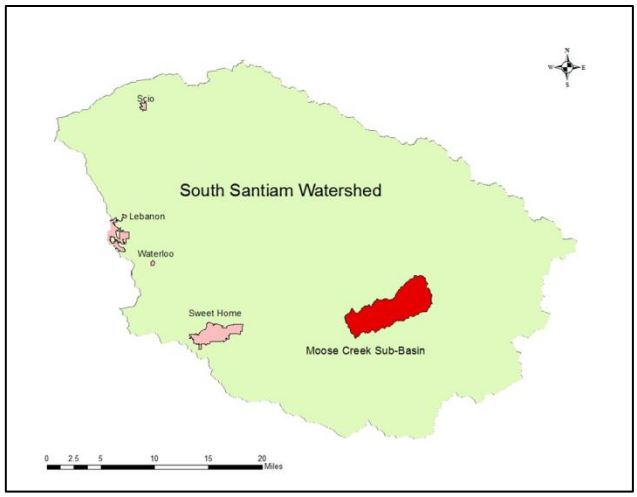
Moose Creek Steelhead Habitat Improvement Project
Project Completion Report
OWEB #208-3057-6374
Prepared by: The South Santiam Watershed Council
September 2011

1. Narrative description of the project

The Moose Creek Steelhead Habitat Improvement Project is a joint activity between the South Santiam Watershed Council (SSWC) and the Sweet Home Ranger District of the U.S. Forest Service (USFS). Moose Creek is a tributary to the upper South Santiam River, with its confluence at ~RM 52. The upper South Santiam watershed is comprised of mixed industrial forest and public land, with the majority of the land in the Moose Creek sub-basin under USFS management.



Moose Creek locator map

The Santiam basin supports the core genetic legacy of Upper Willamette River Winter Steelhead, a species listed as "threatened" under the Endangered Species Act. Historically, winter steelhead utilized much of the upper South Santiam watershed for spawning and rearing. However, the construction of two federal dams for flood control (Foster and Green Peter) have greatly reduced the amount of available habitat in the upper South Santiam watershed and have created passage barriers for migrating fish. While Foster Dam offers moderate fish passage facilities, Green Peter Dam currently has no fish passage opportunities for winter steelhead. Thus, it is critically important for tributaries in the upper South Santiam watershed to offer high quality spawning and rearing habitats to help mitigate for the exclusion of steelhead throughout their historic range.

Moose Creek is the top steelhead producing tributary in the upper South Santiam watershed. However, the lack of large wood in the channel has reduced the capacity of Moose Creek to provide the highest quality habitat for spawning and rearing steelhead. Large wood counts in Moose Creek prior to project implementation have repeatedly shown very few large pieces of wood in the channel. This is attributed to both natural and anthropogenic causes. Natural causes include a landslide across Moose Creek ~900 years ago, that created a small lake and effectively cut off the transportation of wood and sediment from the upper sub-basin to the lower reaches. A series of stand replacing fires in the mid-to-late 1800s swept through the sub-basin, resulting in few very large trees remaining in the Moose Creek riparian area. To add to the impact of natural occurrences that have diminished the availability of large wood in Moose Creek, humans have conducted stream clean out activities, timber salvage sales, and channel

straightening associated with building the nearby Moose Creek Road. Together, these factors have contributed to a lack of large wood in Moose Creek, and the degraded habitat conditions that are associated with stream systems lacking wood. Prior to project implementation, Moose Creek contained large amounts of bedrock, few areas of suitable spawning gravels, and little cover for rearing juveniles to escape high water velocities in the winter and predators in the summer.

The lack of large wood in Moose Creek was first addressed in 1994, when the USFS placed cabled logs with a length of ~40 ft. in the channel. The extreme water event in 1996 washed many of those pieces out of the system. Lessons learned from that project include the belief that full-length trees (~150 ft.) are required for maximum retention in Moose Creek, which has an average active channel width of ~60 ft. in the project area. In addition, rootwads should be utilized wherever possible to help keep the tree in in the desired location and to catch other debris as it moves downstream. While Moose Creek lacks a large floodplain throughout much of the project area, it is also important to utilize riparian areas, so that a portion of the placed logs rest out of the active channel.

Placing logs with helicopter, August 2008

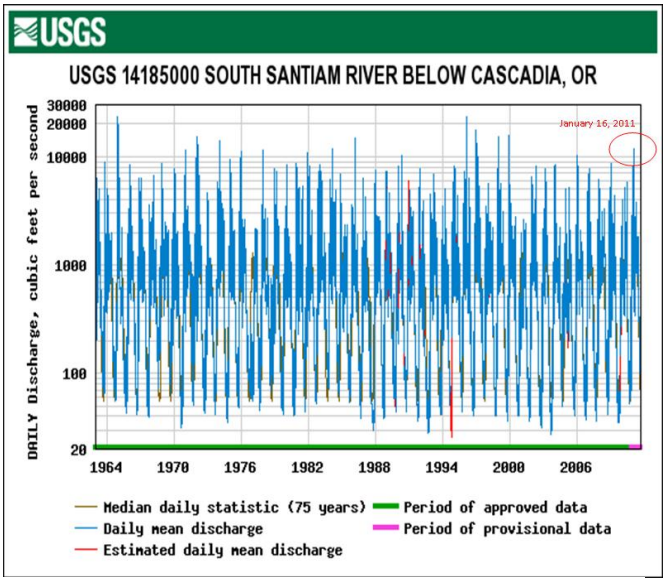
These practices were put into place with the Moose Creek Steelhead Habitat Improvement Project. In the summer of 2008, the project was initiated with the direct felling of 15 trees into Moose Creek by a local logger throughout the 2.5 mile project reach. This was followed by cable-assisted “tipping” of large conifer trees with a preserved rootwad into the creek. A total of 10 trees were pulled over into Moose Creek in a manner that left the rootwad on the stream bank, sometimes well away from the active channel, with the stem interacting with creek and capturing other logs as they are mobilized in high water events. Once the trees were pulled into the creek, a total of 41 full-length trees (140’-170’ in length with a dbh of 28”-36”) were placed with a Chinook helicopter in three areas of Moose Creek that correspond to the cross-sections on the attached map. The flight time (and cost) for the helicopter was lower than anticipated due to the staging of logs close to the placement areas in the creek. This savings allowed for further restoration actions to take place that supplemented and improved upon the original proposal.

High water events in the 2008-2009 winter resulted in some movement of the project wood. This led the project partners to manipulate some of the log structures at the downstream end of the project in the summer of 2009. These structures were stabilized by working with the geology of the site, large boulders present in the creek, and helping augment a pinch-point in the channel where wood would naturally form complexes in the creek. This proved to be a critical aspect of the project, as these structures

performed a valuable role in the high water event of January, 2011 which is discussed in greater detail below.

In 2010, 50 yards of washed, steelhead spawning sized, gravel was placed at a total of two locations on Moose Creek, near the end of the access road, below the highest placed wood and at the mouth of White Rock Creek. The gravel was placed using a pulley system and a container constructed out of half of a propane tank. In order to track the movement of placed gravels, some of the rocks were painted bright colors to help stand out as it was mobilized and distributed downstream.

A storm event on January 16th, 2011 impacted sub-basins in the South Santiam watershed in different ways. Generally speaking, in the lower elevation sub-basins, the storm produced water discharge rates similar to a one or two year event. However, in higher elevation sub-basins, the January storm event melted snow on the ground and produced higher discharge rates. While Moose Creek does not have a stream gauge, the USGS graph at right is from the upper South Santiam River, just downstream of the Moose Creek confluence. The graph shows the event in context of other events in the last 45 years. While not on a level on the same level as other notable events (e.g. 1996), the discharge on January 16, 2011 appears significant. The last occasion the stream gauge registered a reading that high was in the 1999-2000 winter.



Measured discharge on S. Santiam River below the Moose Creek confluence

The event had a significant impact on the Moose Creek Project. Many of the placed logs were mobilized in the high water and were deposited at bends in the stream, trapped by boulders, and at natural pinch points. By far the largest log jam is at the downstream end of the project area where log manipulation was conducted in 2009 to help trap mobilized pieces. A total of 24 project logs have accumulated at this logjam, along with many more pieces that are not associated with the project. Other significant logjams were created upstream, and are highlighted on the attached project map. A preliminary analysis of 2011 pebble counts at the nine cross-section locations is showing promising accumulations of steelhead spawning sized gravels throughout the project area when compared to pebble counts conducted before the project was implemented in 2008. Further analysis will be included in an upcoming monitoring report, and will include cross-section and longitudinal profiles. It should be noted that none of the painted rocks placed in 2010 has been visible to the survey team in 2011.

Self-loader placing logs, August 2011

In August, 2011 the project partners were able to secure ~40 logs from the U.S. Army Corps of Engineers which had stockpiled logs near Green Peter and Foster Reservoirs. The logs were of varying length and diameter, with an estimated average of 30' x 28". 14 of the logs included rootwads. The logs were moved and placed with a self-loader at two locations near the upper end of the project area. It is expected that these logs will mobilize in high water and float into downstream channel spanning log jams. With these additions, the total number of project logs is over 100.

Since 2008, the Moose Creek project has been the site of numerous public awareness and educational activities. Both the SSWC and the Sweet Home Ranger District have included Moose Creek as a tour stop for both the general public and visiting USFS officials from the state and regional offices. The project has also been utilized as an outdoor learning laboratory for students from the Sweet Home Youth Watershed Council and a local alternative high school. Activities conducted at Moose Creek by the students include aquatic macro-invertebrate collection, riparian planting, and constructing exclusionary fencing to protect sensitive areas from heavy recreation use.

The Moose Creek Steelhead Habitat Improvement Project was a unique opportunity for the SSWC and the Sweet Home Ranger District to partner on implementing a large scale stream restoration project. As such, the project offered many lessons learned and recommendations for future projects of a similar scale.

1. The partnership between the SSWC and the Sweet Home Ranger District offered many benefits for both parties. The Sweet Home Ranger District brought to the project extensive design and technical expertise. Sweet Home Ranger District staff was mentored by regional personnel within the U.S. Forest Service to develop a plan for log placement on Moose Creek that was designed for maximum wood retention. This level of expertise guided the work and showed a level of commitment to truly own the project, would have been difficult to obtain with a private consultant. In addition, wage rates for USFS staff are generally lower than what is found in the private sector for similar positions. When the value of the donated logs are added, this project was implemented for far less money than it would have been had we relied on consultants for design and purchased the logs at market prices.

2. For the Sweet Home Ranger District, the partnership with the SSWC allowed for community engagement in planning and implementing the project. In addition, the SSWC was responsible for contracting, a task that is onerous for a federal agency,

and much more flexible through the Council. This approach towards the project, focusing on each partner's strengths, allowed for work to be implemented on a relatively quick timeframe that was responsive to events on the ground. For example, after witnessing the impact of high water in the winter of 2009 on the project, the partners were able to design and implement a manipulation of the lowest log jam during the summer of 2009. This may not have been able to occur had the Sweet Home Ranger District relied on conventional contracting requirements or if the SSWC was working with a private consultant. As we learned, this lower log jam has played an extremely critical role in determining the success of the project.

3. The lower log jam serves as a reminder that logs, even quite large pieces, can be mobilized in high water. It is important to keep this in mind when thinking about large wood placement projects in western Oregon streams that are prone to flashiness and flooding. The important questions to ask include: where will mobilized logs eventually end up? Are there areas where logs can be placed that are typical of where wood is generally deposited? What is the risk to infrastructure if wood is mobilized and moves downstream? In the case of Moose Creek, project wood was mobilized throughout the creek in 2011, and deposited at bends and other locations that typically accumulate large wood.

4. The costs associated with the use of a helicopter for log placement were steep. However, it is difficult to envision any other way for logs well over 100 ft. to be transported to the site, let alone placed in a manner that does not greatly impact the existing riparian vegetation. Moreover, the placement of logs with a helicopter caused very little disturbance within Moose Creek itself. Large wood placement projects of a similar scale raise difficult questions when attempting to incorporate local contractors:

    4.1. Is it possible to use local contractors to implement the project? In this case, we utilized local contractors to the greatest extent possible, as it simply is not feasible to move the size of logs utilized for this project with anything other than a helicopter.

    4.2. Are there time constraints that make it difficult to use local contractors? With an in-water work period for Moose Creek of two months (July and August), and being sensitive to the presence of Harlequin ducks (in early July), the effective timeframe for implementing the project is six weeks. A helicopter placed over 40 logs in one morning, while it is likely that using terrestrial-based machinery exclusively would have taken several weeks.

    4.3. Is there a way to incorporate both local contractor and a helicopter? Yes, with the Moose Creek project, the project proponents were able to use local contractors for important aspects of the project while utilizing the helicopter to place the majority of the large pieces of wood. Future projects of a similar scale will likely employ the same strategy, particularly since it has become clear that Chinook helicopters will likely not be deployed for fish habitat restoration projects

for the foreseeable future. The SSWC and its partners will have to utilize smaller helicopters that place lighter (and smaller) pieces of wood. These smaller pieces are more likely to mobilize in high water, and thus it will become important to augment smaller pieces placed with a helicopter with tipped trees with root wads attached and constructed log jams utilizing terrestrial equipment.

2. Documentation that the project complies with the Oregon Aquatic Habitat Restoration and Enhancement Guide.

The Moose Creek Steelhead Habitat Enhancement Project complied with the Large Wood Placement guidance/considerations outlined in the guide. Moose Creek in the project reach has a relatively low gradient (1-2%) and is found in the conifer-dominated upper section of the South Santiam watershed. If not for the series of natural and anthropogenic causes described above, it is likely that Moose Creek would have had significantly more large wood prior to project implementation in 2008.

While winter steelhead utilized Moose Creek for spawning and rearing prior to 2008, habitat conditions were undesirable with low habitat complexity in the stream channel as well as a greater percentage of bedrock that would have occurred if there were large wood in the channel.

The USFS is the primary manager of the upslope and riparian lands on Moose Creek. The USFS is managing land in this watershed under the Northwest Forest Plan and an ecosystem approach to resource management that utilizes riparian and late-successional reserves. As over 60% of the Moose Creek watershed is described as either understory reinitiation (age range of 50-200 years) or late-successional (age range over 150 years), it appears likely that in the coming decades, the natural delivery of large wood into Moose Creek will resume.

USFS surveys prior to project implementation showed very few pieces of large wood within the Moose Creek project area and designs accounted for the active channel width and slope of the project area. Full-length trees with an average dbh of 32” were used (with the exception of cut logs placed in 2011 that will fill into existing downstream log jams) that are over two times the active channel width and complemented by the pulling over of 10 trees with root-wad attached. These specifications meet and exceed those specified in the ODFW/ODF guide to placing large wood.

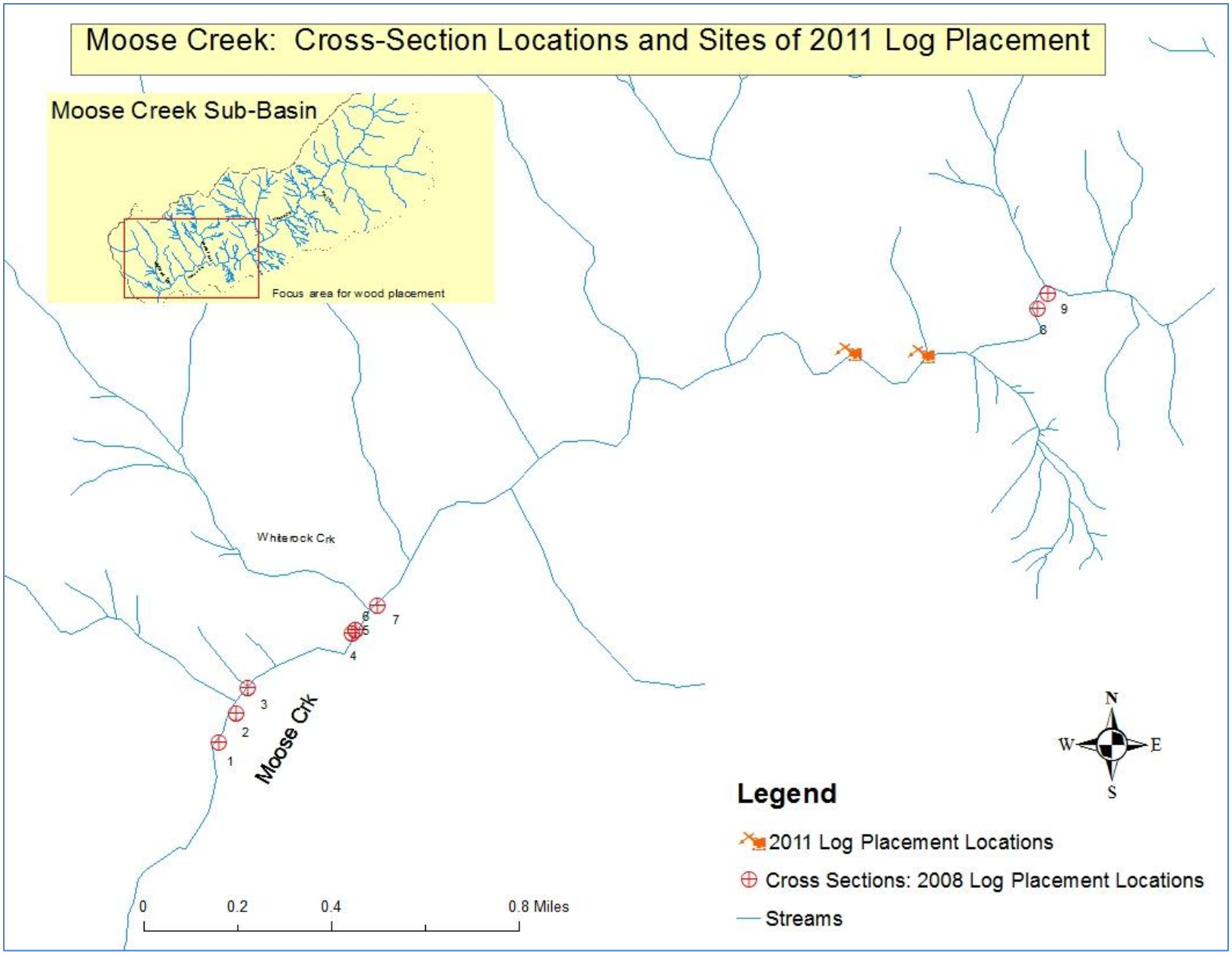
The riparian area throughout the project reach is healthy and includes a native conifer overstory. The trees utilized for tipping/cutting in the riparian area of Moose Creek were carefully selected by an interdisciplinary USFS team that included silviculture, botany, and wildlife. The trees selected for utilization in the project accounted for the presence of Northern spotted owls, red tree voles, and Dolichousnea longissima (sensitive lichen found in the Moose Creek watershed). Trees selected were from the north side of the creek to reduce the impact to stream temperature.

3. Color photographs of the project area before and after the project completion taken at pre-set photo points. *See attached.*

4. A completed OWRI form (#14165) was submitted on-line and approved by OWRI staff.

5. An accounting of the expenditures of Board moneys and all other funding in the project, including a final accounting of all in-kind contributions, donations, and the required non-Board match funds. *See attached.*

Moose Creek Project Maps



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