Ramsey Creek: 2000–2001 Riparian Restoration and Enhancement

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Introduction

In 1997, the Mt. Hood National Forest (MHNF) bought a parcel of land from the Rocky Mountain Elk Foundation (RMEF) in northern Oregon which included 667 ha (1648 acres) located in the Ramsey Creek watershed (Figure 1). The watershed is an important wintering ground for deer and elk, and provides wildlife habitat for other species such as ruffed grouse and mountain quail. The eastern-most run of wild winter steelhead trout (listed as threatened) in the Columbia River Basin also resides in the creek. Unlike other winter steelhead trout in the area, it is genetically similar to interior redband trout.

Since the mid-1860s, the Ramsey Creek watershed has experienced farming, livestock grazing, and extensive selective and industrial timber harvesting (including riparian areas). In the winter of 1997, a rain-on-snow event produced an estimated 15- to 20-year flood. This contributed to severely degrading steelhead spawning and rearing habitat, by causing channel down cutting, loss of connectivity of the stream channel to the floodplain, increased fine sediment, and loss of stream channel vegetation (Figure 2). The previous timber harvesting and lack of roughness (i.e., wood) exacerbated the large amount of degradation. A road that paralleled the creek for 5 km (3 miles) was also a chronic source of fine sediment, disrupted surface and subsurface flow, and in several places posed a risk of capturing the stream. Combined, these conditions led to a need to develop a restoration plan.

Figure 1. Ramsey Creek, Mt. Hood National Forest.

Pre-project Habitat Conditions

Ramsey Creek is a 20 km (12+ miles) long, spring-fed, third-order stream. It flows eastward into Fifteenmile Creek about 6 km (4 miles) below the MHNF. Ramsey Creek flows in a moderate V-shaped valley averaging 5% gradient in the headwaters, then flattens out into a narrow flat valley floor with gradients ranging from 2 to 5%. Average stream width was 4 m with a high width-to-depth ratio (29 or higher) and a high percentage of eroding, vertical stream banks, especially in the lower mile within the MHNF. In-channel large woody debris

Chris Rossel

Figure 2. Ramsey Creek Forest Boundary before (1998) and after (2002) restoration work, Mt. Hood National Forest.

averaged less than 2.5 pieces/km—well below the forest standard of 66 pieces/km. Large, deep pools were also lacking with only three pools deeper than 1 m found in the project area. Habitat conditions, coupled with a lack of stream bank vegetation, resulted in limited fish cover/habitat in the main channel. Off-channel habitat was sparse because there were few small side channels and the main channel incision had resulted in limited access to these refugia areas during high flows. Dominant stream substrates were cobble and gravel with an excessively high percentage of fine sand/silt.

Restoration Planning

Goals of the instream and riparian restoration were to reintroduce large wood to the stream and floodplain, minimize erosion from identified sediment sources, and increase the overall quality of steelhead spawning and rearing habitat. Habitat improvements for large game and birds included converting a 5-km (3-mile) long road to a non-motorized vehicle trail and planting about 2.5 ha of desirable native foraging and nesting vegetation along the trail and throughout small open meadows. The overall goal was to restore the natural function of the stream and floodplain, which would in turn lead to long-term recovery.

In-channel and Floodplain Enhancement

We placed about 1400 logs in and beside the stream channel in a 5-km project reach. Logs placed in the channel were to provide direct cover for fish, create and maintain pool habitat, and ultimately reconnect the stream channel to the floodplain through aggradation of the stream channel. As the channel aggrades over time, stream gradient should decrease and stream length increase, thus increasing the ability of bankfull or greater flows to overflow into the floodplain. More frequent overbank flows disperse water over a larger area and reduce water velocities, thereby reducing the potential for downcutting and bank erosion to occur (Figure 3). Inundation of water into the floodplain should recharge the riparian area with water and sediment, while improving vegetation growth.

Most wood (60–70%) was placed in the floodplain because we anticipated the stream will shift course due to in-channel wood placement. The wood placed in the floodplain will help regulate the rate of stream channel shifting, reduce erosion when it does shift, and become new in-channel habitat when the stream shifts course. Large wood on the floodplain also reduces the amount of erosion during flood events by reducing water velocity through increased roughness. Floodplain wood was placed primarily where the stream channel would shift due to in-channel wood placement, and was oriented roughly perpendicular to the stream channel. Unfortunately, few logs with root wads were used because they were unavailable. Limited woody debris was cabled for the project. We also placed logs in specific locations along stream margins to reduce bank erosion. Most of these sites were located adjacent to the decommissioned road and were designed, in part, to prevent the creek from shifting into the new trail.

Pools were excavated at 30 sites in the 5-km project reach. The excavated pools ranged from 0.7 to 1.1 m deep, and featured high quality rearing habitat for young and adult trout. Pool excavation was primarily limited to existing pool locations with several pools excavated down to bedrock. We constructed the primary pools (>1 m in depth) with either upstream U-shaped rock weirs, or angled sill logs as the hydraulic controls for the head. Tail outs were tapered downstream with layered clean spawning gravels for increased spawning habitat. Cover logs were placed in some pools for additional complexity and cover for fish.

Continued on page 14

Chris Rossel

Figure 3. Ramsey Creek before log and after log placement.

Continued from page 13

Some of the excavated pools will shallow up after a few freshets, but meanwhile they will provide quality spawning and rearing fish habitat. In the long term, the high level of large wood that has been placed in the stream channel will create and maintain pool habitat.

Road Decommissioning/Closure

The natural surface road adjacent to Ramsey Creek was determined to be a major source of fine sediments. Before we could close and treat the road, however, we had to improve access for log trucks delivering wood for in-channel and floodplain enhancements.

Decommissioning began in fall 2000 and was complete in 2001. The upper 2.5 km of road was fully obliterated. Road fill was pulled upslope and shaped to match the natural slope contour. A small bench was left at the top for the trail. Other short sections of road leading down to the creek were also obliterated. The lower 2.5 km was sloped away from the hillside and scarified to improve drainage and increase water infiltration. About one-third of the road surface was left as a trail (non-vehicle) to keep access open for a private land holding in the project area. The constructed drain dips, which had been armoured with rock, were left in place. Treated areas were planted with native grass seed and mulched with straw. A small parking lot/trailhead was constructed at the MHNF boundary in 2001.

Riparian Planting

To restore both aquatic and terrestrial habitat, a wide variety of vegetation was planted along Ramsey Creek including conifers (i.e., western redcedar, Douglas-fir, and ponderosa pine) and shrubs (i.e., ceonothus, elderberry, and bitter cherry). Shrub seeds were collected from the area and propagated at Stone Nursery in Medford, Oregon. Conifer trees were planted for stream bank stability and shade, and will eventually fall into the stream or floodplain and provide fish habitat. Shrubs offer wildlife cover and forage, as well as stabilize stream banks.

Chris Rossel

Figure 4. Local member of Ruffed Grouse Society planting seedlings.

The Ruffed Grouse Society, another active partner in restoring riparian and streamside conditions, contributed over $6,000 in materials and in-kind contributions, and about 430 hours of labour (Figure 4).

Monitoring

Pre-restoration monitoring (1997 and 2000) focused on stream habitat that was expected to change because of project activities, including stream shape, amount of large wood, number and size of pools, amount of shade, and bank stability.

Long-term effectiveness is being monitored. Before and after restoration monitoring will compare water temperature, valley bottom cross-sectional profiles, photo points, pebble counts, stream channel shade, stream bank stability, streambed profile, treatment site mapping, low elevation aerial photos, and Level II stream surveys. No trend results of project effectiveness are available to report at this time.

In addition to habitat monitoring, MHNF and Oregon Department of Fisheries and Wildlife personnel have been surveying adult steelhead trout spawning within Ramsey Creek and the entire Fifteenmile Creek Basin for many years. Based on the number of steelhead redds counted since 1997, Ramsey Creek is clearly an important steelhead spawning stream within the Fifteenmile Creek Basin. Most of the steelhead spawning occurring in Ramsey Creek since 1997 has been within the parcel acquired, underscoring the importance of restoring this habitat for this unique steelhead run.

Key Messages

The floodplain is critical when developing restoration goals and objectives—it contains the historic, current, and future stream channel. Plans should focus not solely on the stream but on broader "ridge to ridge" restoration. Finally, partnering with the Rocky Mountain Elk Foundation and the Ruffed Grouse Society made this project possible.

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