

Appendix 2:
2007 Watershed Restoration Projects,
Lost Man Creek

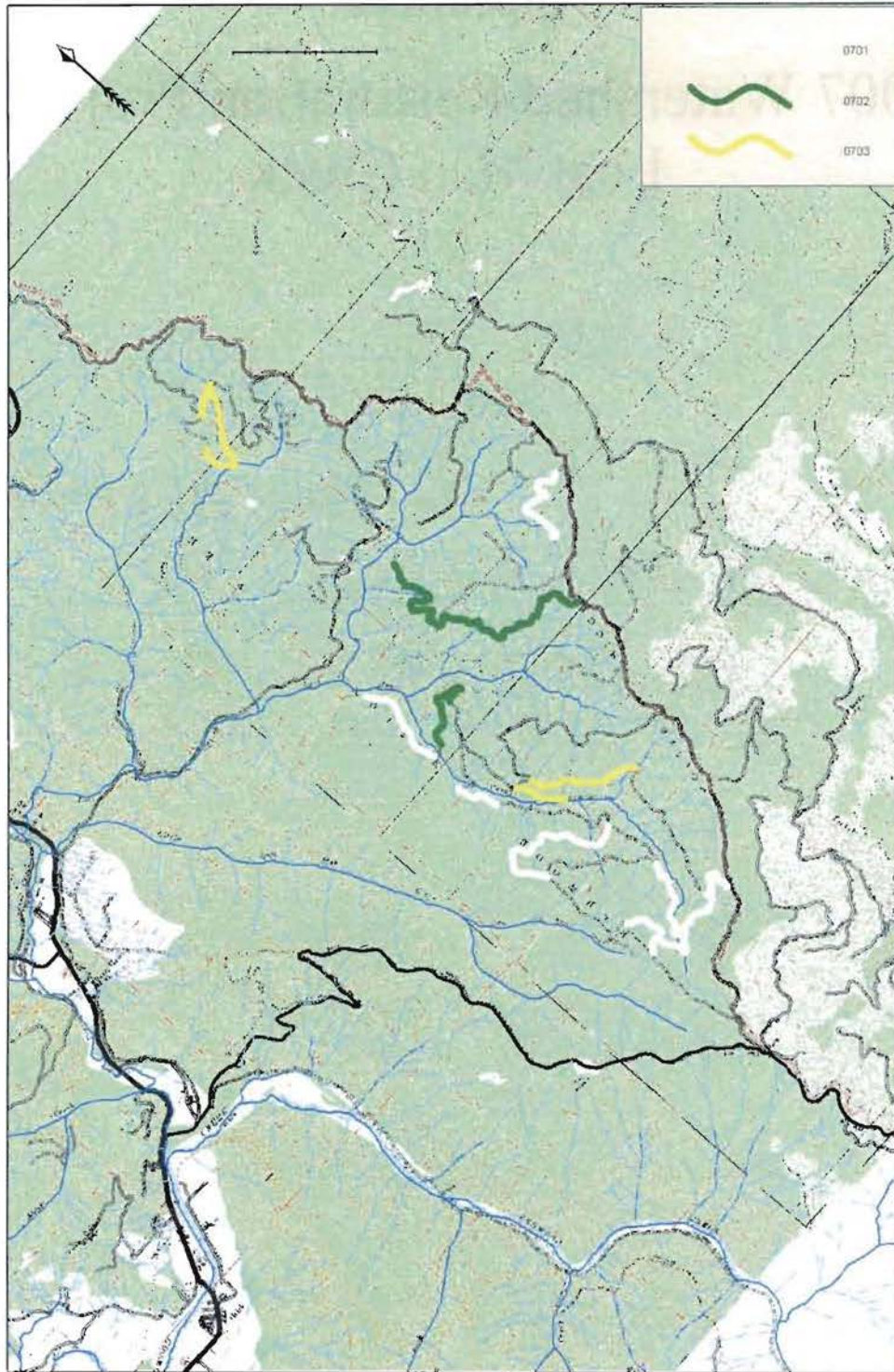
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No heavy equipment hours

2008 / Report / 2008 report draft



Map showing distribution of project locations for 2007, South Fork Lost Man Creek.

Watershed Restoration Project 07-01: Removal of the West Side Roads---07-01A, Removal of the A111 Road---0701B

INTRODUCTION

Watershed Restoration Project 07-01 is comprised of two restoration projects which are located in 2 differing basins within Lost Man Creek. The first project, Removal of the West Side Roads, (07-01A) included treatment of erosion problems on the A100 South, the A130, the A140, the A150, the A160 and the A170 roads. These roads are located in the south fork drainage of Lost Man Creek (See large rectangular box in Figure 1). The second project, Removal of the A111 Road (07-01B), is located in the eastern headwaters of the middle fork of Lost Man Creek (See small rectangular box in Figure 1).

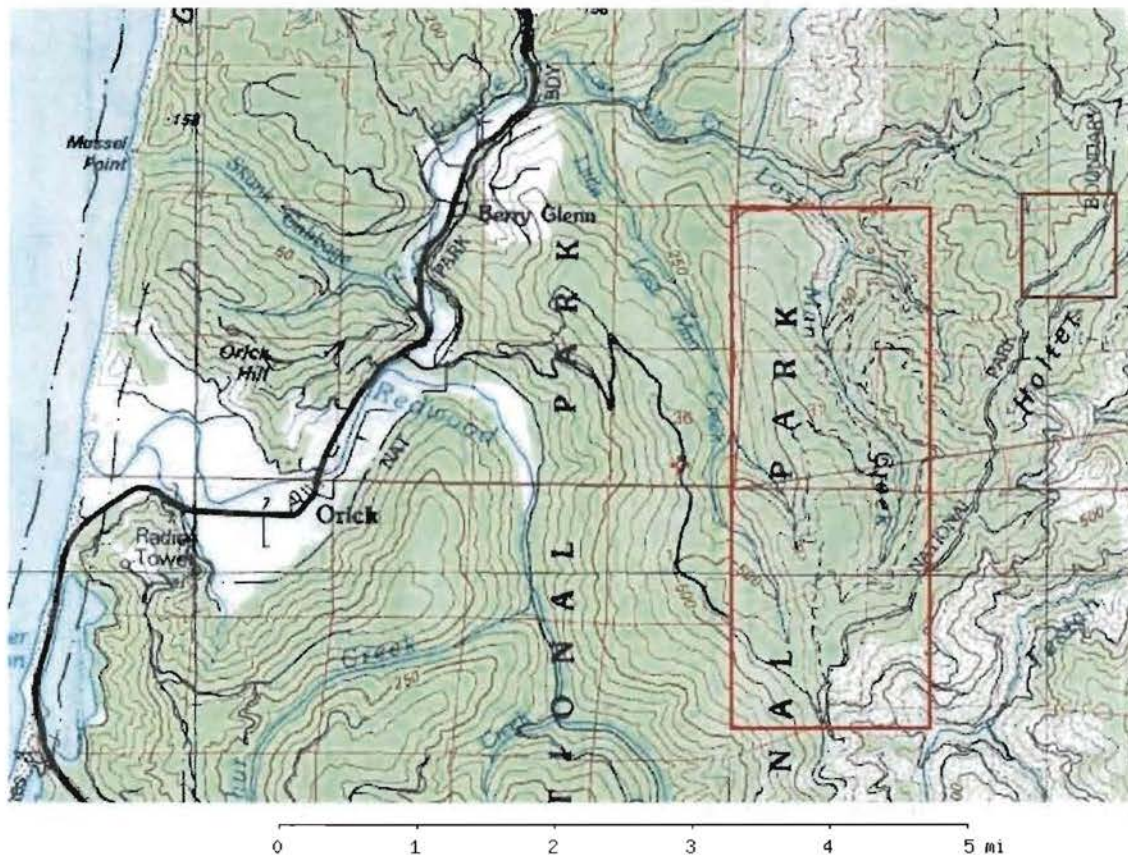
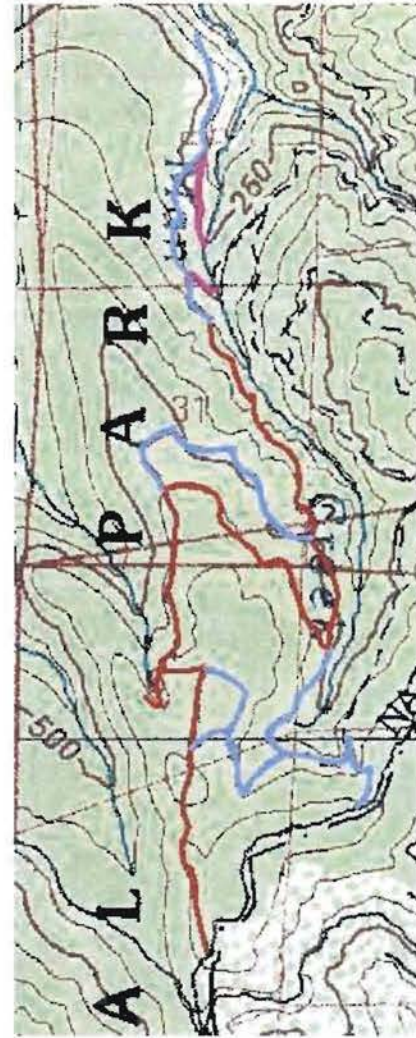


Figure 1: Regional Map of Project Worksites. Large rectangular square delineates project locality for Project 07-01A, Removal of the West Side Roads. Project 07-01A site is enlarged in Figures 2A and 2B. Smaller rectangular area in the upper right hand portion of the figure delineates project locality for Project 07-01B, Removal of the A111 Road. Project 07-01B is enlarged in Figure 3.



— A100 — A150
 — A130 — A160
 — A140 — A170

Figure 2A: Road network and old growth forest boundary, delineated in prominent North-South trending green line. Contiguous old growth located west (left) of green delineation. South Fork Lost Man Creek, delineated in blue, located immediately east (right) of road network



■ Removed 2006
 ■ Removed 2007
 ■ Remaining

Figure 2B: Road network associated with the west side roads. Remaining portions of the network delineated in red; removed segments are delineated by treatment year.

Table 1 provides a compilation of total project volumes and costs for both the 07-01A and 07-01B work projects. Excavation volumes and costs for each these projects are presented independently later in this section of the appendix.

The A100 South is the main arterial road into this area of the basin and the secondary roads (A130, A140, A150, A160, and A170) were constructed as access roads to specific areas in the drainage. Project 07-01 is the second phase in a 4-phase project to remove all roads within the South Fork drainage of Lost Man Creek.

TABLE 1 WATERSHED RESTORATION COSTS SUMMARY FOR UNIT 07-01: REMOVAL OF THE WEST SIDE ROADS, SOUTH FORK, LOST MAN CREEK: 07-01A REMOVAL OF THE A111 ROAD: 07-01B					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
STREAM CROSSINGS	37,522yds ³	26	\$288,893.79	45.5%	\$7.70
EXPORT OUTSLOPING	17,269yds ³	25	\$114,255.73	18.0%	\$6.62
OUTSLOPE	35,032 yds ³	63	\$188,649.07	29.7%	\$5.39
MISC. BID ITEMS	---N/A---	22	\$43,139.61	6.8%	---N/A---
<i>Grand Total:</i>	89,823 yds ³	136	\$634,938.20	100.0%	\$7.07

Project 07-01A continued restoration work begun in 2006 on the roads located within the western portion of the south fork of Lost Man Creek basin. These roads share a common access and are all connected, and thus the removal of all as a protracted project was a logical design. After the 2006 project work season, the remaining portion of the A140, located at the south-eastern portion of the south fork Lost Man basin was also incorporated into the project scope. Treatment on the A140 was initiated in 2000 and then resumed in 2006. However, the work season was shorter than originally anticipated and the seasonal shutdown in November 2006 left approximately 3700' of the A140 untreated. Given the close proximity of the A140 to the access into the south fork basin, the remaining portion of the A140 was incorporated into this year's project.

These roads are located east of the contiguous old growth unit, which is located at the western headwaters of Lost Man Creek and dominates the landscape of the Little Lost Man Creek drainage further west. The proximity of this contiguous stand of old growth restricts operations of heavy equipment along these roads, owing to concerns for threatened and endangered (T&E) species; these restrictions prohibit heavy equipment operating within 500 feet of the old growth prior to September 16th. Thus, these restrictions greatly limit the available operating season for heavy equipment, requiring a multi-year strategy for complete treatment of this area of the watershed. Restoration work on the west side roads began in 2006 and the work completed in 2007 is the second of four phases. (See Figure 2B for map of treated and untreated segments of roads.) Restoration work is expected to last for two more phases and be completed in 2009. Upon completion, this project will effectively treat erosional threats associated with the 10.5 miles of abandoned, failing roads. Treating these roads will require the excavation of an estimated 275,000 cubic yards (yd³) of fill. Of this, approximately 140,000 yd³ are associated with stream crossings, another 112,000 yd³ are associated with swales and approximately 23,000 yd³ are associated with unstable road reaches. Table 2 provides a compilation of total project volumes and costs for Unit

07-01A: Removal of the West Side Roads, South Fork Lost Man Creek.

Project 07-01B initiated restoration on the A111 Road, located in the eastern headwaters of the middle fork of Lost Man Creek. The A111 Road begins on the ridge divide which forms the eastern boundary of the national park. This road descends from the ridge into a prominent tributary to the middle fork of Lost Man Creek. (See Figure 3.)

TABLE 2 WATERSHED RESTORATION COSTS SUMMARY FOR UNIT 07-01A: REMOVAL OF THE WEST SIDE ROADS					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
STREAM CROSSINGS	32,260 yds ³	24	\$248,481.63	43.4%	\$7.70
EXPORT OUTSLOPING	15,953 yds ³	22	\$105,966.21	18.5%	\$6.64
OUTSLOPING	33,707 yds ³	59	\$181,340.09	31.6%	\$5.38
MISC. BID ITEMS	---	17	\$37,252.31	6.5%	---N/A---
GRAND TOTAL:	81,920 yds ³	122	\$573,040.24	100.0%	\$7.00

The A111 terminated into a large landing constructed in the middle of the channel formed at the confluence of several tributaries. The major erosional threats associated with A111 were located along the last 2/3 of the road. The first 1/3 of the road is proximal to a ridge and erosional threats are less severe. The work completed in 2007 on the A111 concentrated on removing erosional threats associated with the more threatening 2/3 of the road with the remaining portion of the A111 expected to be treated in 2008. Upon completion, this project will effectively treat erosional threats associated with 0.8 miles of the abandoned and failing A111 Road. Treating this road will require the excavation of an estimated 11,800 yd³ of fill. Of this, approximately 6,200 yd³ are associated with stream crossings, another 2,800 yd³ are associated with swales and approximately 2,800 yd³ are associated with unstable road reaches. Table 3 provides a compilation of total project volumes and costs for 07-01B project.

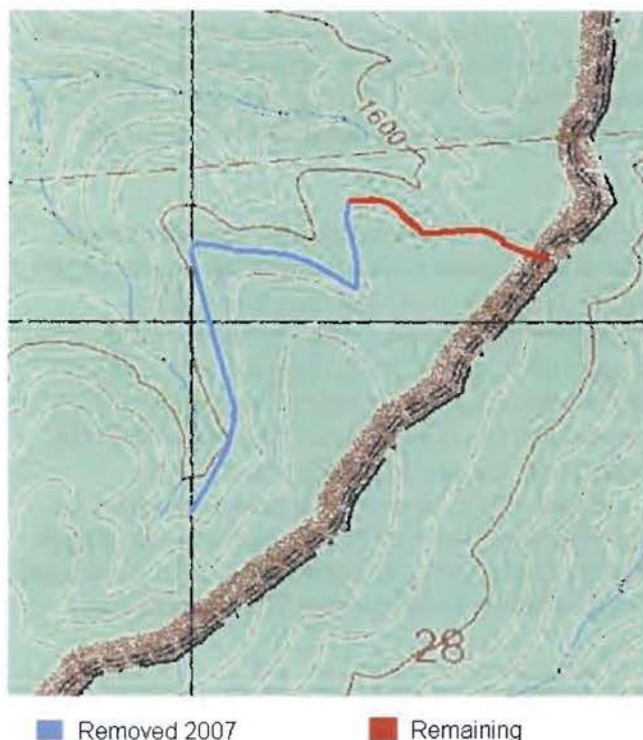


Figure 3: Map of the A111 Road and treatments. Prominent brown line marks Holter Ridge and the eastern boundary of the national park. Untreated segment delineated in red; treated segment delineated in purple. Remaining portion of the A111 is scheduled for treatment in 2008.

TABLE 3 WATERSHED RESTORATION COSTS SUMMARY FOR UNIT 07-01B: REMOVAL OF THE A111 ROAD					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
STREAM CROSSINGS	5,262 yds ³	2	\$40,412.16	65.3%	\$7.68
EXPORT OUTSLOPING	1,316 yds ³	3	\$8,289.52	13.4%	\$6.30
OUTSLOPING	1,325 yds ³	4	\$7,308.98	11.8%	\$5.52
MISC. BID ITEMS	---	5	\$5,887.30	9.5%	---N/A---
GRAND TOTAL:	7,903 yds ³	14	\$61,897.96	100.0%	\$7.83

Treatments for both portions of this project have focused primarily on stabilizing side cast fill, and restoring natural hillslope topography and drainage patterns altered by the construction of these roads and their associative secondary roads. Recovered organic and nutrient rich side cast was returned to the surface in order to help speed recovery of native vegetation. Vegetation disturbed during excavation was stockpiled and dispersed along the finished surface in order to provide habitat and simulate natural forest litter. Additional organic material was occasionally imported to supplement ground cover and further protect exposed finished slopes from post-excavation surface erosion.

2007 WORK SCHEDULE AND HEAVY EQUIPMENT OPERATIONS

Heavy equipment operations were performed by the Yurok Tribe's Watershed Restoration Program staff. Operations began on July 24th and continued until the seasonal shutdown on

October 17th. Planned operations included the use of 2 bulldozers and one excavator. Operations were arranged through a cooperative agreement and funded through an annual funding agreement (AFA) between the National Park Service and the Yurok Tribe. A task agreement for the restoration work was issued and the costs were derived from a negotiated hourly cost for the equipment and operators.

An hourly arrangement for payment was employed owing to the considerable amount of work necessary to gain access into the worksites. The 6 major roads associated with the project (A100, A111, A130, A140, A150, and the majority of the A160) had not been traveled on since incorporated into the park. These roads were completely overgrown with vegetation and the vast majority of stream crossings were in varying states of failure. In 2006, restoring access into the far northern portion of the worksite took over 2 weeks of equipment time to accomplish. Much of the time spent was the result of vegetation removal and road rebuilding. At the end of the 2006 project season, a considerable amount of winterization and site preparation needed to be accomplished before suspending equipment operations. Consequently, the road network on the west side requires considerable amount of logistical work that is difficult to compensate through conventional contracting. Due to the high amount of time needed to conduct logistical work (road building, vegetation removal, winterization, etc.) an hourly compensation to these tasks was employed.

Restoration work began on June 26th along the western end of the A150. The A150 originated in the old growth band along the western portion of the project area. Thus, work began out from the old growth in observance of noise restrictions for T&E species concerns. Upon completing the A150, equipment moved to the intersection of the A160 and the A100. Operations then proceeded south along the A100 to the intersection with the A170 and the A140. At this time equipment then headed out to the northern terminus of the southern A140 and proceeded to work back towards the A170. Equipment then continued on with the A170, removing the entire portion located within the south fork basin on Lost Man Creek. Equipment then continued out along the western portion of the A160, removing the portion of the A160 located in the southern-most portion of the south fork basin. Work along these sections of roads was completed September 7th.

Upon completing these sections of roads, the only place left to work was now the far end of the A130, located in the northern most portion of the project area. However, equipment operations along the A130 were restricted until after September 15th, and so equipment was walked over to the A111 Road. Originally, it was planned to work on the A111 Road until September 15th, then walk back over to the west side roads and then commence work on the A130. However, the prominent excavation of a landing located in the confluence of two stream courses proved to be a more complex and voluminous excavation and slightly delayed the return to the A130; work on the A111 continued until September 17th after which equipment returned to the west side of Lost Man Creek and resumed work on the A130.

Work resumed on the A130 on September 19th and was completed on October 15th. Work continued on the A100 for 2 more days when adverse weather suspended restoration work for the season. Afterwards, 3 days were spent performing final winterizing of the access roads into the worksite. Winterization and all equipment operations were completed on October 20th.

During this work season, several weather systems moved in to create some added difficulties. The first system arrived in mid-August and made access to the worksite very problematic. At this time, work was progressing on the southern-most portion of the A100. This section of the A100 had undergone considerable amount of rebuilding due to past failures and much of this rebuilt road was designed for temporary access and not long-term stability. Consequently, much of the

road became a very muddy path which required routine attention to prevent off-site impacts. This was an unforeseen drain on equipment time and delayed production. The other note-worthy storm occurred in early October and it too played havoc on site access. At this time, a ridge road had been opened up along the watershed divide between the mainstem of Lost Man Creek and Little Lost Man Creek. This access road was an old skid road which was reoccupied by bulldozing out the old road's footprint. However, no rock was employed and the newly opened road was easily exploited by moisture and quickly became impassable. Equipment operators needed to utilize quad runners in order to gain access down to the worksite on the A130. While these two systems were most noteworthy, several other spells of rain occurred and these all required equipment operations to be diverted to attend to maintaining the access roads to prevent off-site impacts. This, in turn, would greatly reduce the rate of road removal as equipment was busy performing maintenance work. The access road into the A130, for instance, was 4.5 miles long and would take the better portion of a day just to blade and ditch the road surface to adequately deal with runoff.

Prescriptions and Treatments

Stream Crossings

A total of 26 stream crossings were excavated during the 2007 equipment season. Many of these stream crossings were low order, primarily first order, stream courses. For both the west side roads and the A111 Road, the roads originated along ridges and then descended into the basin. Those portions of the watershed proximal to the ridges typically had minor to moderately formed channels and flow courses. Where roads intersected these low order flow courses, modest excavations were required to restore these flow courses to their natural conditions; typically, these crossings were less than 1000 yd³ and often dry or had minor subsurface flow which wasn't encountered until the final portion of the excavation. As the roads descended into the basins, channel development and stream order increased and this resulted in increased volume and added complexity to the site excavations. This was due to both the morphology of the crossing (steeper, deeper channel development) and the increased amount of moisture. Throughout project 07-01, all excavated channels had no surface flow at time of excavation, but subsurface flow was encountered. For the higher order stream courses, this flow was diverted during the excavation.

For the low-order stream crossings, excavations were typified by moderate channel development, subtle channel morphology including relatively shallow side-banks, and relatively low volume of fill. These crossings were also typically dry or contained minimal flow. Photos 1 and 2 show the typical conditions associated with these low-order stream crossing excavations.



Photos 1 and 2: RX10, A150 Road.

Left photo depicts initial conditions after equipment opened road for access and excavation.

Right photo depicts conditions of crossing after excavation, showing magnitude of excavation and typical application of woody debris.

Higher order stream crossings had greater degree of difficulty associated with the excavation, typically due to increased moisture, greater volume and more developed channel morphology. For many of these crossings, flow was present but not located on the existing surface. Thus, excavations were usually initiated at the top of the crossing in order to capture existing stream flow. However, initiating excavations at the top of a crossing could have the adverse consequence of saturating fill, greatly adding to the difficulty of the excavation. For excavations with a more voluminous flow, excavations were usually initiated with the goal intent to capture and divert existing flow and then at a later time, begin formal excavation of the crossing itself. This allowed for a dewatering of the excavation site as well as minimizing the generation of turbid water. Photos 3 and 4 represent an excavated channel of a higher order stream.

An additional element of difficulty was present in several of the larger stream crossings. Several crossings that were excavated had originally served as landings and the amount of material was considerable. Additionally, much of the material which was used to form the landing originated upslope of the crossing and returning this material to its site of origin was often prohibitive. Thus, material typically was exported offsite to a suitable fillsite which required extra equipment time. These larger crossings were typified by having a lower rate of production while also having a fairly large total volume.



Photos 3 and 4: RX 6, A100 Road, looking downstream

Photos 5-7 document the excavation of RX1 on the A111 Road. This stream crossing was a large landing that was located at the end of the A111. An added difficulty to this excavation was the need to export fill to a suitable fillsite which was located in the foreground of these photos. This required the excavation of the top of the crossing before completing the bottom, which allowed moisture to increase in the excavated material. Normally, it would be preferred to start excavation at the bottom of the crossing to allow for free drainage but in this case, doing so would have

truncated access to the fillsite. Instead, initial excavation removed the upper portion of the crossing, which intercepted stream flow. This was then diverted around the worksite and excavation then resumed at the bottom of the crossing.



Photos 5 and 6: RX1, A111 Road

Photo 5 shows crossing shortly after landing has been brushed and initial excavation has begun. Photo 6 taken during the excavation of the channel. The upper portion of the crossing has been excavated.



Photos 7: RX 1, A111 Road.

Completed crossing excavation. Note the individual standing on an exhumed stump in center left of the photo.

Export Outsloping

A number of export outslope prescriptions were applied to Project 07-01 and like the roads themselves, these prescriptions were quite varied in their nature and their size. For instance, the A150, which was predominately an upper to middle-slope road, all EOS prescriptions were relatively modest in scale, averaging about 65-70 yd³ each. This is understandable given the relatively benign development of channel and swale morphology.

As the roads descend deeper into the basin and attain slope position more proximal to the main stem channel, the nature of the EOS prescriptions change considerably. Both the frequency and the magnitude of the EOS prescriptions increases as roads occupy lower and inner-gorge slope positions. The noted exception to this is the A130 Road. This is due to the segments of the A130 that had already failed, and treatments were not prescribed to these pre-existing failures. Had these sections been intact, the likely prescription would have been EOS.

Looking at the averages for the roads treated, the A150 averaged about 70 yd³ per EOS prescription, the A160 and A170 roads averaged ~200 yd³ and ~180 yd³ respectively, the A140 averaged ~300 yd³, the A100 and A111 averaged ~500 yd³ and ~440 yd³ respectively, and the A130 averaged ~2200 yd³.



Photos 8 and 9: EOS prescription on the A100 Road.
Left photo shows pre-existing condition with the center of the swale demarked by flagged (pink) tree on outboard edge of the road. Right photo is the final condition after swale has been excavated.

Outsloping

A prominent portion of the project entailed outsloping prescriptions. These prescriptions included complete recontoured outsloping, where all the sidecast fill material was recovered and replaced on the pre-existing bench of the road. Also included as an outslope prescription was positive outsloping (POS) where only the requisite amount of sidecast was recovered to ensure positive drainage of the slope. POS prescriptions were applied to segments of road that posed no threat to fluvial habitat and did not threaten valuable terrestrial habitat. These prescriptions were typically applied to portions of upper and mid-slope road reaches that were both removed from active stream courses and located in second growth forests.



Photos 10 and 11: Outslope prescription, A100 Road.
Left photo shows equipment in process of outsloping road. Right photo shows condition after excavation was completed.

Miscellaneous

Miscellaneous prescriptions include mobilization and de-mobilization of equipment, staff, and support equipment. Also, an additional mobilization was included for moving production from the west-side over to the A111 road.

An atypical miscellaneous prescription incorporated in the budget for project 07-01 was the fillsite. Usually, fillsites were inclusive with other dirt-moving prescriptions, but because of the way in which this project was billed (hourly versus by volume or unit), fillsites were also delineated for time spent. Consequently, fillsites are classified as a treatment prescription. Many fillsites required equipment to brush and remove standing vegetation and then when the fillsites were filled to capacity, time spent to shape the fill and properly mulch the final surface. While the fillsites have a volume based upon capacity, the cost is associated with the time equipment spent finishing the fillsite to specifications.



Photos 11 and 12: These are depictions of stand density and woody debris application, typical of treatments on project 07-01.

The west side roads are located in second growth forests that have grown after timber harvesting in the late-50s and early to mid-60's. Prior to the initiation of equipment on this project, these roads have been essentially undrivable owing to the thick regrowth of vegetation. Gaining access into the project area required a considerable amount of time just removing vegetation for access. In addition, the stand density along many of the roads is considerably greater than typical restoration projects and this stand density requires more equipment time to remove and subsequently scatter the vegetation. Photos 11 and 12 show typical conditions that border the roads; these photos also show how the vegetation is subsequently lopped and scattered at the completion of a prescription.

At the close of the season, remaining roads used for access needed to be winterized before the final onset of winter conditions. Winterization treatments included installation of rolling dips, trenching through partially treated stream crossings, and distribution of mulch in areas considered problematic for future surface erosion. Similar to access costs, winterization was considerable for this phase owing to the length of road which was opened for access and remained after restoration. Future winterization is anticipated to be less expensive as the west side road network is reduced during each phase of equipment operations.

T&E Specifics

This project is complicated by the proximity of the northern portion of the west-side roads network to prime habitat for T&E species. Access to the A130 road is gained by reoccupying a skid road through the eastern portion of old growth which extends west into Little Lost Man Creek and the Bald Hills Road. This stand of old growth is considered very vital to the long-term survival of the marbled murrelet and access and equipment operations are very sensitive to this issue. This access created a scheduling conflict owing to the need to get work done but not being able to access the A130 until after September 15th. As a result of finishing work that was precluded from noise restrictions prior to the September 15th date, equipment were ferried over to the A111 Road to continue work until the noise restrictions were lifted.

TABLE 6 AREAS AFFECTED BY RESTORATION UNIT 07-01						
TOTAL ACRES DISTURBED	RIPARIAN BUFFER ACRES DISTURBED	WILDLIFE HABITAT ACRES DISTURBED				TOTAL ACRES RESTORED ⁵
		START DATE	MAMU DEGRADED ²	MAMU CORVID ³	MAMU NESTING / NOISE .25 MI BUFFER ⁴	
26	6.3	9/19/07	3.0	38.1	114 ⁶	496

¹ These statistics are actual "as built" acreages.

² Marbled Murrelet habitat degraded.

³ Marbled Murrelet habitat subject to potential increased corvid threat.

⁴ Marbled Murrelet nesting habitat potentially affected by noise (restoration site within 0.25 mile buffer of habitat).

⁵ Acres restored are defined as the hydrologically connected landscape area that is influenced by the road removal.

⁶ This acreage may have been impacted by noise disturbance due to confusion over the 2006 harassment guidelines which indicated that a 500 ft noise disturbance buffer would suffice for heavy equipment operation. Subsequent to the project completion, it was indicated that the back-up beepers on the equipment are above the decibel level threshold for a 500 ft buffer

TABLE 7 NOAA STATISTICS FOR RESTORATION UNIT 07-01				
SITE TYPE	# OF SITES ¹	VOLUME EXCAVATED	VOLUME PREVENTED FROM ERODING	VOLUME PREVENTED FROM DELIVERY
STREAM XING	26	37,522 yds ³	26,754 yds ³	26,185 yds ³
ROAD REACH	20,064 ft	52,301 yds ³	86,224 yds ³	31,408 yds ³
	TOTAL	89,823 yds ³	112,978 yds ³	57,593 yds ³

¹ For road reaches, the number of sites is the length of road (ft.).