substantially, especially in the lowermost survey reaches. In 2008 and 2009, 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 for a total of 3.2 miles. The highest bull trout redd counts for the survey sections on Bear/Goat Creeks have been recorded in Goat Creek (mouth to waterfall, RM 0 to RM 0.9), except in 2008 where more redds were documented in Bear Creek than in Goat Creek.

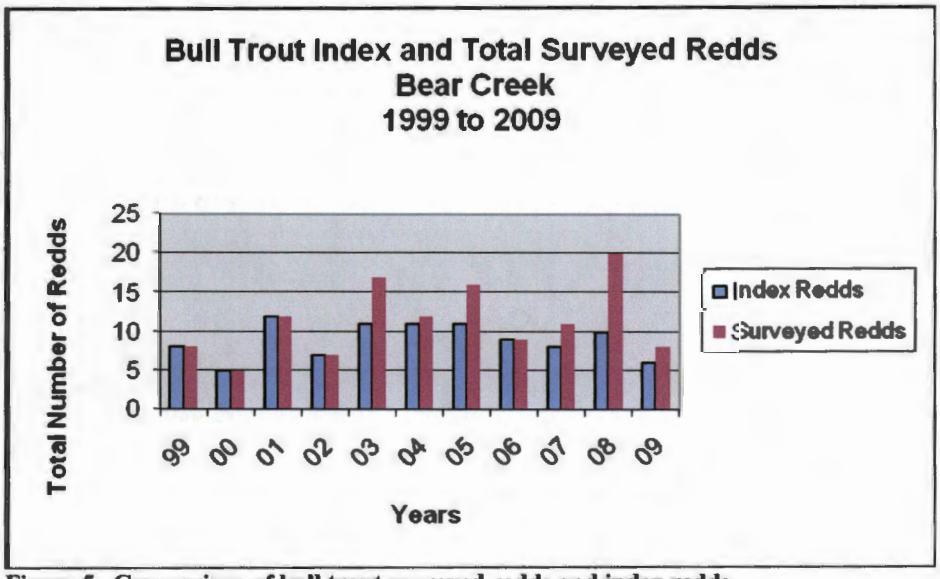

Figure 5. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 1999 to 2009 on Bear Creek (including Goat Creek).

Deer Creek

In 2009, an exploratory one time late season survey was conducted on Deer Creek for approximately 1.5 miles of stream. The survey was located at the confluence with Sage Creek upstream approximately 1.5 miles (survey reach included approx. 5 miles upstream of the Deer Creek culvert project at Rd.8270, and one mile downstream). No redds or bull trout were documented during this survey.

Sizes of Bull Trout Redds

Bull trout redds were measured using the same methodology in 2004 through 2009 and comparison of bull trout redd sizes (mean redd area (m^2)) for these years is illustrated below. There is a relationship between size of female salmonid and size of redd; large fish make large redds (Bjornn and Reiser 1991; P. Sankovich, Service, pers. comm., 2006). In addition, length/frequency distributions of mature resident bull trout and mature fluvial bull trout do not overlap, therefore, there is little overlap in size of redds (P. Sankovich, pers. comm., 2006).

Lostine/Bear/Goat

Figure 6 compares bull trout redd sizes for the Lostine River, Bear Creek, and Goat Creek in 2004-2009. Mean redd area (m^2) ranged from 0.9-1.4 for the Lostine, 0.3-0.9 for Goat Creek, and 0.2-1.0 for Bear Creek. The Bear Creek sample area was expanded in miles surveyed in 2007 (in past years the redd area was smaller and more typical of resident redds, in 2007 the redd area was larger and more typical of fluvial size bull trout redds. Brook trout are thought to be abundant in Bear Creek (due to historical stocking in the headwater lakes). Bull trout redds were not observed or documented in Bear Creek within the index area in 2006. The Lostine River contains brook trout, but for most survey years, we have not observed brook trout spawning with bull trout. This observation changed in 2008 where they appeared to be spawning together and hybrid fish were observed. Genetic sampling of bull trout/brook trout in the Lostine has occurred but the results have not been reported to date. Currently, genetic sampling of bull trout/brook trout has not occurred on Bear Creek to assess the magnitude of hybridization. Goat Creek is limited in available spawning habitat, but it appears to be the best available spawning habitat for fluvial fish in the Bear/Goat Creek system during drought years. (Several miles of upper Bear Creek were dry due to low snowpack and summer drought conditions). It appears from the data in 2004-2009 that redds in Goat Creek were a combination of resident and fluvial fish, as the redd sizes were midway between the Bear Creek (resident size) and the Lostine (fluvial size) (except for the fluvial-size redds in Bear Creek in 2007 - 2009. Two bull trout that were observed occupying a redd on Goat Creek in 2004 were <12 inches (<300 ml) and were on a redd that had an area of 0.3 m^2; therefore, this size of redd is resident (related to the fish size). More years of data collection on these streams should help us better understand the resident and fluvial life histories of bull trout in this area, relative to fish and redd sizes.

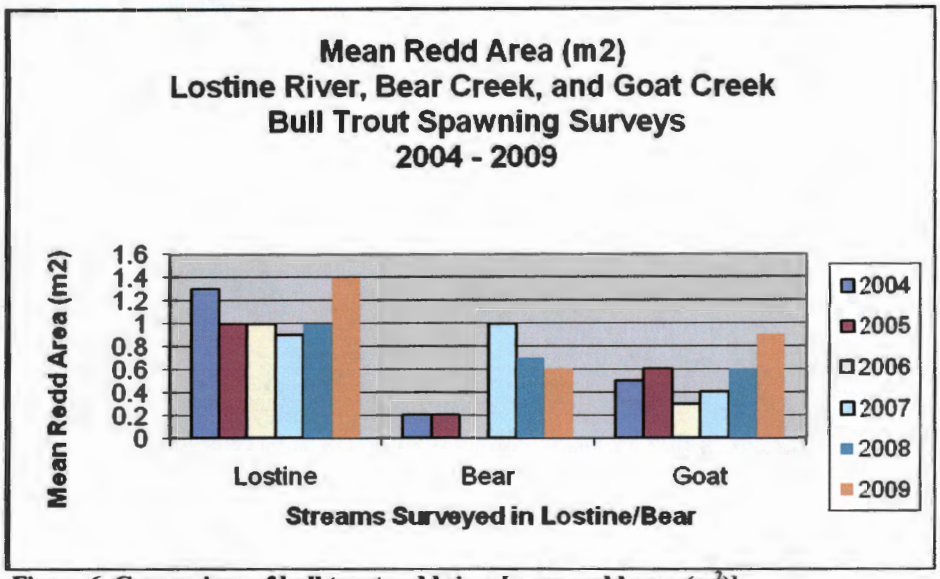

Figure 6. Comparison of bull trout redd sizes [mean redd area (m^2)] for Lostine River, Bear, and Goat Creeks sampled during bull trout spawning surveys, 2004-2009.
Footnote: Bull trout redds were not observed in the index area of Bear Creek in 2006.

Imnaha and Big Sheep

Figure 7 compares bull trout redd sizes for the sampled streams in the Imnaha system in years 2004-2009. Mean redd area (m^2) ranged from 0.3-1.0 for Lick Creek, 0.1-0.4 for Big Sheep, 1.2-1.8 for Upper Imnaha, 0.3-1.2 for N.F. Imnaha, 0.9-1.3 for S.F. Imnaha, and 0.1-0.4 for Cliff Creek. Middle Imnaha had only two redds observed in 2005 and three redds in 2004. In 2006-2008, Middle Imnaha had a large distribution of redds in this survey area (sample size = 18 for 2006 and 2007 and 28 for 2008) compared to past years. Middle Imnaha in 2004 and 2006 had primarily fluvial size redds with resident redds documented in 2005 and a mix of fluvial and resident redds in 2007 and 2008. As shown in Figure 7 below, very large redds (produced by large fluvial bull trout) were documented on the Middle Imnaha in 2008. Cliff Creek is a known resident system with a waterfall near the mouth. The survey on Cliff Creek in 2004 included a large fluvial size redd near the confluence with the S.F. Imnaha and therefore the mean redd size was higher than in 2005 and 2006 when no fluvial redds were observed in Cliff Creek below the waterfall. Lick Creek and Imnaha had an overlap of bull trout and chinook redds, which may make differentiation between the two sometimes difficult. Lick Creek data in 2004-2008 appeared to be a combination of resident and fluvial redds (with more resident redds documented in 2004, 2007, and 2008). Big Sheep contained resident redds all years, and Upper Imnaha and S.F. Imnaha contained a majority of fluvial redds. North Fork Imnaha appears to have had more resident redds in 2004, 2007, and 2008, more fluvial size redds in 2005, and a mix of fluvial and resident in 2006. Cliff Creek is a known resident system with a mean redd size of 0.2 m^2 in 2007. Mean redd size was greater, a size of 0.3 m^2 in 2004 as a result of a fluvial redd near the mouth and potential superimposition of redds above the barrier. 2007 mean redd size included a few larger redds below the falls (near the mouth) which are presumed to be fluvial redds. 2008 mean redd size was greatest above the falls, likely superimpositions of redds above the

barrier. In 2008 not all the redds were measured above the falls (31 of 52 total redds, 59.6%) and all redds were measured below the falls (1 of 1, 100%). The sample size in 2008 was large enough to get a good estimate of sizes of redds above and below the falls and at the same time completing the survey in a reasonable amount of time (while redds were still visible during daylight). Refer to Tables 4a and 4b in Appendix B for additional information on 2008 bull trout redd characteristics.

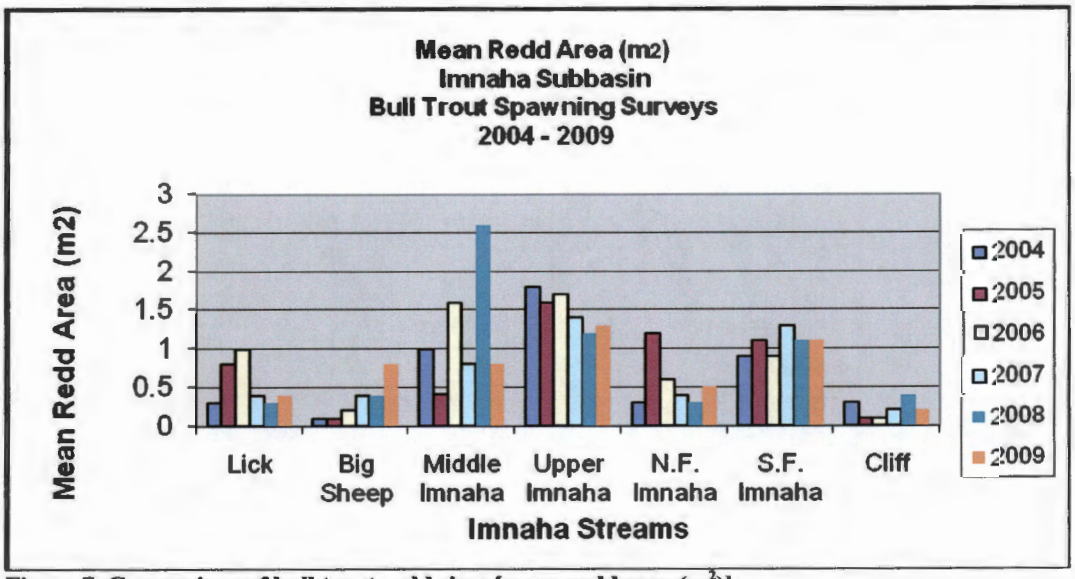

Figure 7. Comparison of bull trout redd sizes [mean redd area (m^2)] for sampled streams in the Imnaha Subbasin, 2004-2009.

Bull Trout Redd Distribution on the Lostine River

The bull trout spawning surveys on the Lostine River in years 2005 through 2009 included collection of UTM coordinate data on the spatial distribution of the bull trout redds observed along the Lostine River. Bull trout redds on the Lostine River (as well as in other surveyed streams) were often arranged in complexes (several redds in close proximity to each other). Redds were primarily located in the French Camp to Shady Falls and Bowman to French Camp reaches along the Lostine River in both 2005 and 2006; and mainly in the French Camp to Shady Falls reach in 2007 and several miles (approximately 10 miles) downstream of these reaches at the Six Mile Bridge to Pole Bridge reach. High site fidelity is documented by the overlapping of bull trout redds from 2005-2009, especially in the upper reaches of the Lostine River. Location and densities of bull trout redds in 2009 were similar to past years except for the Williamson to Walla Walla Reach, which had several more redds documented in 2008 and 2009 than in previous years.

Sections of the Lostine River not surveyed due to insufficient spawning gravels (boulder and cobble dominated substrate) and difficult access include; Bowman to Walla Walla (approximately 2.2 miles) and Williamson to Pole Bridge (approximately 3.5 miles). Downstream of Westside Ditch on the Lostine River (approximately 9 miles) is private property that is not surveyed due to lack of bull trout spawning gravels, higher stream temperatures, and low flows associated with irrigation withdrawal.

Lostine River within the Shady Campground to French Camp bull trout spawning area. Surveyors in photo are left to right; Suzanne Anderson (Service and Ken Bronec (consultant), 2009.

DISCUSSION

A combination of low flows (due to drought conditions) and severe streambed scour activity in the spring seasons of 2006-2009 created limited available habitat for spawning bull trout in the fall seasons of 2006-2009. This is noted by the author as most evident in the Lostine/Bear and Imnaha systems. During drought conditions, as in 2006-2009, Bear Creek had limited spawning habitat for fluvial bull trout due to the subbing out of flows. It is assumed that there is habitat upstream of the index area above subbing flows for resident bull trout. In 2009, the author has observed Bear Creek (from Standley trail crossing to Goat Creek confluence) having limited spawning habitat and more rearing habitat due to low flows (concentrated on one or both sides of a large floodplain and large woody debris creating pool habitat in these areas). In 2007, surveyors noted a chinook redd (obvious because of the huge size and large substrate) in lower Goat Creek which was probably a result of extremely low flows and warm temperatures in Bear Creek in 2007. Several side channels on the Imnaha were no longer flowing in 2006-2009, and this was evident as well during the chinook surveys on these streams. This likely had an effect on densities and distribution of redds for both bull trout and chinook species in these systems.

The Imnaha in 2006-2008 had a large distribution of bull trout redds that extended further downstream than in past years (Blue Hole to Indian Crossing, a two mile section); which may be due to limited passage of fluvial bull trout at the falls and potential bull trout/chinook interactions that are not well understood. In 2008, the redd size was larger; therefore, larger fluvial fish were building redds in this area. As mentioned in the previous reports, additional research on timing in the Imnaha and especially passage above and below the falls would be beneficial in our understanding of bull trout in this system. In 2009, the Imnaha redd distribution extended further upstream (similar to pre 2006) and total redd counts (excluding resident Cliff Creek) were down in 2009, 70 redds for 16.9 miles of stream in 2009 versus 132 for 16.9 miles of stream in 2008. The survey on S.F. Imnaha had very low flows and the instream rocks were covered with slippery algae growth, due to low flows, past debris flows contributing to high instream sediment, and exposure to sunlight. In 2009, Cliff Creek bull trout surveyors documented that a recent avalanche deposited several pieces of wood into the channel. High flows in 2009 channelized the creek bed and created large jams.

The Middle Fork of Big Sheep (a one mile section of stream in the headwaters) was surveyed in 2008 per recommendation by Service researchers. They have documented several bull trout in that area post their survey of the area utilizing electrofishing techniques. It appears to be excellent rearing habitat, but in 2008 there were very limited spawning gravels and/or use of existing gravels by spawning resident bull trout. This survey was not repeated in 2009.

Quartz Creek, a tributary to Lick Creek, had an experimental survey also per Service researcher recommendations. There appears to be bull trout spawning and rearing habitat in this stream, as six redds were reported in a one mile survey reach of stream. The stream is very healthy, i.e. excellent canopy cover/streamside vegetation; therefore, the stream is not recommended to survey on an annual basis due to difficult access and a problem in detecting redds due to the amount of cover. This survey was not conducted in 2009.

Deer Creek had an experimental survey conducted in 2009. No redds or bull trout were located. The surveyors recommend continuing this survey in 2010 upstream of the Rd 8920 culvert for approx 1 mile. A recent brushed wildfire fire line near the creek made walking the creek much easier than through the dense jungle like vegetation downstream. The recommendation was to survey this stream not every year, but enough to get some trend information.

Overall, future needs for this project include continued funding and support from all involved parties for conducting and reporting bull trout redd counts in the Wallowa Mountains. A phase II of this project, OWEB Proposal: Phase II Wallowa Mountains Bull Trout Redd Monitoring (2010-2011) was submitted for funding in October 2009. At least 15 years (consecutive years) of bull trout redd data are needed for trend data (Maxwell 1999) and for bull trout recovery data needs. Caution must be exercised in using the above bull trout spawning data for adult population trends until at least 15 years of data have been collected.

CONCLUSION

The local bull trout populations surveyed appear to be relatively stable for the survey period (1999-2008) with a recent downward trend in 2009 (except for resident Cliff Creek which had an increasing trend).

The Imnaha population is one of the strongholds within the Imnaha Subbasin as it has multiple age classes, contains fluvial fish, has an anadromous prey base and connectivity with the Snake River, and bull trout are distributed throughout the habitat. Primary spawning activity on the Imnaha River has been documented to occur in the headwaters which lie within wilderness. Both fluvial and resident life history forms are present. The Imnaha River is rated at low risk of extinction, and Big Sheep is rated "of special concern" (Buchanan et al. 1997).

The Lostine River is considered a moderately-strong population within the Grande Ronde Subbasin. Our results are consistent with Buchanan et al. (1997). Lostine River and Bear Creek contain brook trout and the degree of hybridization is unknown. Limited redd count data is available on Bear Creek and this portion of the Lostine River/Bear Creek local population has been listed as a special concern by Ratliff and Howell (1992). Future genetic analysis of bull trout and brook trout is recommended to help determine the significance of this threat.

Male adult fluvial bull trout near redd on the Lostine River near Turkey Flat, 2009

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APPENDIX A – TABLES

Table 1 – Bull Trout Spawning Surveys and Survey Frequencies for selected Grande Ronde River and Imnaha River Streams, 1999-2009

Stream	Year	Dates	Survey Frequency	Total Redds	Total Miles	Total Redds/Mile
Lostine River	1999	9/16,9/23,10/12	3 Times	39	9.75	4.0
	2000	9/21,9/28,10/12	3 Times	38	13.74	2.8
	2001	9/17-18,10/11-12	Twice	43	14.4	3.0
	2002	9/23-24,10/7-8	Twice	22	10.7	2.1
	2003	9/23-24,10/6-7	Twice	71	10.5	6.8
	2004	9/14-15,10/5-6	Twice	26	8.5	3.1
	2005	9/15, 9/21-22, 10/3-10/4	Twice, and 3 Times in Turkey Flat and Shady Campground areas	32	10.5	3.0
	2006	9/14, 9/20-21, 10/2-10/4	Twice, and 3 Times in Turkey Flat and Shady Campground areas	45	10.5	4.3
	2007	9/19-9/20, 10/3-10/4	Twice	47	10.1	4.7
	2008	9/17, 10/1-10/2, 10/9-10/10	Twice, and 3 Times in Turkey Flat and Shady Campground	53	10.1	5.3
	2009	9/11, 9/23-24, 10/7-10/8	Twice, and 3 Times in French Camp to Bowman	41	10.1	5.2
Bear Creek (including Goat Cr)	1999	9/7,9/22	Once Bear, Twice Goat	6	1.8	3.3
	2000	10/18	Once	5	1.8	2.8
	2001	10/16	Once	12	2.3	5.2
	2002	10/15	Once	7	2.3	3.0
	2003	10/16	Once	17	3.8	4.5
	2004	10/1	Once	11	2.3	4.8
	2005	10/11	Once	16	2.8	5.7
	2006	10/10	Once	9	1.9	4.7
	2007	9/17, 10/9	Twice, Exploratory (more reaches than past years)	11.0	7.2	1.5
	2008	9/30, 10/7	Twice	20	3.2	6.3
	2009	9/22, 10/13	Twice	8	3.2	2.5

Deer Creek	2009	10/14	Once	0	1.5	0

Table 1 (Continued)– Bull Trout Spawning Surveys and Survey Frequencies for Selected Grande Ronde River and Imnaha River Streams, 1999-2009

Stream	Year	Dates	Survey Frequency	Total Redds	Total Miles	Total Redds/Mile
Imnaha River	1999	9/20,28,10/11	Middle = Thrice	14	15.2	0.9
(excluding	2000	9/20,22,25,26,27,10/11	Upper = Once, Middle = Twice	92	29.1	3.2
Big Sheep)	2001	9/20,21,10/1,2,3,9,10	Upper = Once, Middle = Twice	291	31.3	9.3
	2002	9/25,26,9/30,10/1-2,10/10-11	Upper = Once, Middle = Twice	113	30.5	3.7
	2003	9/25-26,9/29-30,10/1,10/8-9	Upper = Once, Middle = Twice	266	31.6	8.4
	2004	9/15-9/16,9-27,28,29,10/7-8	Upper = Once, Middle = Twice	293	31.5	9.3
Middle=Blue Hole	2005	9/26-28, 10/7	Once Upper and Middle	276	19.4	14.2
to Indian 2005-2009	2006	9/25-28,10/5	Upper = Once, Middle = Twice	186	19.4	9.6
	2007	9/24-27, 10/5	Upper = Once, Middle = Twice	284	19.4	14.6
	2008	9/22-25, 10/6	Upper = Once, Middle = Twice	190	19.4	9.8
	2009	9/28-30, 10/1, 10/9	Upper = Once, Middle = Twice	235	19.4	12.1

Table 1 (Continued)– Bull Trout Spawning Surveys and Survey Frequencies for Selected Grande Ronde River and Imnaha River Streams, 1999-2009

Stream	Year	Dates	Survey Frequency	Total Redds	Total Miles	Total Redds/Mile
Big Sheep	1999	9/21,29,30,10/18,19	Once	20	14.2	1.4
[(including Lick,	2000	10/13-10/16	Once	12	8.4	1.4
and Salt).	2001	10/14,10/17	Once	24	8.4	2.9
Salt Cr. not	2002	9/30,10/1,10/14-15	Twice	41	9.3	4.4
surveyed post 2003,	2003	9/22,10/14	Twice	18	9.3	1.9
and Upper Big	2004	9/20,9/28-9/29,9/30,10/4,10/19	Once Big Sheep, Twice Lick	43	14.1	3.0
Sheep exploratory	2005	9/19-20, 10/6	Twice	16	8.6	1.9
in 2004].						
	2006	9/19, 10/4	Twice	18	7.6	2.4
	2007	9/21, 10/2	Twice	27	8.6	3.1
	2008	9/29, 10/1, 10/10	Twice except once exploratory Quartz creek tributary to Lick and once Lick Creek 39 Rd to meadow	30	9.1	3.3
	2009	9/16, 10/6	Twice	20	7.6	2.6

Table 2a–Bull Trout Spawning Surveys for the Lostine River Comparing 1999 to 2009 Surveys

Stream	Survey Years										
Lostine	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
	Redds Surveyed										
Reaches (miles surveyed)											
Lundquist Bridge to OC Ranch (2.8)	1	0	2	3	3	5	0	5	4	5	0
Williamson to Walla Walla (2.2 miles)	0	2	1	0	6	1	3	0	2	13	8
Bowman to French Camp (1.6 miles)	18	19	16	11	18	3	9	9	5	12	
French Camp to Shady Falls (1.5)	20	12.0	23	8	43	17	12	22	31	20	23
Lostine Total Redds (Comparable Reaches)	**39**	**33**	**42**	**22**	**70**	**26**	**24**	**36**	**42**	**50**	**38**
Lostine Total Miles of Comparable Stream	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Lostine Redds/Mile Comparable Stream	**4.6**	**3.9**	**4.9**	**2.6**	**8.2**	**3.1**	**2.8**	**4.2**	**5.2**	**6.2**	**4.7**
Total Redds For Year	39	38.0	43.0	22.0	71.0	26.0	32.0	45	47	53	41
Total Miles Surveyed For Year	9.8	13.7	14.4	10.7	10.5	8.5	10.5	10.5	10.1	10.1	10.1
Total Redds/Mile For Year	4.0	2.8	3.0	2.1	6.8	3.1	3.0	4.3	4.6	5.2	4.1

Notes: The Lostine was surveyed three times in 1999 and 2000. During survey years 2001-2009, the Lostine was surveyed twice (except Shady Campground and Turkey Flat areas were surveyed three times in 2005, 2006, and 2008 and French Camp to Bowman was surveyed three times in 2009). 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 2b – Bull Trout Spawning Surveys for Bear and Goat Creeks Comparing 1999 – 2009 Surveys

Stream	Survey Years										
Bear Creek	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
			Redds	**Surveyed**							
Reaches (miles surveyed)											
Bear: Goat Confluence to Wilderness Boundary (1mile)	0	2	3	1	2	3	5	0	1	6	1
Goat Creek: Mouth to Falls (0.9)	8	3	9	6	9	8	6	9	7	4	5
Bear (and Goat) Total Redds (Comparable Reaches)	**8**	**5**	**12**	**7**	**11**	**11**	**11**	**9**	**8**	**10**	
Bear Creek Total Miles of Comparable Stream	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Bear Creek Redds/Mile Comparable Stream	**4.2**	**2.6**	**6.3**	**3.7**	**5.8**	**5.8**	**5.8**	**4.7**	**4.2**	**5.3**	**3.2**
Total Redds For Year	8	5	12	7	17	12	16	9	11	20	8
Total Miles Surveyed For Year	1.9	1.9	2.3	2.3	3.8	2.3	2.8	1.9	7.2	3.2	3.2
Total Redds/Mile For Year	4.2	2.6	5.2	3.0	4.5	5.2	5.7	4.7	1.5	6.3	2.5

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 and 2009, 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.

Table 2c – Bull Trout Spawning Surveys for the Imnaha River, Comparing 2001 – 2009 Surveys

Stream	Survey Years								
Imnaha River	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
	Redds Surveyed								
Reaches (miles surveyed)									
South Fork Imnaha and tributaries:									
Cliff Creek, mouth to 2.5 miles (2.5 miles)	96	22	57	65	61	17	93	52	164
South Fork Imnaha, NF to Soldier (1.5 miles)	6	7	14	12	44	9	30	6	7
South Fork Imnaha, Soldier to Cliff (3.1 miles)	33	18	37	29	55	26	37	15	8
North Fork Imnaha:									
North Fork, above Middle Fork (4.1 miles)	49	18	40	68	39	18	30	17	2
North Fork, below Middle Fork to mouth (2.1 miles)	2	8	15	9	21	6	7	5	3
Middle Fork, mouth to falls (0.8 miles)	12	0	12	6	24	7	17	8	7
Imnaha River:									
Imnaha River, NF to Falls (0.6 miles)	0	3	5	1	2	3	2	1	0
Imnaha River, Falls to lower falls (0.8 miles)	41	18	35	40	13	37	28	12	13
Imnaha River, Blue Hole to Indian Crossing (2.0 miles)	8	7	9	3	2	18	18	28	2
Imnaha Total Redds (Comparable Reaches)	**247**	**101**	**224**	**233**	**261**	**141**	**262**	**144**	**206**
Imnaha Total Miles of Comparable Stream	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Imnaha Redds/Mile Comparable Stream	**14.1**	**5.8**	**12.8**	**13.3**	**14.9**	**8.1**	**15.0**	**8.23**	**11.8**
Total Redds For Year	269	103	293	286	276	186	284	184	235
Total Miles Surveyed For Year	19.4	18.3	42.8	41.2	19.4	19.4	19.4	19.4	19.4
Total Redds/Mile For Year	13.9	5.6	6.8	6.9	14.2	9.6	14.6	9.5	12.1

Notes:

All reaches except Blue Hole to Indian Crossing were surveyed once in 2001 to 2009.

The Blue Hole to Indian Crossing reach was surveyed twice, in mid September and October from 2001-2009, except in 2005 it was surveyed once.

Table 2d – Bull Trout Spawning Surveys for Big Sheep Creek and Lick Creek, Comparing 2001 – 2009 Surveys

Stream	Survey Years									
Big Sheep Creek (including Lick Creek)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
		Redds	**Surveyed**							
Reaches (miles surveyed)										
Big Sheep, canal to 39 rd. (1.9 miles)	2	6	17	2	3	5	6	12	3	2
Lick Creek, Meadow to 39 rd. (1.5 miles)	0	6	3	0	1	3	5	3	4	5
Lick Creek, 39 rd. to Quartz Creek (4.2 miles)	8	5	14	8	4	1	7	12	15	13
Big Sheep Total Redds (Comparable Reaches)	**10**	**17**	**34**	**10**	**8**	**9**	**18**	**27**	**22**	**20**
Big Sheep Creek Total Miles of Comparable Stream	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Big Sheep Creek Redds/Mile Comparable Stream	**1.3**	**2.2**	**4.5**	**1.3**	**1.1**	**1.2**	**2.4**	**4.6**	**2.9**	**2.6**
Total Redds For Year	12	24	41	18	43	16	18	27	30	20
Total Miles Surveyed For Year	8.4	8.4	9.3	9.3	14.1	8.6	7.6	8.6	9.6	7.6
Total Redds/Mile For Year	1.4	2.9	4.4	1.9	3.0	1.9	2.4	3.1	3.1	2.6

Notes: Survey frequency varied by year, surveys were conducted once in mid to late October in years 2000 and 2001 for both Big Sheep and Lick Creek, and surveys were conducted twice, once in September and once in October in years 2002-2009, except for Big Sheep which was surveyed once in 2004.

Bull Trout Spawning Surveys
For the Imnaha River, 2009
USFWS, La Grande Field Office

Imnaha Basin		Kilometers	Miles		Redds				Total		Bull Trout Observed (mm)		
Stream Reach, Section	Date(s)	Surveyed	Surveyed	Occ	Unocc	Total	Per km	Per Mile	But obs	<6"(150mm)	<12" (~300mm)	<18"(450mm)	>18"(450mm)
Upper Imnaha System													
South Fork Tributaries													
Cliff Cr., mouth to 3.8 km	29-Sep	4.0	2.5	10.0	154.0	164.0	41.0	65.6	75.0	28.0	47.0	0.0	0.0
South Fork Tributaries Total		**4.0**	**2.5**	**10.0**	**154.0**	**164.0**	**41.0**	**65.6**	**75.0**	**28.0**	**47.0**	**0.0**	**0.0**
North Fork													
Middle Fork., mouth to falls	29-Sep	1.3	0.8	0.0	7.0	7.0	5.4	8.7	3.0	1.0	2.0	0.0	0.0
N. Fk., above M. Fk. (reach 3-7)	28-Sep	6.6	4.1	2.0	0.0	2.0	0.3	0.5	14.0	4.0	10.0	0.0	0.0
N. Fk., below M. Fk. (reach 1-2)	29-Sep	3.4	2.1	0.0	3.0	3.0	0.9	1.4	0.0	0.0	0.0	0.0	0.0
North Fork Total		**11.3**	**7.0**	**2.0**	**10.0**	**12.0**	**1.1**	**1.7**	**17.0**	**5.0**	**12.0**	**0.0**	**0.0**
South Fork													
S. Fk., North Fork to Soldier Cr.	28-Sep	2.4	1.5	0.0	7.0	7.0	2.9	4.7	6.0	2.0	2.0	0.0	2.0
S. Fk., Soldier to Cliff Cr.	29-Sep	5.0	3.1	0.0	8.0	8.0	1.6	2.6	5.0	2.0	3.0	0.0	0.0
South Fork Total		**7.4**	**4.6**	**0.0**	**15.0**	**15.0**	**2.0**	**3.3**	**11.0**	**4.0**	**5.0**	**0.0**	**2.0**
Upper Imnaha													
Upper Imnaha (Falls to North Fork)	30-Sep	1.0	0.6	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0
Upper Imnaha Falls to lower falls	30-Sep	1.3	0.8	0.0	13.0	13.0	10.0	16.1	3.0	0.0	1.0	0.0	2.0
Falls downstream .67 mi. to beg. of gorge	30-Sep	1.1	0.7	3.0	22.0	25.0	22.7	36.6	6.0	0.0	0.0	2.0	4.0
Lower end of gorge to next gorge (.25 mi)	30-Sep	0.4	0.2	0.0	3.0	3.0	7.5	12.1	0.0	0.0	0.0	0.0	0.0
Canyon above slide to canyon just above slide	30-Sep	1.5	0.9	0.0	1.0	1.0	0.7	1.1	0.0	0.0	0.0	0.0	0.0
Upper Imnaha Total		**5.3**	**3.3**	**3.0**	**39.0**	**42.0**	**7.9**	**12.8**	**11.0**	**0.0**	**1.0**	**2.0**	**8.0**
Upper Imnaha System Total		**28.0**	**17.4**	**15.0**	**218.0**	**233.0**	**8.3**	**13.4**	**114.0**	**37.0**	**65.0**	**2.0**	**10.0**
Imnaha Basin Total (Page 2)		**15.6**	**9.6**	**1.0**	**21.0**	**22.0**	**1.4**	**2.3**	**49.0**	**23.0**	**10.0**	**14.0**	**2.0**
Imnaha Basin Total Pages 1 & 2)		**43.6**	**27.0**	**16.0**	**239.0**	**255.0**	**5.9**	**9.4**	**163.0**	**60.0**	**75.0**	**16.0**	**12.0**

Bull Trout Spawning Surveys
For the Imnaha River, 2009
USFWS, La Grande Field Office

Imnaha Basin / Stream Reach, Section	Date(s)	Kilometers Surveyed	Miles Surveyed	Redds Occ	Redds Unocc	Redds Total	Per km	Per Mile	Total But obs	<6"(150mm)	Bull Trout Observed (mm) <12" (~300mm)	<18"(450mm)	>18"(450mm)
Middle Imnaha													
Blue Hole to Indian Crossing	1-Oct	3.2	2.0	0.0	1.0	1.0	0.3	0.5	7.0	0.0	2.0	4.0	1.0
Blue Hole to Indian Crossing	9-Oct			0.0	1.0	1.0	0.3	0.5	9.0	0.0	0.0	8.0	1.0
Middle Imnaha Total		3.2	2.0	0.0	2.0	2.0	0.6	1.0	16.0	0.0	2.0	12.0	2.0
Big Sheep System													
Big Sheep, Canal to Rd. 39	16-Sep	3.1	1.9	1.0	1.0	2.0	0.6	1.1	24.0	17.0	6.0	1.0	0.0
Big Sheep, Canal to Rd. 39	6-Oct			0.0	0.0	0.0	0.0	0.0	4.0	1.0	2.0	1.0	0.0
Lick Cr. Meadow to 39 rd.	16-Sep	2.4	1.5	0.0	4.0	4.0	1.7	2.7	0.0	0.0	0.0	0.0	0.0
Lick Cr. Meadow to 39 rd.	6-Oct			0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lick Cr. 39 Rd. to Quartz Cr.	16-Sep	6.8	4.2	0.0	7.0	7.0	1.0	1.7	4.0	4.0	0.0	0.0	0.0
Lick Cr. 39 Rd. to Quartz Cr.	6-Oct			0.0	6.0	6.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0
Big Sheep System Total		12.3	7.6	1.0	19.0	20.0	1.6	2.6	33.0	23.0	8.0	2.0	0.0
Imnaha Basin Total (Page 1)		28.0	17.4	15.0	218.0	233.0	8.3	13.4	114.0	37.0	65.0	2.0	10.0
Imnaha Basin Total (Page 2)		15.5	9.6	1.0	21.0	22.0	1.4	2.3	49.0	23.0	10.0	14.0	2.0
Imnaha Basin Total Pages 1 & 2)		43.5	27.0	16.0	239.0	255.0	5.9	9.4	163.0	60.0	75.0	16.0	12.0

Bull Trout Spawning Surveys
For Some Grande Ronde Tributaries, 2009
USFWS, La Grande Field Office

Grande Ronde Basin		Kilometers	Miles		Redds				Total		Bull Trout Observed (mm)		
Stream Reach, Section	Date(s)	Surveyed	Surveyed	Occ	Unocc	Total	Per km	Per Mile	But obs	<6"(150mm)	<12" (~300mm)	<18"(460mm)	>18"(460mm)
Bear Creek													
Goat Cr (Mouth to Falls)	22-Sep	1.4	0.9	0.0	2.0	2.0	1.4	2.2	0.0	0.0	0.0	0.0	0.0
Goat Cr (Mouth to Falls)	13-Oct			0.0	3.0	3.0	2.1	2.3	3.0	0.0	3.0	0.0	0.0
Bear Creek (Standley Trail to USFS Cabin)	22-Sep	1.4	0.9	0.0	1.0	1.0	0.7	1.1	4.0	2.0	1.0	1.0	0.0
Bear Creek (Standley Trail to USFS Cabin)	13-Oct			0.0	1.0	1.0	0.7	0.8	0.0	0.0	0.0	0.0	0.0
Bear Creek (USFS Cabin to Goat Creek)	22-Sep	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bear Creek (USFS Cabin to Goat Creek)	13-Oct			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bear Creek (Goat Creek to Wilderness Boundary)	22-Sep	1.4	0.9	0.0	1.0	1.0	0.7	1.1	10.0	7.0	3.0	0.0	0.0
Bear Creek (Goat Creek to Wilderness Boundary)	13-Oct			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bear Creek Totals		**5.1**	**3.2**	**0.0**	**8.0**	**8.0**	**1.6**	**2.5**	**17.0**	**9.0**	**7.0**	**1.0**	**0.0**
Lostine River													
Lundquist Bridge to OC Ranch	24-Sep	4.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lundquist Bridge to OC Ranch	8-Oct			0.0	0.0	0.0	0.0	0.0	21.0	0.0	0.0	6.0	15.0
Pole Bridge to 6 Mile Bridge	8-Oct	3.2	2.0	0.0	1.0	1.0	0.3	0.5	7.0	5.0	0.0	2.0	0.0
Pole Bridge to 6 Mile Bridge	24-Oct			0.0	1.0	1.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0
Williamson to Walla Walla	23-Sep	3.5	2.2	1.0	1.0	2.0	0.6	0.9	2.0	0.0	2.0	0.0	0.0
Williamson to Walla Walla	7-Oct			0.0	7.0	7.0	2.0	3.2	0.0	0.0	0.0	0.0	0.0
Mini Turkey Flat	11-Sep			1.0	0.0	1.0			3.0	0.0	1.0	0.0	2.0
Bowman to French Camp	23-Sep	2.6	1.6	0.0	5.0	5.0	1.9	3.1	3.0	2.0	1.0	0.0	0.0
Bowman to French Camp	7-Oct			0.0	1.0	1.0	0.4	0.2	1.0	1.0	0.0	0.0	0.0
French Camp to Shady Falls	23-Sep	2.4	1.5	0.0	16.0	16.0	6.6	10.7	2.0	0.0	1.0	1.0	0.0
French Camp to Shady Falls	7-Oct			0.0	7.0	7.0	2.9	1.9	0.0	0.0	0.0	0.0	0.0
Lostine River Total		**16.2**	**10.1**	**2.0**	**39.0**	**41.0**	**2.5**	**4.1**	**39.0**	**8.0**	**5.0**	**9.0**	**17.0**
Grande Ronde Basin Total													

31.0

Table 4a –
Summary of Measured Bull Trout Redds, Grande Ronde River Basin
Lostine River, Bear Creek, and Goat Creek 2009

Stream	n*1		Length (M)	Width (M)	Area (m2)	Length/Width ratio
Lostine	41	mean	1.5	0.9	1.4	1.7
		sd	0.7	0.3	1.1	0.5
		max	3.0	1.8	4.7	2.9
		min	0.5	0.3	0.2	0.5
Bear	3	mean	1.0	0.5	0.6	2.3
		sd	0.7	0.3	0.6	0.6
		max	1.9	0.7	1.3	2.7
		min	0.4	0.2	0.1	1.6
Goat	5	mean	1.1	0.7	0.9	1.5
		sd	0.6	0.3	0.8	0.3
		max	2.0	1.1	2.0	2.0
		min	0.6	0.4	0.2	1.1

*n = number of redds observed and measured (sample size).

Table 4b – Summary of Measured Bull Trout Redds, Imnaha River Basin 2009

Stream	n*1		Length (M)	Width (M)	Area (m2)	Length/Width ratio
Lick Creek	18	mean	0.7	0.5	0.4	1.5
		sd	0.2	0.2	0.2	0.4
		max	1.2	0.9	1.0	2.3
		min	0.3	0.3	0.1	0.9
Big Sheep Creek	2					
		mean	1.0	0.6	0.8	1.9
		sd	0.7	0.5	1.0	0.5
		max	1.5	1.0	1.5	2.2
		min	0.6	0.3	0.1	1.5
Middle Imnaha	2	mean	1.15	0.7	0.8	1.6
		sd	0	0	0	0
		max	1.5	0.7	0.8	1.6
		min	0	0.7	0.8	1.6
Upper Imnaha	42	mean	1.4	0.9	1.3	1.8
		sd	0.5	0.3	0.9	1.1
		max	2.7	1.5	3.6	8.0
		min	0.7	0.2	0.2	0.9
N.F. Imnaha	12	mean	0.8	0.5	0.5	1.6
		sd	0.4	0.2	0.5	0.3
		max	1.5	1.0	1.5	2.0
		min	0.4	0.2	0.1	1.1
S.F. Imnaha	15	mean	1.4	0.7	1.1	2.0
		sd	0.8	0.3	0.9	0.7
		max	2.7	1.2	3.2	3.3
		min	0.4	0.3	0.1	1.1
Cliff Creek	58*	mean	0.6	0.4	0.2	1.7
		sd	0.2	0.2	0.1	0.8
		max	1.1	0.9	0.5	4.0
		min	0.3	0.2	0.1	0.5

Footnote 1: n = number of redds observed and measured (sample size).
Footnote 2: Cliff Creek had 58 redds measured out of a 164 total redds documented. 50 redds were measured above the falls (resident fish) and 8 redds were measured below the falls (fluvial/resident fish).

Oregon Watershed Enhancement Board (OWEB)
Match / In-Kind Documentation for Final Report

File: F:/user/oweb/forms/match spreadsheet

OWEB Grant # 207-244

Organization Name	Actual Cash Contribution	Donated / In-Kind Services	Volunteers Hours Worked	Volunteers Hourly Rate	Volunteers Volunteer Value	General Description
OWEB Final Expenditures->	$ 13,057.69	N/A	N/A	N/A	N/A	OWEB Cash
Other Organizations						
ODFW	$	$ 8500.00			$	In Kind
WDNF	$	$ 2250.00			$	In Kind
USFWS	$	$ 20750.00			$	In Kind
Nez Perce Tribe	$	$ 9600.00			$	In Kind
Anderson-Perry	$	$ 2500.00			$	In Kind
Volunteers	$	$			$ 600.00	In Kind
NMFS	$	$ 250.00			$	In Kind
Idaho Power	$	$ 750.00			$	In Kind
	$	$			$	
	$	$			$	
	$	$			$	
	$	$			$	
Total Dollar Amount	$ 13,057.69	$ 44,600.00			$ 600.00	

Total Overall Project Costs $ 58,257.69 **(Total dollar value of OWEB & Other Organization's Actual Cash Contributions, In-Kind Services and Volunteer value ALL added together)**

Total Non-OWEB Funds $ 45,200.00 **(Total dollar value of Other Organization's Actual Cash Contributions, In-Kind Services and Volunteer value ALL added together)**

OWEB Match $ 45,200.00 **(What dollar value of the Total Non-OWEB Funds are you claiming as OWEB Match. You are required to show a minimum of 25% of the total actual OWEB cash contributions. You may show more than 25%.)**

(General Description column can be used to describe categories such as Tree Planting, Rent, Cash, etc.)

Note: Volunteer Hours X Volunteer Rate = Volunteer Value (Combine Volunteer Hours by Type of Work. Example: Total project tree planting hours (500) x rate. Do not shown individual amounts - retain those records in your files)

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