

Summary Report

Watershed Restoration Project 08-02: Removal of a portion of the A400 road – 08-02A; (Removal of a portion of the A141 road – 08-02B); Removal of portions of the A100 and A140 roads – 08-02C;

Watershed Restoration project 08-02 was comprised of three different work units located within the Lost Man Creek watershed (see Figure 1). Under contract #C8482060010, Task Order #8480080025 was issued to remove the A400 road (unit A), a portion of the A141 road (unit B), and portions of the A140 and the A100 (north) roads (unit C). Unit A was only partially completed; unit B was winterized, but not removed. All work was performed by Z Logging, LLC of Orick, CA. between June 16th and October 17th, 2008.

The Redwood National and State Parks geologist for this project was G. Gibbs. It was the project geologist's responsibility to perform all formulation and evaluation of rehabilitation prescriptions, complete the surveying and photo-documentation, generate the plansheets and technical specifications for contracting, oversee the heavy equipment operations as the COTR, and complete the final documentation. The project geologist/Contracting Officer's Technical Representative (COTR) was not onsite for all heavy equipment operations, but did inspect and accept each work item as the project progressed.

Approximately 64,000 cubic yards of road fill were relocated at a total cost of \$680,465, restoring **328 acres** as a result of this project. Heavy equipment used consisted of (1) D8K CAT, (2) D6H CAT (one with a wench; one with a grapple), (1) 330 CAT excavator, and (1) D8L high-track CAT (utilized for "big pushes" and when Larry Zuber operated as an extra catskiner).

Table 1 provides a compilation of total project volumes and costs for the 08-02 project. Excavation volumes and costs for each project unit are presented independently later in this section of the appendix. For compiled statistics of the Lost Man Creek Watershed Restoration Projects accomplishments during 2006-2008, please see the tables in the preceding 2008 report section (not appendices).

TABLE 1 WATERSHED RESTORATION COSTS SUMMARY FOR PROJECT 08-02: REMOVAL OF A PORTION OF THE A400, A100, AND A140 ROADS					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
STREAM CROSSINGS	30,100 yds ³	11	\$350,371.23	52%	\$11.64
EXPORT OUTSLOPING	26,030 yds ³	8	\$217,454.32	32%	\$8.35
OUTSLOPING	7,799 yds ³	10	\$29,816.05	4%	\$3.82
MISC. BID ITEMS	---	---	\$82,823.78	12%	---
GRAND TOTAL:	63,929 yds ³		\$680,465.38	100%	\$10.64

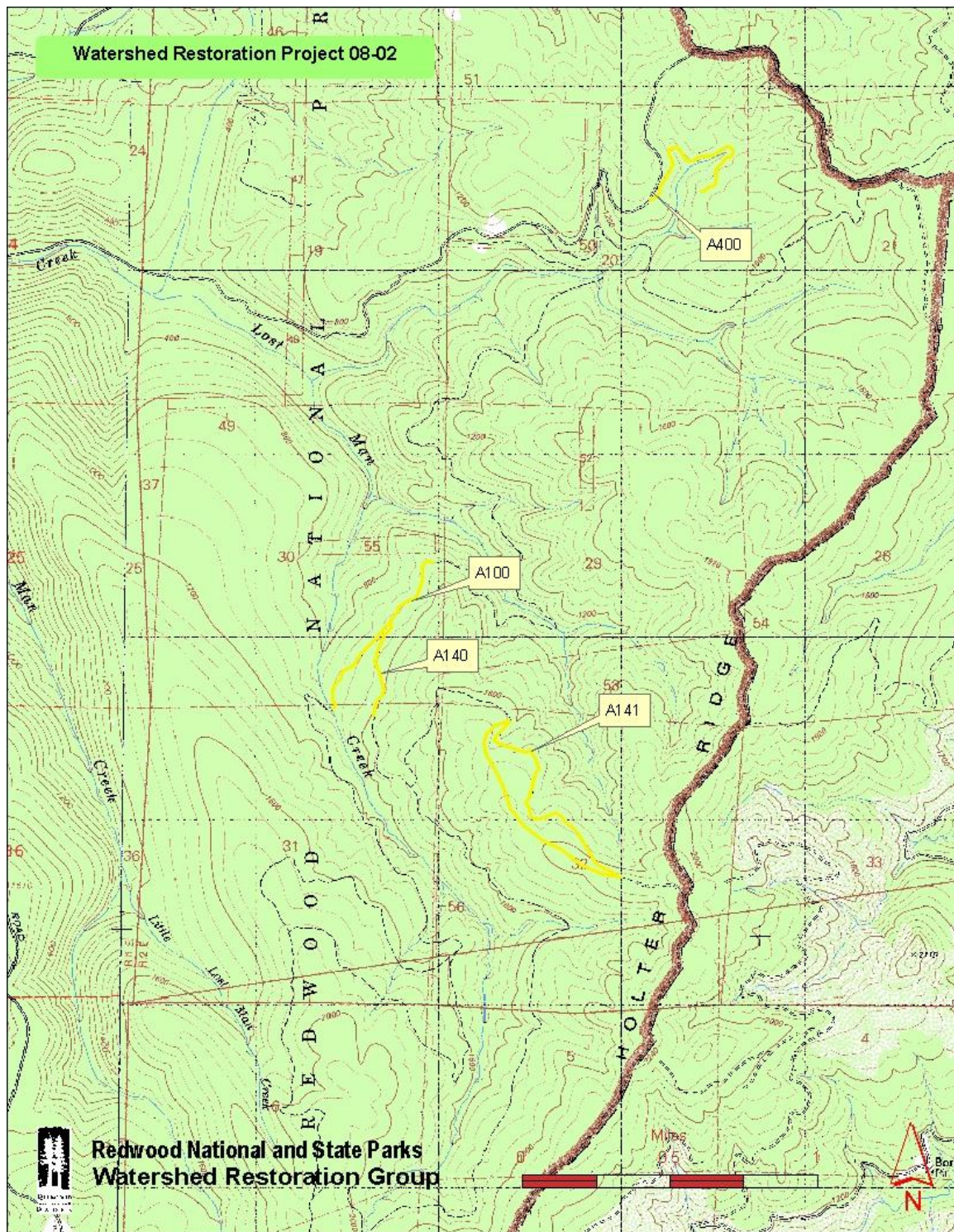


Figure 1. Location map for A400, A141 (and alternate), and A100/A140 roads, Lost Man Creek.

Past reports (prior to 2007) have included tables showing production rates for each work item (e.g. Appendix 1; Project 06-02; Tables 2-4). Organized by prescription type, these data were generated based on the actual equipment hours required for each site. Due to budgetary /

management goals, park representation on the project sites was reduced in 2007. Documentation of equipment hours on specific work items was limited to the time when the COTR was onsite, resulting in incomplete / inconsistent “hours” data. Because the accuracy of production rates data (at the work item resolution) was compromised it is not presented in report tables for this project.

A400 ROAD (UNIT 08-02A)

Watershed Restoration Unit 08-02A was designed to remove the entire length of the A400 road, as well as some associated skid roads. The A400 road was located near the headwaters of a tributary to the Middle Fork Lost Man Creek (MFLMC). The unit targeted road associated sediment production from 3 small perennial streams that comprise the headwaters of this sub-watershed to the MFLMC.

Unit 08-02A relocated a total of 30,310 cubic yards of road fill along the A400 road at a total cost of \$384,641, restoring 249 acres. The design addressed erosion problems along 3,700 feet of main haul road and approximately 2,000 feet of skid road associated with the A400 road (Fig. 2). This design was not achieved however because 3 of the stream crossing sites were larger and wetter than anticipated and required more time than designed. Therefore, due to the need to move to a T&E restricted work unit (08-02C) during our allowable noise window (September 16th till winter rain), not all work items designed for unit 08-02A were attempted – compare figures 2 and 3. Moreover, the delay also precluded the undertaking of Unit 08-02B, the upper A141 road removal.

TABLE 1 WATERSHED RESTORATION COSTS SUMMARY FOR UNIT 08-02A: REMOVAL OF A PORTION OF THE A400 ROAD					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
STREAM CROSSINGS	25,776 yds ³	7	\$322,257.69	84%	\$12.50
EXPORT OUTSLOPING	3,644 yds ³	3	\$17,943.60	4%	\$4.92
OUTSLOPING	890 yds ³	4	\$3,334.40	1%	\$3.75
MISC. BID ITEMS	---	---	\$41,104.98	11%	---
GRAND TOTAL:	30,310 yds ³		\$384,640.67	100.0%	\$12.69

Heavy equipment was moved in on June 16th and, after 4 days of road opening and drainage improvement, actual work item excavation began June 23rd under Task Order Number T8480080025. On September 12th, unaccomplished work items were winterized and equipment was staged to move to the A100 road. No move out was paid for the A400 road; equipment walk time was added to move in cost for the A100/A140 roads (Unit 08-02C). Project unit 08-02A moved approximately 30,000 cubic yards of material over 12 weeks, which equates to a gross scale production rate of 2,500 cubic yards per week: or an average of roughly 17 cubic yards per hour for the entire project unit. Project unit 08-02A costs are summarized in Table 1.

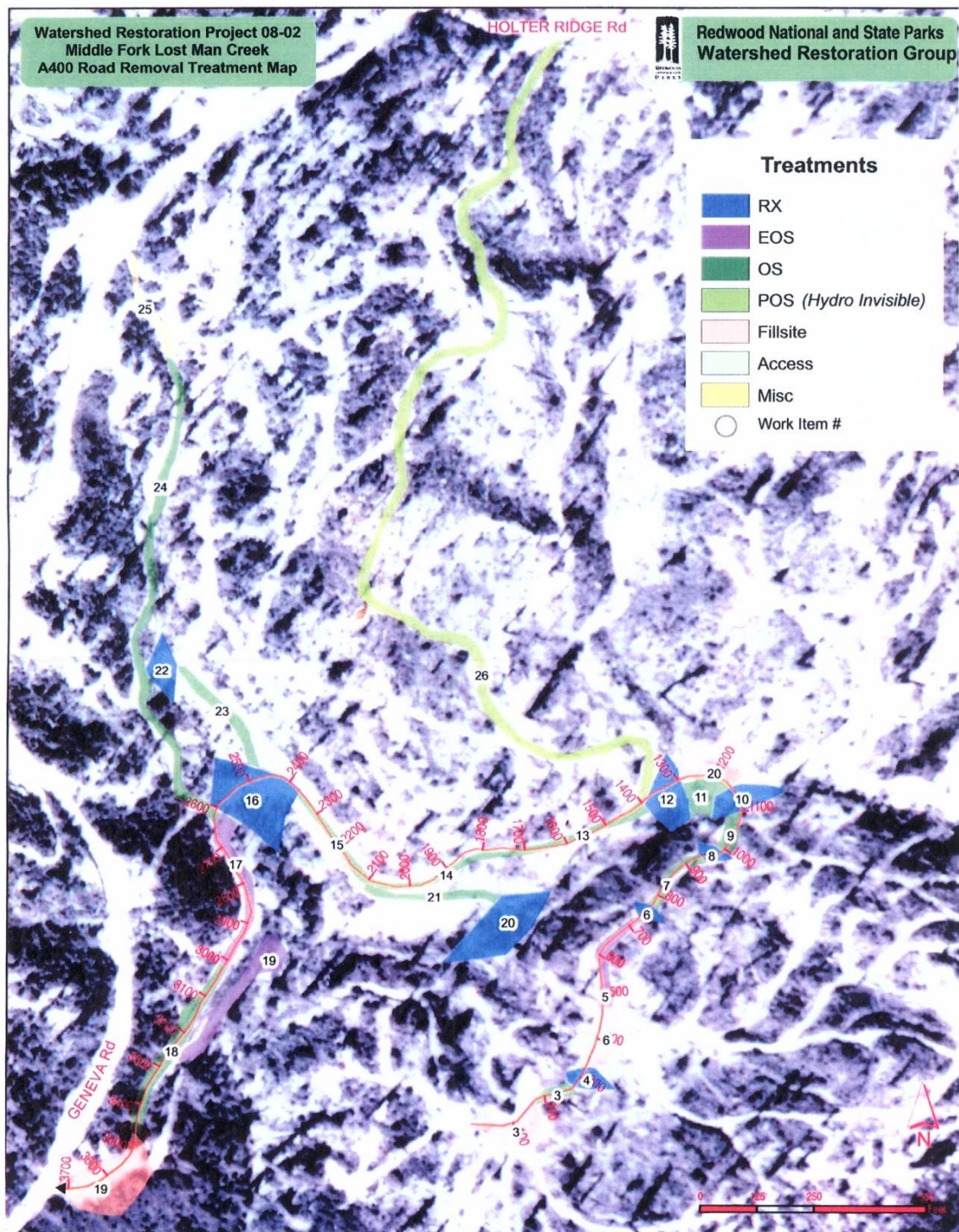


Figure 2. Design plan map for the A400 road: project unit 08-02A. White dots are work item numbers.

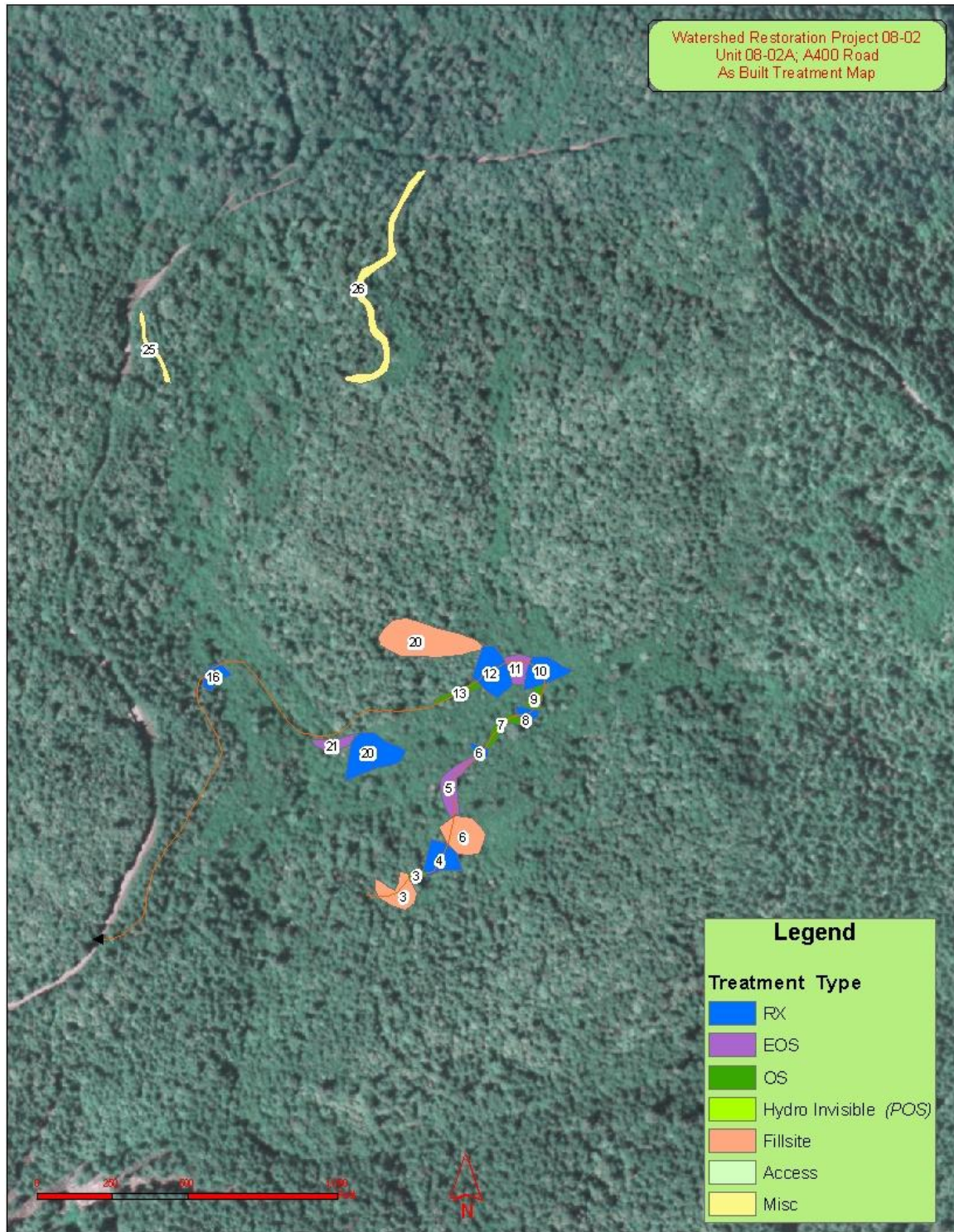


Figure 3. As built plan map for the A400 road: project unit 08-02A. Note different scale from Figure 2.

Prescriptions and Treatments

Restoration focused on the removal of the stream crossings and unstable side cast fill, and restoring natural drainage patterns interrupted by the A400 road. This road is situated in the Prairie Creek

Formation (QTc), very near the contact with the Franciscan Assemblage (KJfl). The geologic setting was the main contributing factor to the very low 'overall' production rate for the A400 road. The proximity to the contact between these units promoted the excessively wet conditions along most of the road. The excavation of the stream crossings was challenging because the weakly consolidated silts, sands, and gravels of the bedrock (QTc) made it difficult to distinguish original bottom; the in situ bedrock appeared nearly identical to the road fill, and the presence of lag gravels in the bedrock made it difficult to find original channel gravels.

Excavated fill was used to mimic the surrounding natural topography as much as possible. Many cutbanks were not matched, however, due to the extensive amount of spring flow present in this porous bedrock. Organic and nutrient rich side cast was sparse, but, when found, it was returned to the surface in order to help speed recovery of native vegetation. Vegetation removed during excavation was stockpiled and dispersed along the finished surface, according to RNSP Post-excavation erosion control guidelines, in order to inhibit surface erosion and provide habitat. In some cases, if the erosion control guidelines would still be met, the larger boles were left stockpiled due to the cumbersome nature of their size and length.

The project accomplished 14 work items and 4 miscellaneous bid items, which included the excavation of 7 haul road-stream crossings (RX), 550 ft of road export outslowing (EOS), and 625 ft. of road outslowing (OS) (Figure 3). Partial outslope treatment was designed (but not applied) for an access route that was not utilized (work item #26). Miscellaneous bid items included cross road drain and rolling dip installations (work items # 25 and 26, respectively), as well as 30 hours of winterization for open road associated with unaccomplished work items. Miscellaneous bid item costs are summarized in Table 5.

Stream Crossings (RX)

RX-4

Work Item #10 was a collapsing Humboldt crossing that was part of a landing (work item #11) built near the confluence of two streams (work items #10 and 12). Here the A400 crosses the northern, blue-line, branch of the Middle Fork Lost Man Creek (MFLMC). Due to the persistent (late season) excessive moisture at these sites, production was low and cost of excavation was well above the design estimates. Original design was for a volume of 3,366 yd³ at a cost of \$27,635, but final volume was 4,891 yd³ at a cost of \$71,638. The increase was mostly attributable to much longer push differentials, as well as a failure to budget for excessive moisture and flow diversion expenses.

Original design called for utilizing work item #11 for storage of the fill spoils from this excavation. Site conditions changed once work item #11 was opened, however, and because of the significant spring flow coming from the base of the cutbank it was decided to spoil fill elsewhere. As much as possible (3,133 yd³) was pushed to the distant fillsite #3 before access to that side of the creek had to be eliminated. This necessitated the opening of an alternate local fillsite, work item #20 (Figure 3), which was also used for spoils from stream crossing work items #12 and #20.



LDS



LDS

A few very long, old growth logs were pulled from the bottom of this excavation. Good video exists for the excavation of the landing complex.



LUS



LLB

RX-5

Work Item #12 was 240 ft. of buried channel that was beneath 20 ft. of collapsing fill and large wood at the downstream end. The upstream 90 ft. of the excavation was fine sediment deposition (up to 12 ft. deep) behind large, jack-straw, woody debris that appeared to be culls pushed off the landing. The excavation was designed to move 3,701 yd³, but actually excavated 8,576 yd³. Moreover the spring flow coming from every direction, coupled with the weakly consolidated sand (bedrock and fill) complicated the excavation and the push to the fillsite. Consequently the cost of this site increased from a design of \$36,751 to an actual cost of \$92,568.



LUS 7.25.08



LUS 7.18.08

RX-6

Work Item #16 (RX-7) was a collapsing log stringer bridge prior to A400 road removal efforts began. The collapsed logs and fill had caused sediment aggradation immediately upstream of the crossing. Stream profile and cross sectional surveys estimated that the depth of this aggradation was in excess of eight feet. The designed excavation was to be 2,193 yd³, but only 1,241 yd³ was excavated prior to moving to work unit 08-02C.

As part of the road opening and improvement to gain access to the first work items, the log stringers were removed and a temporary culvert was installed. The culvert was at approximately the top of the aggraded wedge, or at the existing channel surface. A small (1 yd³) settling pond was dug at the culvert inlet. During this process it was discovered that there had been a more traditional Humboldt crossing (logs parallel to flow) prior to bridge installation. The culvert was placed on top of the Humboldt logs and backfilled. The sideslopes of the crossing were excavated back to a gradient that would be drivable.

Due to the need to move to a T&E restricted work unit (08-02C) on September 15th, no additional excavation outside of the bridge corridor was undertaken on this work item. Instead, the crossing was winterized by pulling the temporary culvert, cleaning the dirt from on top of the Humboldt logs, excavating the sideslopes back to a 1:1 gradient, and mulching the sideslopes with vegetation disturbed during road opening. It is anticipated that this crossing will be completely excavated in the summer of 2009.



RX-6 prior to excavation.



RX-6 partial excavation.

RX-7

Work Item #20 was a landing in the same creek as, and downstream of, RX-4 (Work Item #10). Here again springs from an adjacent cutbank made the push out of the hole very slow in terms of production rate. The lower push road (work item #21) was repeatedly compromised by oversaturation and the inability to gain traction.

Export Outsloping (EOS)

Work items #11 and #21 were designed as Outslope treatments, but paid as Export Outslope because spring influence made them unsuitable for onsite fill storage.

Outsloping (OS)

Outslope treatments were very uneventful. The cutbank was not matched with fill at every location (full recontour), but all benches were relieved to an angle that would allow free drainage of runoff.

Miscellaneous

The miscellaneous portion of the cost accounting for project unit 08-02A is summarized in Table 5 and includes all payments outside of the excavation treatment categories described above. Move in is the cost of moving heavy equipment (including highway transport incidentals) to the lowboy drop-off; in this case, the B-Line gate at County Line Road.

Miscellaneous move in is the cost required to walk equipment in from the lowboy drop-off point as well as the cost of bonding (required by the federal government) and administrative expenses incurred during this phase. The A400 road had no move out costs because equipment was walked from the project end location to the staging area of the 08-02C project unit: these miscellaneous costs were included on the move in for the 08-02C project unit.

Other miscellaneous costs include winterization and rolling dip and cross road drain installation.

TABLE 5 MISCELLANEOUS BID ITEM COSTS FOR UNIT 08-02A: REMOVAL OF A PORTION OF THE A400 ROAD				
WORK ITEM #	ITEM TITLE	QUANTITY	UNIT PRICE	TOTAL COSTS
1	MOVE IN	1 JOB	---	\$3,225.75
1A	MISCELLANEOUS MOVE IN	1 JOB	---	\$29,032.90
---	WINTERIZE	30 hours	\$275	\$8,250
25/26	ROLLING DIPS / CROSS ROAD DRAINS	4	---	\$596.33
			Total	\$41,104.98

Threatened and Endangered Species Concerns

Work Items #15-23 and a portion of work item #24 is within a 0.25 mile Daily Limited Operating Period (2 hours after sunrise to 2 hrs before sunset) zone with respect to marbled murrelet habitat. Part of this area had to be crossed in order to work in areas outside of the restricted zone. This was achieved by walking equipment through the outer 500 ft. of the zone, without beepers activated.

Trash pump and hose were used to divert streams around active excavations for all sites that had live flow. Moreover, straw bales and settling ponds were used at all stream crossing excavations that required diversion because invariably 100% of flow (stream or spring) could not be captured. This technique also provided a back-up in case of pump failure and a settling pond for the “first-flush” of sediment post-excavation.

TABLE 6 AREAS AFFECTED BY RESTORATION UNIT 08-02A: REMOVAL OF A PORTION OF THE A400 ROAD						
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	
8.9	1.9	6/19/07	0	0.5	0	249

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.

TABLE 7 STATISTICS FOR RESTORATION UNIT 08-02A: REMOVAL OF A PORTION OF THE A400 ROAD				
SITE TYPE	# OF SITES ¹	VOLUME EXCAVATED	VOLUME PREVENTED FROM ERODING	VOLUME PREVENTED FROM DELIVERY

STREAM XING	9	16,789 yds ³	9,281 yds ³	8,724 yds ³
ROAD REACH	10,800 ft	36,970 yds ³	26,057 yds ³	8,749 yds ³
	TOTAL	53,759 yds ³	35,338 yds ³	17,472 yds ³

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

A141 ROAD (UNIT 08-02B)

Watershed Restoration Unit 08-02B was designed to remove the upper approximately 1 mile of the A141 road, and open an existing ridge top skid road as an alternate, low resource risk route between Holter Ridge and the lower reach of the A141 road. These road segments are located on the upper part of the north-facing slope to the headwaters of the little south fork, and on the ridge between the little south fork and the South Fork of Lost Man Creek (see Figure 1).

Unit 08-02B cleared trees and brush from the skid road alternate access route at the beginning of the season (billed hourly as slopework). The treatments designed for the A141 road however, were not attempted because of time constraints and the need to accomplish unit 08-02C this season. Instead of the designed treatments for the A141 road (upper reach), 27 hours of CAT time was paid to improve drainage and minimize erosion on the entire length of the A141 until this road can be effectively removed. These treatments (billed hourly as miscellaneous move-in) included 27 rolling dip and 2 cross road drain installations. All cost for unit 08-02B was therefore miscellaneous bid items and are summarized in Table 1 and Table 5.

TABLE 1 WATERSHED RESTORATION COSTS SUMMARY FOR UNIT 08-02B: WINTERIZATION OF THE A141 ROAD					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
MISC. BID ITEMS	---	---	\$18,175	100%	---
GRAND TOTAL:	---		\$18,175	100%	---

TABLE 5 MISCELLANEOUS BID ITEM COSTS FOR UNIT 08-02B: WINTERIZATION OF THE A141 ROAD				
WORK ITEM #	ITEM TITLE	QUANTITY	UNIT PRICE	TOTAL COSTS
27	MISCELLANEOUS MOVE IN	27 Hours	\$275	\$7,425
28	SLOPEWORK	43 Hours	\$250	\$10,750
			Total	\$18,175

A100/A140 ROADS (UNIT 08-02C)

Watershed Restoration Unit 08-02C was designed to remove 3,500 feet of the A100 road and approximately 1,500 ft. of the A140 road (Figure 1). These road segments were located on the eastern slope of the South Fork of Lost Man Creek, running on the inner gorge and lower slope to the South Fork Lost Man Creek. The A100 segment ran north from the eastern bank of the South Fork of Lost Man Creek to where it had been previously removed, near the A100/A130 junction (Project 07-02). The A140 was removed south from the A100/A140 junction.

Unit 08-02C relocated a total of 33,619 cubic yards of road fill and restored 79 acres of landscape at a total cost of \$277,650. The project addressed erosion problems along 5,615 feet of road that included portions of the A100 and A140 haul roads and an associated skid road / log deck. Heavy equipment was moved in and excavation work began on September 15th under Task Order Number 8480080025. On October 17th, the final work items were completed and equipment was staged for move out.

The project moved approximately 34,000 cubic yards of material over 5 weeks, which equates to a gross scale production rate of 6,800 cubic yards per week: or an average of roughly 45 cubic yards per hour (per machine) for the entire project. Project costs are summarized in Table 1.

TABLE 1 WATERSHED RESTORATION COSTS SUMMARY FOR UNIT 08-02C: REMOVAL OF A PORTION OF THE A140 AND A100 ROADS					
TREATMENT	QUANTITY	# of JOBS	TOTAL COSTS	% OF GRAND TOTAL	AVERAGE UNIT COSTS
CONTRACT COSTS - HEAVY EQUIPMENT					
STREAM CROSSINGS	4,324 yds ³	4	\$28,113.54	10%	\$6.50
EXPORT OUTSLOPING	22,386 yds ³	5	\$199,510.72	72%	\$8.91
OUTSLOPING	6,909 yds ³	6	\$26,481.65	10%	\$3.83
MISC. BID ITEMS	---	5	\$23,543.80	8%	---
GRAND TOTAL:	33,619 yds ³		\$277,649.71	100.0%	\$8.26

Prescriptions and Treatments

Restoration focused primarily on the removal of the stream crossings and unstable side cast fill, and restoring natural hillslope topography and drainage patterns interrupted by this portion of the A100/A140 roads. Vegetation removed during excavation was stockpiled and dispersed along the finished surface, according to RNSP Post-excavation erosion control guidelines, in order to inhibit surface erosion and provide habitat.

All 15 work sites in the project design were accomplished prior to the onset of winter weather. The project, as built, included the excavation of four road-stream crossings, 2,000 ft. of road export outsloping, and 2,590 ft. of road outsloping (Fig 4). Additionally, 5 miscellaneous bid items included road ripping.

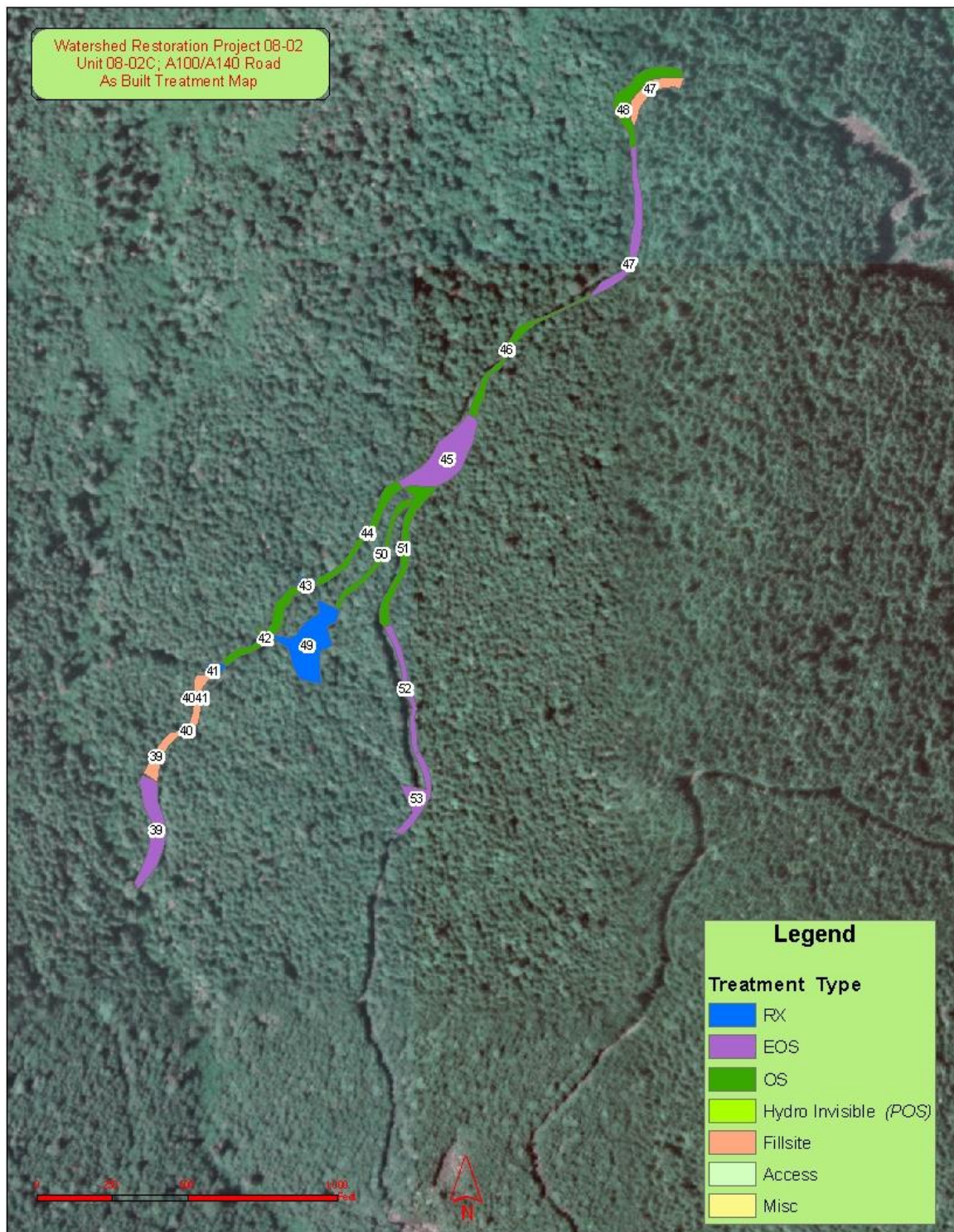


Figure 4. As Built map for the 08-02 project unit 08-02C: A140 and A100 roads.

Stream Crossings (RX)

The stream crossing excavations on this unit were sites #40, 41, 43 and 49. They were all void of any drainage structures and consequently were sources of stream diversions and gully erosion. They were all relatively small volumes, with work items #40 and #41 being less than 300 yds³ each. The main objective of the road-stream crossing excavations was, therefore, to make the road hydrologically transparent to concentrated runoff.

Export Outsloping (EOS)

Export Outsloping was the lion's share of the treatments for this restoration unit. Work items #45 and #52 were the largest excavation sites on the 08-02C unit at 6,793 yds³ and 6,043 yds³, respectively. Likewise, work item #45 was the most costly site of Unit 08-02C and 80% of the material excavated had a push distance of 1500 ft. to fillsite #48.

Another EOS treatment of interest is work item #39, which is located closest to the South Fork Lost Man Creek (SFLMC). This treatment begins where the A100 road log stringer bridge used to cross SFLMC: see photo below.



South Fork Lost Man Creek at former A100 crossing. Unit 08-02C, work item #39 at excavator. Pre-treat.

Outsloping (OS)

Outslope treatments were straight-forward with very small volumes.

Miscellaneous

The miscellaneous portion of the cost accounting for project unit 08-02C is summarized in Table 5 and includes all payments outside of the excavation treatment categories described above.

Move in (work item #38) is the cost of walking equipment to the A100/A140 road junction from the A400 road. Miscellaneous move out is the cost required to walk equipment from the end of the project unit to the lowboy pick-up point. Move out is the cost of moving heavy equipment (including highway transport incidentals) from the lowboy pick-up; in this case, Holter Ridge gate at Bald Hills Road to the contractor's yard. Other miscellaneous costs include road ripping for work items #50-53.

TABLE 5 MISCELLANEOUS BID ITEM COSTS FOR UNIT 08-02C: REMOVAL OF A PORTION OF THE A140 AND A100 ROADS				
WORK ITEM #	ITEM TITLE	QUANTITY	UNIT PRICE	TOTAL COSTS
38	MOVE IN	1 JOB	---	\$4,950
50-53	ROAD RIP	4	---	\$7,507.80
2	MOVE OUT	1 JOB	---	\$3,812.25
2A	MISCELLANEOUS MOVE OUT	1 JOB	---	\$7,273.75
			Total	\$23,543.80

Threatened and Endangered Species Concerns

Unit 08-02C was partially within a Limited Operating Period (LOP) zone with respect to marbled murrelet habitat. All work was preformed after September 15th, 2008.

TABLE 6 AREAS AFFECTED BY RESTORATION UNIT 08-02C: REMOVAL OF A PORTION OF THE A140 AND A100 ROADS						
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	

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.

TABLE 7 STATISTICS FOR RESTORATION UNIT 08-02C: REMOVAL OF A PORTION OF THE A140 AND A100 ROADS				
SITE TYPE	# OF SITES ¹	VOLUME EXCAVATED	VOLUME PREVENTED FROM ERODING	VOLUME PREVENTED FROM DELIVERY
STREAM XING		yds ³	yds ³	yds ³

ROAD REACH	ft.	yds ³	yds ³	yds ³
	TOTAL	yds ³	yds ³	yds ³

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