

**2009 BEST MANAGEMENT PRACTICES EVALUATION
PROGRAM REPORT
USDA FOREST SERVICE
LAKE TAHOE BASIN MANAGEMENT UNIT**



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REVISED MAY 2010

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Appendix A: Summary of Post-storm BMP Monitoring Evaluations for October 13th, 2009 Storm Event (Pages 16 – 23)

EXECUTIVE SUMMARY

In 2009, the Lake Tahoe Basin Management Unit (LTBMU) completed 30 Best Management Practices Evaluation Program (BMPEP) evaluations as part of the Pacific Southwest Region's effort to evaluate the implementation and effectiveness of BMPs designed to protect soil and water resources associated with Timber, Engineering, Recreation, Revegetation and Prescribed Fire activities. Of the 43 Regional targets, 30 evaluations were conducted. Thirteen were not conducted due to a lack of qualifying projects implemented in 2009. In the future, the LTBMU will coordinate earlier with Regional office staff to ensure that reasonable targets are assigned relative to the Forests annual program of work.

A significant rain on snow event occurred in May of this year, which created conditions useful for determining BMP effectiveness. In addition, a major rainfall event occurred on October 13th of this year, and many sites other than those selected through the random BMPEP site selection process for 2009 were monitored as part of a post-storm monitoring effort. A complete discussion of post-storm monitoring conducted as a follow-up to this event is presented separately in Appendix A to this report: *Summary of Post-storm BMP Monitoring Evaluations for October 13th, 2009 Storm Event*. This included eleven BMPEP evaluations on seven projects, that were not part of the random pool selected at the beginning of the year for the regional target. Because of the desire to maintain a clear account of BMP effectiveness during this major rainfall event, the results are presented and displayed in the above mentioned separate report. This ensures that a complete record of evaluations conducted during this event is maintained, regardless of whether the sites monitored were captured as part of the regional BMP evaluation process. Eight of the eleven additional BMPEP evaluations conducted as part of this storm monitoring effort were rated as implemented and effective, and three evaluations, within the Angora Hazard Tree Project, were rated not implemented and not effective. The overall percent of effective BMPEP evaluations during this storm event was then 73%, with 27% not implemented or effective.

If any of the sites sampled during the October event are selected through the random site selection process for 2010 regional targets, the evaluations performed during this October event will be incorporated.

The results discussed below only pertain to the sites selected to accomplish the regional BMPEP targets. In 2009, twenty-seven (90%) of the regional target BMP evaluations were rated as effective. Two BMP evaluations (7%) were rated as not implemented but effective. One of these ratings occurred at Regency Road-16N93, due to not having a Forest Service gate installed at the western terminus of the road, which allows access during the winter season administrative closure period. And the other occurred at the Dollar Underburn project, due to the lack of a defined soil cover objective in the burn plan prescription.

And finally one evaluation (3%) for in-channel construction practices was rated implemented but not effective. This occurred at the Blackwood Phase IIIA Stream Channel/Floodplain Restoration project, due to the failure of the temporary grade control constructed at the end of the project reach completed in 2008, to effectively pass flows and sediment during the 2009

spring runoff event. The completion of the entire restored reach in 2009 has since resolved the geomorphic instability created at the temporary grade control structure.

Monitoring in 2009 also included two follow-up evaluations at sites which had reported deficiencies in 2008. These evaluations are separate from the 30 evaluations described above. The Ward Creek Trail Bridge cutbank erosion issues have resolved through ongoing revegetation establishment. The fence at the Bliss Creek Road 15N61 access has still not been repaired, but is scheduled to be addressed in 2010.

And finally, two project specific evaluations were performed at a fuels reduction project in Bayview campground, due to concerns expressed by Lahontan staff regarding late season operations on moist soils. Both of these evaluations (skid trail and stream crossing) were rated as implemented and effective.

1. INTRODUCTION

This report summarizes the results of the 2009, United States Department of Agriculture, Forest Service (USFS), Region 5 (R5), Best Management Practices Evaluation Program (BMPEP), for the Lake Tahoe Basin Management Unit (LTBMU). The objectives of this program are to (i) fulfill USFS monitoring commitments to the State Water Resources Control Board (SWRCB), as described in the SWRCB/USFS Management Agency Agreement and *Water Quality Management for National Forest System Lands in California (USDA Forest Service, 2000)*; (ii) assess and document the efficacy of the USFS water quality management program, specifically, the implementation and effectiveness of BMPs; and (iii) to facilitate adaptive management by identifying program shortcomings and recommending improvements.

It should be noted that a significant rain on snow event occurred in May of this year, which created conditions useful for determining effectiveness of BMPs installed in 2008.

In addition to the project evaluations which were selected in accordance with the random BMPEP site selection process (i.e. following at least one winter cycle of precipitation events), additional BMP evaluations were conducted at all active and recently completed project following a large magnitude storm event that occurred in October of 2009. Although most of the BMPs evaluated during this post-storm monitoring effort were rated as implemented and effective, there were some notable exceptions.

The results of the post-storm monitoring effort conducted subsequent to this 25 year precipitation event is presented separately in an Appendix A to this report entitled; *Summary of Post-storm BMP Monitoring Evaluations for October 13th, 2009 Storm Event.*

2. OBJECTIVES AND METHODS

Onsite evaluations are used to assess both implementation and effectiveness of BMPs. Implementation evaluations determine the extent to which planned, prescribed and/or required water quality protection measures are actually put in place on project sites. Effectiveness evaluations gauge the extent to which the practices meet their water quality protection objectives. Component ratings for project planning, implementation, and effectiveness are entered into the BMPEP database, along with the degree, duration, and extent of any problems that exist. Based on conditions observed during the evaluation, weight is applied to the component ratings to determine an overall rating for implementation and effectiveness.

Additional details regarding BMPs, protocols, and site selection can be found in *Investigating Water Quality in the Pacific Southwest Region, Best Management Practices Evaluation Program (BMPEP) User's Guide (USDA Forest Service, 2002)* and *Water Quality Management for National Forest System Lands in California (USDA Forest Service, 2000)*.

BMP implementation evaluation forms are used to document answers to a variety of specific questions intended to determine whether the project was executed as specified in project

planning documents. A range of possible scores are assigned to each question depending on its relative importance and the degree to which a particular requirement is met (e.g., whether the project exceeds, meets, departs immaterially or substantially from requirements). Scores for all implementation questions are then summed and compared to a pre-determined threshold to conclude whether BMPs were implemented completely. BMP effectiveness is determined through observations of qualitative water quality protection (e.g., evidence of sediment delivery to channels) and quantitative measurements (e.g. amount of ground cover, percent of stream shade).

This scoring approach results in a 2 x 2 matrix, where a given suite of BMPs are placed into one of four categories: implemented and effective (I-E); implemented, but not effective (I-NE); not implemented, but effective (NI-E) and not implemented and not effective (NI-NE). A score of NI-E results when BMPs were not implemented, or were not installed according to specifications, and there is no evidence of potential water quality impairment. No evidence of impairment can result when (i) incorrectly installed BMPs were still effective, (ii) no BMP was necessary for the specific situation, (iii) no precipitation event occurred to provide evidence of impairment, or (iv) only project planning deficiencies were noted.

For sites with poor implementation or effectiveness scores, observers are asked to identify reasons and suggest corrective actions. For those sites with poor effectiveness, evaluators estimate the degree, duration and magnitude of any existing or potential impacts to water quality, based on published Region 5 guidelines. This type of “hillslope monitoring” uses indirect measures to evaluate BMP effectiveness. Poor scores represent potential, rather than actual, impairment of beneficial uses by a given activity.

Best Management Practices Evaluation Program protocols are applied to both randomly and non-randomly selected project sites in the Basin. The number of random evaluations to be completed each year is assigned to the National Forests by the Regional Office based on (i) the relative importance of the BMP in protecting water quality in the Region and (ii) those management activities most common on the individual Forest. Forests can supplement these randomly selected sites with additional sites based on local monitoring needs, such as those prescribed in an environmental document. Only data from onsite evaluations made at randomly selected sites are used to assess BMP implementation and effectiveness at a Regional programmatic level.

3. RESULTS

The LTBMU completed 30 of the 43 regionally assigned BMPEP targets. Thirteen of the assigned targets could not be completed because the type of project to be evaluated was not conducted on the unit during the evaluation period. This occurred for assigned target evaluations related to range management, prescribed underburns, road obliteration, in-channel construction, and revegetation of disturbed areas. In addition, the lack of qualifying dispersed recreation sites currently present on the LTBMU impacted the ability to meet that assigned target. The LTBMU targets are summarized in Table 1.

In 2009, 97 % of the evaluations were rated as effective. For comparison, the percent of effective evaluations in 2006 was 85%, 84% in 2007, and 97% in 2008. Of the 30 evaluations, 27 (90%) rated BMPs both implemented and effective, and 2 evaluations (7%) rated BMPs as not implemented but effective, and 1 evaluation (3%) BMPs were implemented but not effective. Observed implementation deficiencies occurred in management of roads during wet periods (E20), and prescribed burn (F25). The effectiveness deficiency occurred at a stream channel restoration project (E13). Table 2 summarizes the above results.

Additionally, follow-up BMP evaluations were conducted at two sites where BMP deficiencies were documented in previous years. Deficiencies were resolved at one of these sites, and the other site has corrective actions scheduled for 2010.

And finally, 2 site specific evaluations were conducted at a fuels reduction project in Bayview Campground, as requested by the Lahontan Regional Water Quality Control Board during a project review in 2008 due to concerns related to late season operations on moist soils. These evaluations were also rated as implemented and effective.

Table 1: 2009 BMPEP Targets and Selections for the LTBMU.

<i>Evaluation</i>	<i>Form</i>	<i>Region 5 Target</i>	<i>Available Project Sites</i>	<i>Evaluations</i>	<i>Project Site</i>
Streamside Management Zones	T01	1	11	1	Chukar CTL Unit #5
Landings	T04	3	11	3	Chukar CTL Unit #7, Chukar CTL Unit #5, Angora ULM
Timber Sale Administration	T05	1	2	1	Angora ULM Hazard Tree TS
Special Erosion Control & Revegetation	T06	3	11	3	Angora ULM (2), Roundhill CTL Unit #7
Road Surface & Slope Protection *	E08	5	5	5	Slaughterhouse Canyon, 16N56 Martis Tie, T12N21 High Meadow, 14N32 Genoa Peak Rd, 15N38.4 Blackwood
Stream Crossings*	E09	4	5	4	Slaughterhouse Canyon, 16N56 Martis Tie, T12N21 High Meadow, 14N32 Genoa Peak Rd
Road Decommissioning	E10	2	0	0	No roads decommissioned
Control of Sidecast Material*	E11	2	5	2	Slaughterhouse Canyon, 16N56 Martis Tie
In-channel Construction Practices	E13	5	1	1	Blackwood Creek Phase IIIA (upper 1/3 completed in 2008)
Rip Rap Composition	E15	1	1	1	Slaughterhouse Canyon
Management of Roads During Wet Periods	E20	2	43	2	16N93 Regency Extension, 16N74 Sawmill Flat
Developed Recreation Sites	R22	3	31	3	Zephyr Cove Resort, Hotel, & Lodging, William Kent CB & Beach, Baldwin Beach
Dispersed Recreation Sites	R30	4	6	3	Meeks Bay Trailhead, Genoa Trailhead, Angora Lookout, Bucks Lake
Range Management	G24	1	0	0	No active range allotments
Prescribed Fire	F25	2	1	1	Dollar Burn Unit #5
Revegetation of Surface Disturbed Areas	V29	4	0	0	No revegetation projects completed
TOTAL		43		30	BASIN-WIDE

*Of the 43 Regional targets, only 30 evaluations were conducted due to a lack of qualifying projects for the In-channel Construction Practices, Revegetation of Surface Disturbed Areas, Range Management, Road Decommission, Landings, Dispersed Recreation Sites, and Prescribed Fire.

Table 2. Results of the 2009, LTBMU, BMPEP Evaluations by Program Area.

Program Area & Form	Number of Evaluations	EFFECTIVE		NOT EFFECTIVE	
		Implemented & Effective	Not Implemented & Effective	Implemented & Not Effective	Not Implemented & Not Effective
Timber					
T01	1	1	0	0	0
T04	3	3	0	0	0
T05	1	1	0	0	0
T06	3	3	0	0	0
Subtotal #	8	8	0	0	0
Engineering					
E08	5	5	0	0	0
E09	4	4	0	0	0
E10	0	0	0	0	0
E11	2	2	0	0	0
E13	1	0	0	1	0
E15	1	1	0	0	0
E20	2	1	1	0	0
Subtotal #	15	14	1	1	0
Recreation					
R22	3	3	0	0	0
R30	3	3	0	0	0
Subtotal #	7	7	0	0	0
Other					
G24	0	0	0	0	0
F25	1	0	1	0	0
V29	0	0	0	0	0
Subtotal #	1	0	1	0	0
Total # BMPs	30	27	2	1	0
Total Rating %		90%	7%	3%	0%
		97%		3%	

The following section describes completed evaluations and provides a brief description of site specific issues and conditions.

~ Timber (Vegetation and Fuels Management) ~

In 2009, Timber evaluations were conducted at fuels reduction treatment projects implemented at Chukar CTL - Unit #5 at Bayview Campground, Roundhill CTL - Unit #7, Chukar CTL Unit #7 at D.L. Bliss Campground, and Angora Urban Lot Management. These treatment projects were completed in 2008. All evaluations were rated implemented and effective.

T01: Streamside Management Zones - 1 evaluation.

- Chukar CTL Unit #5 – *Implemented and effective*

T04: Landings - 3 evaluations

- Chukar CTL Unit #7 – *Implemented and effective*
- Chukar CTL Unit #5 – *Implemented and effective*
- Angora ULM – *Implemented and effective*

T05: Timber Sale Administration – 1 evaluation

- Angora ULM Hazard Tree Timber Sale – *implemented and effective*
 - This urban lot project is located at Pyramid Ct. and is a separate and smaller part of the main project.

T06: Special Erosion Control and Revegetation -3 evaluations.

For all T06 evaluations, chips or masticated material covered 98% of the units, which exceeded the standard of 80% outlined in the NEPA documents.

- Round Hill CTL Unit #7 – *Implemented and effective*
- Angora ULM (at Pyramid Ct) – *Implemented and effective*
- Angora ULM (at Mule Dr.) – *Implemented and effective*

~ Engineering and Restoration ~

A total of 15 evaluations were conducted at 8 locations for BMPs related to roads and in-channel construction practices. The regional target for engineering project evaluations was met in all areas except for Road Decommissioning (E10) and In-channel Construction Practices (E13). Out of 15 Engineering evaluations, only one was rated as not implemented and all were rated as effective. Engineering sites and evaluations are outlined as follows:

Slaughterhouse Canyon Road 15N67, Road grading and repair project.

E08: Road Surface, Drainage and Slope Protection - *Implemented and effective.*

E09: Stream Crossing - *Implemented and effective.*

E11: Control of Sidecast Material - *Implemented and effective.*

Martis Tie Road 16N56, Road grading and repair project

- E08: Road Surface, Drainage and Slope Protection - *Implemented and effective.*
- E09: Stream Crossing - *Implemented and effective.*
- E11: Control of Sidecast Material - *Implemented and effective.*

High Meadow Road 12N21

- E08: Road Surface, Drainage and Slope Protection - *Implemented and effective.*
- E09: Stream Crossing-*Implemented and effective.*

Genoa Peak Road 14N32

- E08: Road Surface, Drainage and Slope Protection - *Implemented and effective.*
- E09: Stream Crossing-*Implemented and effective.*

Blackwood Canyon Road 15N38

- E08: Road Surface, Drainage and Slope Protection - *Implemented and effective.*

Slaughterhouse Canyon

- E15: Management of Rip Rap - *Implemented and effective.*
 - Concrete riprap was used to armor the fill slope in three locations along the road. No evidence of erosion or sediment transport was observed during the evaluation.

Regency Road 16N93

- E20: Management of Roads during Wet Periods - *Not Implemented and effective*
 - The seasonal road is administratively closed to public use from November 15 to June 1st, however a Forest Service gate does not exist at the western terminus of road 16N93 (where it meets road 16N63). Ruts and fresh tire tracks indicated the road was used during the prescribed closure period. No erosion or sediment transport was observed or considered likely because of the very low gradient where ruts were visible. Installation of a gate is currently planned for 2010.

Sawmill Flat Road 16N74

- E20: Management of Roads during Wet Periods - *Implemented and effective*
 - Gate was locked at the time of the evaluation.

Blackwood Creek Phase IIIA

- E13: In-Channel Construction Practices – Upper 1/3 Implemented in 2008-
Implemented but not effective

The Blackwood Creek Restoration Project Phase IIIA, resulted in 900 feet of reconstructed stream channel within the main channel of Blackwood Creek in the summer of 2008. This completed approximately 1/3 of the total planned restoration for the reach in Phase IIIA. Channel restoration included construction of flow deflection and floodplain deflection structures and the construction of a new channel with appropriate morphology in terms of channel width, depth, gradient, and

sinuosity. E13 protocols requires at least one winter cycle before the effectiveness portion of the evaluation can be completed

Water quality protection design features, and measures related to erosion control and sediment transport were identified in NEPA documents, design plans, and the Storm Water Pollution Prevention Plan. Field visits to the site during construction verified design measures were implemented according to specifications. These design features included water diversion structures, filter fabric, coir logs, equipment staging areas and project delineation flagging. In addition, channel construction was completed per specification in the design plans, except that a temporary grade control structure had to be constructed at the end of the completed project reach because only 1/3 of the project was constructed. This temporary grade control structure was not able to withstand the flows and sediment bedload that occurred during the May rain and storm event (estimated to have caused 5 to 10 year flow volumes). This resulted in sediment bedload deposition filling in a portion of the restored channel reach, and the channel being deflected into a side channel. The constructed floodplain and channel features above this evulsion performed as expected however the failure of this temporary grade control results in an overall effectiveness failure for this evaluation. A full description of project performance observed during this event can be found in the project monitoring field notes document prepared after this event, and is available upon request (USFS, 2009).

In hindsight, it is hard to say whether there was any way to avoid the difficulties that occurred because of this phased construction. The size and complexity of the project prohibited completion of the in-channel work within one field season. During spring of 2009, massive channel erosion was observed well below the 2008 completed reach, as has occurred in this reach historically during high flow events. Based on field observations of channel scour and floodplain deposition during the May and October storm events, it is believed that even with the failure that occurred at the temporary grade control in the constructed reach, this project (completed in 2009) has resulted in an overall reduction in sediment transport from Blackwood Creek.

Implementation monitoring was conducted on the remaining 2/3 of the project, constructed in 2009, and effectiveness was evaluated on the whole project, as documented in the October 13th post-storm monitoring report presented in Appendix A (rated as effective). BMP effectiveness for the entire project will be repeated in the spring of 2010, following spring runoff. Both of these effectiveness evaluations will be included in the 2010 BMPEP annual monitoring report.

~ Recreation~

Developed Recreation Sites (R22)

Three developed recreation sites were randomly selected from a pool of 31 such sites within the Lake Tahoe Basin Management Unit. These sites provide services such as; sanitation, water and/or refuse removal. Selected sites included Zephyr Cove Resort and Campground,

William Kent Campground and Beach, and Baldwin Beach. All three developed recreation site evaluations (R22) were rated implemented and effective.

Zephyr Cove Resort and Campground – Implemented and effective

Zephyr Cove Resort is operated on a Special Use Permit, managed by the Forest Service. It consists of a restaurant, lodging, campground (93 RV sites, 47 walk-in sites, & 10 drive-in sites), beach and pier. Services include refueling boats and boat rentals. The site has 3 large underground storage tanks (12,000 gallon diesel, 10,000 gallon gasoline, and 8,500 gallon gasoline) and two above ground storage tanks (400 gallon used oil and 250 gallon anti-freeze). As required by the R22 protocol, an additional evaluation, (E12) Servicing and Refueling, was conducted on the site to evaluate potential for leakage from existing tanks, lines or dispensers. There is no evidence of leaking fuel and the facilities meet current structural standards, therefore this evaluation was also rated as implemented and effective.

William Kent Campground and Beach – Implemented and effective

The campground and beach are located on west shore near Tahoe City. There are 84 campsites and hookups with restrooms, water faucets and garbage disposal service. .

Baldwin Beach – Implemented and effective

Baldwin Beach is located at South Shore and it is managed under a Special Use Permit by California Land Management. It consists of two large parking lots and two restrooms.

Dispersed Recreation Sites (R30)

Four sites were randomly selected from a total of eight dispersed recreation sites currently on the LTBMU. A 2008 Forest Order reduced the amount of dispersed camping on the LTBMU to only two sites that contain very minimal facilities. Therefore the number of dispersed recreation sites on the LTBMU decreased significantly from previous years BMPEP sample pools. One of the randomly selected sites (Meeks Bay trailhead) was just evaluated in 2008, and so was removed from the sample pool. Upgrades to the unpaved parking at Meeks Bay are currently scheduled for 2011. Two of the randomly selected sites were evaluated in 2007, but because of the limited sample pool, were reevaluated in 2009. The LTBMU will coordinate with Regional office staff to ensure appropriate targets for this BMP evaluation are assigned in the future, so that sites are not visited more than once every two or three years.

All three dispersed recreation site evaluations (R30) were rated implemented and effective. Sites evaluated include: Bucks Lake, Genoa Trailhead, and Angora Lookout.

Buck Lake – Implemented and effective

Buck Lake is located on west shore and is connected to the Rubicon Trail, and improvements consist only of unpaved parking and two fire rings. There are no disposal, water or sanitation services on site.

Genoa Trailhead – Implemented and effective

The Genoa trailhead is located near Daggett Summit and consists of paved parking and unpaved off road vehicle staging areas. There are no disposal, water or sanitation services on site. BMPs include paved parking and signage.

Angora Lookout – Implemented and effective

Angora Lookout is a historic site located off of Angora Ridge Road. No specific BMPs have been prescribed at the site because this facility is located on rock substrate.

~ Prescribed Fire (F25) ~

The prescribed fire evaluation was conducted at Dollar Burn Unit #5 underburn near Tahoe City. The underburn was implemented in 2008. It was rated *not implemented but effective*. The not implemented rating is due to the lack of a defined ground cover objective in both the NEPA document and the Burn Plan for this project. Previous Burn Plans at the LTBMU have contained a ground cover standard, and recently developed Burn Plans are utilizing this standard which states: “Maintain 25% duff retention over 80% of the surface area. Tolerable deviations include 100% of the duff consumption on less than 25% of the surface area.” This standard was not incorporated in the planning process for this project. Fire management staff will review and update each existing Burn Plans on the Unit to make sure this standard is contained in the Burn Plan document.

Although the above standard was not stated in Burn Plan, the monitoring staff determined that the site contained close to 25% residual soil cover over all, and there was no evidence of erosion or sediment transport from the site. Therefore the evaluation received an effective rating.

Monitoring staff also evaluated hydrophobicity at the underburn site, and determined that all areas, both unburned and burned, were hydrophobic. Tahoe Basin soils are often naturally hydrophobic due to waxy organic substances produced by local vegetation and microorganisms (Dingman, 1994). Therefore this appears to be an inappropriate objective to establish as currently suggested in the BMP evaluation form. Ground cover should be the only objective established and utilized for upslope underburn evaluations in the Lake Tahoe Basin.

No other underburn projects were implemented in the Tahoe Basin during this evaluation period.

~Follow-up Evaluations from 2008~

The 2008 BMPEP Report recommended follow-up evaluations at two site locations to verify whether corrective measures were taken to address past issues of concern. A cutbank on

Ward Creek at the Ward Creek Trail Bridge was revisited in June to determine the status of observed minor erosion. Ward Creek erosion was greatly diminished due to the recent establishment of vegetation on the previously bare slope. No follow-up evaluations are recommended at this site. Bliss Creek Road, 15N61 was revisited in 2009 to determine if the fence was repaired as recommended in the 2008 BMPEP report. As of the June site visit, the Bliss Creek Road fence has not been repaired although it is currently scheduled for repair by engineering staff in 2010. This site is recommended for follow-up evaluation in 2010/2011.

~Site Specific Evaluations-Bayview Campground~

Chukar 2 CTL Unit #5 (Bayview CG), E09 and T02– Implemented and Effective

Chukar CTL Unit #5 at Bayview Campground was a special site specific project evaluation performed at the request of the Lahontan Regional Water Quality Control Board (LRWQCB) using Stream Crossings (E09) and Skid Trails (T02) protocols after a field visit to the project site in October of 2008, and concern over wet soil operations. Fifty trees were mechanically thinned in both Unit #5 & Unit #7.

A cut to length harvester and forwarder was utilized at this project, so no skid trails were created during this project. The skid trail protocol was applied to the harvester/forwarder trail. The harvester trail was covered with slash (approximately 90% cover), and there were no visible tire ruts, or evidence of erosion or sediment transport. The stream crossing was located between the corral and the campground. The crossing structure had been removed, and there was no evidence of disturbance to the stream channel.

~Post Storm Monitoring of October 13, 2009 Storm Event~

Post-storm monitoring conducted on a variety of recently completed and active projects as a follow-up to this storm was conducted utilizing both BMPEP protocols, as well as Temporary BMP protocols. A full discussion of all the BMP monitoring conducted following this storm event is presented separately in Appendix A entitled; Summary of Post-storm BMP Monitoring Evaluations for October 13th, 2009 Storm Event. These post storm evaluations included projects that were not included in random samples selected to achieve the regional BMPEP target evaluations.

4. SUMMARY / RECOMMENDATIONS

Forestwide, BMPs in 2009 were 97% effective, and 93% of project BMPS were implemented as planned. Implementation departures included: 1) lack of ground cover objective in the Dollar Burn prescribed burn plan, and 2) continued lack of a Forest Service gate to prevent wet period use on Regency Road-16N93.

The effectiveness failure occurred because of failure of the temporary grade control constructed at the end of the restored reach of the Blackwood Phase IIIA Stream Channel and Floodplain Restoration project completed in November of 2008. This temporary structure was meant to transition the gradient between the 900 feet of restored channel reach completed in 2008, down to the existing channel. However the constructed geomorphology

at the end of the reach was not able to withstand the volume of flow that occurred during a 5 to 10 year frequency rain on snow high flow event that occurred in May of 2009. The restored channel just upstream of the grade control filled with sediment and diverted flow into a remnant side channel. This failed section of restored channel was reconstructed in 2009, along with the remaining 2/3 of total restored channel reach for this project. The completed 2,800 feet of restored channel functioned as designed during a 25 year rain event in October of this year.

Recommendations

Follow-up evaluations are recommended for Regency road 16N93 and Bliss creek road 15N61, to evaluate installation of currently planned BMPs for 2010. It is also recommended that fire management staff review all existing Burn Plans to ensure that a ground cover objective is specified. Hydrology and fire management staff should continue to use data from ongoing research and monitoring efforts to determine whether the current prescribed underburn ground cover objective should be modified for future projects.

LTBMU monitoring staff will coordinate with Regional Office staff by March 30 each year, to ensure that targets are not assigned that cannot be met related to the anticipated annual program of work and lack of qualifying facilities.

References

- USDA Forest Service. 2002. Investigating Water Quality in the Pacific Southwest Region: Best Management Practices Evaluation Program (BMPEP User's Guide. Pacific Southwest Region; Vallejo, CA.
- USDA Forest Service. 2000. Water Quality Management for National Forest System Lands in California: Best Management Practices. Pacific Southwest Region; Vallejo, CA.
- USDA Forest Service. May 2009. 2009 Peak Flow and Geomorphic Monitoring Field Notes for Blackwood Creek Restoration Phase IIIA: Stream and Floodplain Restoration Project. Lake Tahoe Basin Management Unit.

Appendix A

Summary of Post-storm BMP Monitoring Evaluations for October 13th, 2009 Storm Event

BMP Monitoring Evaluations were conducted following a major storm event that occurred on October 13th and 14th of 2009. This approximately 25 year precipitation frequency event was of sufficient magnitude (2.75" to 8" inches/24 hours around the Basin) to warrant post-storm monitoring of not only those projects which were still active at the time of this storm, but also other projects which had been completed earlier in the summer.

LTBMU Temporary BMP (TBMP) monitoring protocols were utilized for active construction projects. TBMPs are defined as the temporary erosion and runoff control measures required for soil disturbing activities that occur during construction projects in the Tahoe Basin, such as for facilities retrofit and stream channel restoration projects. TBMPs differ from permanent BMPs as they are designed to prevent erosion primarily during construction activities, and to remain effective only until construction is complete and permanent BMPs can be applied. These TBMPs are described in general terms in NEPA document design features, and presented in detail on final project design plans, and in storm water prevention plans for projects permitted through the Lahontan Water Quality Control Board.

For TBMPs the results are presented in terms of minor deficiencies and major deficiencies in implementation and effectiveness. A rating is considered a minor deficiency, if eroded sediment did not reach or have the potential to reach, an SEZ (Stream Environment Zone). A rating is considered a major deficiency, if sediment did reach, or had the potential to reach a SEZ. This rating does not imply anything about the amount of sediment that may have been transported. A total of five TBMP evaluations were conducted for 5 active construction projects.

Regional BMPEP protocols were applied to completed construction projects, and all non-construction projects. A total of eleven BMPEP evaluations were conducted for 7 projects. BMPs for non-construction projects and completed construction projects are described in the USFS BMP handbook. These BMPs are also frequently described in further detail in the project specific design features presented in the NEPA analysis. If the work is conducted through a contractor, further specificity can be found in contract documents. These protocols were applied to vegetation management projects, road and trail BMP retrofit projects, and a completed stream channel restoration project. Please refer to the BMPEP User's guide or the Annual BMPEP Reports for a description of the rating system for these evaluations.

Temporary BMP Evaluations (for active construction Projects)

Facilities retrofits (all active)

- Fallen Leaf Campground
- Pope Beach Toilets
- Tallac Creek Bridge

Vahalla Pier
Angora Water Tank Road

BMPEP evaluations

Watershed Restoration

Blackwood Creek Phase IIIB (completed)

Trail BMP Retrofits

Barker Pass Road Slide Repair (completed)

Daggett Summit Trail (completed)

East Shore Trail (active)

Vegetation Management

Quail/Mckinney (active)

Round Hill (completed)

Angora Hazard Tree (active)

Facilities Retrofits

Fallen Leaf Campground (Minor Deficiency)

Fallen Leaf Campground was still undergoing permanent BMPs retrofits during the October 13th storm. Permanent BMP retrofits include paving the Moraine Trailhead Parking lot, construction of a sediment retention basin, redefining the lake access trail, upgrading a stream crossing, and redefining campsite spurs to reduce impervious coverage. Of these permanent BMPS, 80% were completed, and 20% were still in progress. TBMPs included sediment fence and coir logs, which were implemented as designed. There was one minor deficiency in BMP implementation in that the mulch material to be placed on restored soils (removed pavement), was not available to be put in place right after treatment. Wood chips should have been on site ready to install soon after pavement and soil restoration occurred, so these sites would have already been protected from rainfall splash erosion and compaction during the storm event.

Although post-storm monitoring conducted on October 14th identified numerous areas where sediment fence was eventually rendered ineffective by wind and storm water during the October 13th event, no significant erosion was observed and no sediment left the site.

Pope Beach Toilets (Minor Deficiency)

Upgrading of the two restrooms at Pope Beach, was still in progress during the October 13th storm event. One minor BMP implementation deficiency did occur related to management of concrete waste. Just prior to the storm event the contractor washed out a truck containing concrete waste onto a constructed ramp within the project, protected by two layers of silt

fence. There was also concrete waste present on SEZ soils within the project area adjacent to the foundation. There was no transport of concrete or fill during the storm event, however concrete wastes may have leached contaminants into underlying or adjacent SEZ soils. Because of the overall volume of concrete waste involved, and the fact that most of this did occur on fill material that will be removed, it is believed soil and water quality impacts will be minimal. All other TBMPs were implemented and effective during the post-storm site visit conducted on October 14th. Some silt fences did fail during the storm, and required constant maintenance throughout the project as this BMP is difficult to maintain in the beach sand substrate present at this site. This type of BMP may not be the best choice for this type of substrate, and other alternatives should be considered in future projects. There was no evidence of erosion or sediment transport at this site during or after the storm event.

Tallac Creek Bridge (Major Deficiency)

Post-storm monitoring of this project occurred on Oct. 14, 2009. Most TBMPs were implemented as initially designed, and as prescribed during site visits just preceding this storm event. However BMP implementation did occur related to water diversion during the storm event, which also contributed to a major BMP effectiveness failure.

A water diversion structure was installed to route flow in Tallac Creek around the bridge construction site and back into the stream channel below, via a sediment basin. The diversion was initially implemented as designed, consisting of a sandbag coffer dam which funneled water into a 12 inch flexible plastic pipe. During construction the pipe had to be moved and the contractors' relocation of the pipe, along with the methods used for construction of pipe joints, was not adequate to handle this storm event. The location of the pipe after it was moved resulted in the pipe having to transport flow "uphill" against a 5 foot elevation gain. The baling wire used to hold the pipe joints together was not able to handle the amount of pressure put on the pipe joints, against the 5 foot head during the flow volumes experienced during this event. The 12 inch pipe failed because the degree of leaking at the pipe joint created saturated conditions in the soils around the pipe, which eventually collapsed into the excavated area, and caused a total failure of the pipe.

Failure of the pipe resulted in diverted water discharging directly into the excavated area. During the first 8 hours after this occurred when the contractor was trying to repair the failed pipe, the contractor pumped turbid water directly out of the excavated area, and into the stream channel below. This was a deviation from the BMP prescription which was to pump water to an upslope location where flow would disperse and infiltrate away from the stream. This action was corrected when detected by USFS staff. The entire failure of the water diversion BMP is judged to constitute a major BMP effectiveness failure because stream channel turbidity increased from 4 NTUs above the project to 584 NTUs below the project during the storm event.

Recommendations to prevent this type of diversion pipe failure to occur in the future include:

- Perform more rigorous inspection of pipe joints, particularly segments of pipe and pipe joints that are either buried and/or flowing under pressure rather than just gravity.
- Perform more rigorous inspection of pipe alignments adjacent to excavations, to make sure the pipe is secured and cannot settle once full, creating stress on pipe joints.
- Provide more detail in contract document regarding installation and maintenance of flow diversions, including specifying the horizontal location of the pipe alignment and vertical grade of the pipe.

Although implemented as designed, some sediment control TBMPs were knocked down or overwhelmed during the storm event (stockpile covers, filter fence, and coir logs). In general the practice of utilizing plastic sheeting to protect stockpiles during rain events should be re-evaluated. This BMP can be effective at reducing air borne transport of fine sediment particles, but during rain events concentrates flows and does not allow for infiltration. There were also minor implementation deficiencies related to coir log placement throughout the project (gaps between and under coir logs). No additional sediment transport to Tallac Creek was observed as a result of these BMP failures, other than what occurred as a result of the failed diversion pipe. All TBMPs were repaired and fully functioning again by October 29th including the installation of new BMPs as determined through communications with Lahontan staff. New BMPs included additional silt fence, rerouting of groundwater diversion discharge, and wood chips on disturbed surfaces.

A BMP deficiency may also have occurred related to the jetting of fines on the reconstructed channel. Jetting of fines is seldom 100% successful with one application of the treatment, and experience on past projects indicates that some areas often require multiple treatments. The amount of loose soils still present after jetting was supposed to be complete at this project was sufficient for Lahontan inspectors to require fines to be re-jetted on a portion of the channel. Standards are not defined for determining when the level of jetting is sufficient, and this determination is typically made based on the professional judgment of project leaders. Future design specifications should establish criteria for determining when this BMP has been successfully implemented.

A BMP implementation deficiency also occurred related to the application of aggregate on a section of temporary access road leading to the stream crossing. This was prescribed by Lahontan staff for implementation soon after the storm event, but was not implemented by the contractor until a week before the end of the project. The project was closed with all BMPs in place for the winter by December 1st.

Valhalla Pier (Major Deficiency)

The project to reconstruct the Valhalla pier was also still ongoing during the October 13th storm. Post-storm monitoring performed on Oct. 14, 2009, identified rilling at the base of the site (2 inches to 3 inches wide, by 1 inch to 4 inches deep). Off-site effects were observed in the form of sediment deposits being transported to within 20 feet of Lake Tahoe.

Offsite erosion resulted because an appropriate soil cover BMP was never prescribed to prevent transport of disturbed/loose soils within the construction site, to be applied if needed while the project was still under construction. An appropriate BMP would have been materials that would allow infiltration while preventing sediment transport. However because these materials were not available on site, project and regulatory staff decided in the short time frame available to do something to install a large plastic sheet to cover recently placed fill within the construction area. The plastic sheet had the effect of capturing all rain water and channeling it to the base of the construction site where it broke through and undermined the sediment fence and coir logs.

Erosion and sediment transport offsite would likely not have occurred if erosion control methods to provide soil cover had been properly prescribed during project planning and design, such as jute matting, straw or wood chips which will promote infiltration of rain water as opposed to collecting and channelizing it. Plastic sheeting should only be prescribed to prevent wind erosion of stock piled materials.

Angora Water Tank Road (Minor Deficiencies)

This road upgrade is located at Angora Ridge near Upland Way and was implemented under special use permit to the South Tahoe Public Utility District. The design plan for permanent BMPS included water bars, a rock-lined drainage ditch, an infiltration basin and prefab drywell to prevent erosion and sediment transport from 630 feet of road length. This project was still active during the storm. All TBMP's were properly implemented prior to the October 13th/14th storm, and were effective at preventing off site transport of sediment during the storm.

In addition to the three coir log waterbars specified in the design plans, three additional coir logs were installed across the road prior to the forecast storm, for a total of six coir logs spaced along the 630 feet of road. The two upper coir log waterbars functioned as designed, however the third failed due to filling with sediment and over topping, and the fourth and fifth coir log failed due to undermining. Fortunately the sixth coir log was effective and prevented any eroded sediment from being transported off site. As a result only minor rilling occurred (1 inch deep x 3 inches wide x 90 feet in length) within the road bed, and no sediment left the site or was transported into a SEZ.

Some sediment from material stockpiles was transported off site due to the filter fence being overwhelmed during the storm event. The bottom of the filter fence was pulled out of its keyed position, allowing runoff and sediment to flow beneath the fence. However sediment was transported less than 10 feet from the fence and did not reach the SEZ located 1000 feet away. The road work was completed on November 1st with permanent BMPs installed in accordance with design documents.

Watershed Restoration

Blackwood Canyon Phase III (I/E)

This project involved the reconstruction of 2,800 feet of channel and associated floodplain within Blackwood Creek, and was completed on October 9, 2009.

The post-storm BMPEP evaluation for in-channel construction practices (E13) conducted on October 14th, 2009, determined that stream restoration features functioned as designed and were effective at reducing the erosive nature of the pre-restoration stream channel. Some increases in turbidity did occur below the reconstructed channel reach during this event (20 NTUs above compared to 130 NTUs below) due to the recent completion of construction activities and associated areas of unseated sediments, and the expected level of channel scour for this magnitude of event. As described in the NEPA document, the design approach assumes that the channel will remain dynamic during large scale events, while keeping channel erosion away from the high floodplain terraces, and maintaining the overall integrity of the channel morphology. The project was successful in keeping channel erosion away from the high floodplain terraces, and experiencing the large scale bank erosion and collapse that has occurred during previous high flow events within this reach prior to restoration (Blackwood Implementation Monitoring Report, 2009). In addition, overall channel morphology appears to have been maintained and areas of fine sediment deposition were observed within the newly constructed floodplain after this event.

Trail BMP Retrofits

Barker Pass Road Slide Repair (completed July 17th) I/E

This project, which repaired a 62 foot by 50 foot area of unstable fill-slope on the upper section of Barker Pass Road, was completed July 17, 2009. The project used approximately 100 cubic yards of boulders to construct a retaining buttress designed to stabilize the road fill slope and minimize erosion. No evidence of erosion or sediment transport was observed during the post-storm BMPEP evaluation (protocol E08).

Daggett Summit Trail (completed September 11th) I/E

Three miles of trails were decommissioned and/or rerouted. Decommissioned trail segments were tilled and covered with wood chips, branches and rocks. The project was completed on September 11, 2009, and post-storm monitoring BMPEP monitoring occurred on October 14th (protocol E08). Several rills (less than 0.5" deep and approximately 1" wide of varying lengths of 20' to 60') were observed in the trail surface and fill-slopes. No rills or eroded sediment, extended beyond the toe of the fill-slope or into an SEZ. Trail engineer were informed of these conditions and follow-up trail maintenance, which included recommended additional rolling dips, was completed by October 29th.

East Shore Trail (I/E)

This project includes 3.5 miles of decommissioned and rerouted trail which extends from Marlette parking lot to Chimney Beach. The new trail was built on a steep slope using reverse grade, rolling dips and rock steps, and all work on the new trail was completed by August 15th. The new and old trail was evaluated two weeks after the October 13/14th storm. No evidence of erosion or sediment transport were observed on the new trail sections, however there was a deep rill (2.5" x 4" x 30') on the trail section that had not yet been decommissioned. Trail engineers were informed of the above erosion feature and decommissioning was completed by November 13th. (E08)

Vegetation Management

Two of the fuels reduction projects below were still in progress during the October 13th storm event, and one was completed. The following BMPEP protocols were used for these storm event evaluations, as appropriate: T04-Landings, T02-Skid Trails, E14-Temporary Roads, and E09-Stream crossings.

Quail/Mckinney (I/E)

This active site was evaluated on October 15th after the October 13th storm event and again on October 20th following a minor rain event. Both evaluations on temporary roads and landings determined that all BMP's were implemented correctly in accordance with the NEPA decision and contract specifications, and were effective at preventing eroded sediment from leaving the site. Erosion was limited to minor rilling between waterbars and coir logs. There were no stream crossings in place within the project area during the storm event, and cut to length equipment was used for fuels treatments. (E14, T04)

Round Hill (I/E)

The evaluation was performed on a randomly selected unit within the Roundhill project (Unit 22). Project activities for the year were completed in 2009, prior to the storm event. There were no temporary roads or stream crossings located within the 2009 Roundhill treatment units. The landings and skid trail evaluations determined that all BMP's in Unit 22 were implemented correctly in accordance with the NEPA decision and contract specifications and were effective at preventing erosion and transport of sediments. (T02, T04)

Angora Hazard Tree (NI/NE)

This project was still active during the October 13th storm event. BMP implementation and effectiveness failures occurred at several locations within this project because BMPs were not implemented prior to the storm event, as identified in the NEPA decision and the timber sale contract. Failures resulted primarily as a result of not installing waterbars on the temporary roads and landings, which resulted in erosion of the road surface and the transport of flow and sediment to adjacent perennial and ephemeral water bodies. Transport problems

were exacerbated by the failure of BMPS to be prescribed or implemented to hydrologically disconnect pre-existing user created trails which hydrologically connected project roads and landings to adjacent stream channels. Road drainage and road surface erosion were also compounded by the fact that one of the temporary roads became entrenched during construction. (T04, E09, E14).

The BMPEP evaluation conducted for skid trails was rated successfully implemented and effective (T02). It should also be noted that the stream crossing located on a tributary to Angora Creek did function during this event, and that no rilling or gullyng occurred outside of the roads and landings themselves. While not possible to quantify the volume of sediment transported, it can be concluded that loading to active channels was limited to fine and coarse sediment transported in sheet flows, primarily within the boundaries of user created trails connecting landings and roads to adjacent stream channels. Adjacent to these trails it appears that sheet flows and associated sediments were infiltrated and deposited within the established SEZ buffers.

Remediation after this event was not required beyond re-blading the road and installation of the prescribed BMPs.

Conclusions

Out of the twelve projects evaluated, BMPs were rated as implemented as designed, and effective at preventing adverse impacts to soil and water quality at six of the projects. For another three projects minor deficiencies were experienced in either implementation and/or effectiveness. Some of these minor deficiencies in BMP effectiveness occurred because BMP were damaged during the storm event, and/or some minor erosion contained within the project area. However no sediment (including fines) was transported to a water body and the degree of erosion did not cause damage to soil function at these three projects.

In three projects, major BMP implementation and effectiveness failures occurred. BMP effectiveness failure at the Tallac Creek bridge replacement project resulted from a failed diversion pipe and at the Valhalla Pier Project from using plastic sheeting to prevent surface erosion of disturbed soils. Recommendations for improving the design/implementation of BMPS for these two projects were presented in the body of this report and should be included in future project specifications. In the Angora Hazard tree project, major deficiencies occurred in BMP implementation of control structures on project roads and landings, which resulted in deficiencies in BMP effectiveness.

In addition it is acknowledged that an overall procedural deficiency occurred related to the continued implementation of projects past the October 15th grading deadline without a grading exemption, resulting in the LTBMU not complying with winterization requirements specified in Lahontan water quality permits for the projects described in this report.

LTBMU staff are currently conducting an analysis of why these failures occurred in BMP implementation and effectiveness. Recommendations likely to come from this analysis include:

- A more structured extreme event storm forecasting and communication process within the LTBMU. This process will be designed to ensure timely notification to responsible staff, and ensure resources are obtained to respond as needed to prevent avoidable adverse impacts to water quality.
- Modifications to timing and location of soil and water design features for temporary roads, for ensuring adequate BMPs are installed prior to extreme storm events.
- Changes in contracting language and/or more timely implementation of contractor compliance measures in project contracting language related to BMP implementation, to improve contractor compliance,
- Consideration of how to plan for project implementation, as we approach the fall “wet season”, and more timely communication with regulatory partners as we approach this season related to possible grading exemption requests. Plan projects to complete implementation of “in-channel” work prior to October 15th.
- Clarification of terminology internally and externally related to “winterization BMPs”, and clarification of design features/BMPs required to prepare for wet season operations, as opposed to design features/BMPS required to button up a project for the winter. Include wet season BMPs in planning documents (NEPA, erosion control plans, contract specifications), and grading exemption requests.
- Address hydrologic connectivity issues associated with both system and “user created” trails as part of the planning process for a project. Specific design features should be identified and implemented to disconnect these features from project areas (such as landings and roads), as part of project implementation.
- Reevaluate design specifications for stockpile management, and jetting of fines in channel substrates.