

Klamath National Forest Best Management Practices

REGION 5 EVALUATION PROGRAM WATER QUALITY MONITORING REPORT 2009 Fiscal Year

Evaluation of Forest Service administered projects including timber sales, roads, grazing, recreation sites, and mining operations, mining restoration, in channel construction and road obliteration.

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**KLAMATH NATIONAL FOREST
2009
BEST MANAGEMENT PRACTICES (BMP)**

SUMMARY

Fiscal year 2009 was the eighteenth year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest (Forest) and the Forest Service Pacific Southwest Region (Region). This program is designed to evaluate how well the Forest and the Region implement BMPs and how effectively the BMPs control water pollution from National Forest lands. Onsite evaluations have been divided into 29 possible “activity groups” (categories) that look at related management practices. In the 2009 fiscal year, Klamath National Forest staff evaluated timber, engineering, range, recreation, minerals, and restoration projects to determine whether BMPs were implemented and effective. Nineteen different protocols were used to evaluate a total of sixty-five sites. Each protocol is designed to measure implementation and effectiveness of an activity category that includes from one to six related BMPs. Appendix A is a table that cross-walks each protocol/activity category alpha-numeric code with its name and the BMPs it is designed to monitor.

The Forest’s BMPEP is composed of two sampling strategies. The first is the evaluation of randomly sampled sites, where data are collected and entered into a Regional database. The second strategy is non-random monitoring, in which sites are selected based on management interest in specific ongoing projects. These sites are often evaluated concurrently (“real time”) and can be qualitative as well as quantitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment; however, the in-channel construction protocol requires at least one sample per site to be done during the active project phase. The site evaluations followed protocols described in *Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User’s Guide* (USDA, Forest Service, 2002). The random samples were selected from a pool of eligible sites. In cases where the sample pool is very small, either all eligible sites are evaluated, or selection is done in a way that does not bias which sites are selected. The results of the random and non-random evaluations are summarized here.

Randomly sampled sites: In 2009, 65 sites were randomly drawn and evaluated from Forest activity pools and each was reviewed for BMP implementation and effectiveness. Timber (24 sites), prescribed fire (4 sites), road and engineering (26 sites), recreation (3 sites), grazing (4 sites), mining operations (2 sites), and in-channel construction (2 sites) activities were evaluated. Sites were located on all Ranger Districts (Oak Knoll, Happy Camp, Salmon River, Scott River, and Goosenest).

BMP Implementation was evaluated to determine whether: (1) we did what we said we were going to do to protect water quality; and (2) project environmental documentation and/or contract/permit language was sufficient to ensure water quality protection. BMP effectiveness was evaluated to determine if water quality protection measures met objectives. The objective for meeting most evaluation criteria is keeping all sediment out of channels and near-channel areas. Sediment deposition presence, volume and proximity to the nearest watercourse were used to indicate level of effectiveness.

In 2009 BMPs were fully implemented at 97% of the sites evaluated and effective at 98% of the sites evaluated. Water quality was not measurably impacted at either of the two sites where BMPs were not fully implemented.

Non-Randomly sampled sites: Several sites were selected for concurrent monitoring because the activities and their proximity to watercourses pose a potentially high risk for sediment discharge. These sites are not included in the numeric summaries in Tables 1 through 5. They are discussed in the Non-Random Site Results summary section.

The 2009 BMP monitoring report suggests how to continue the trend of improved success by ensuring proper implementation and further refining BMP effectiveness.

Historical Perspective

The results from the 2009 BMP evaluation program are compared to results from previous years to evaluate trends in the data by year, by category, and by watershed. Table 1 summarizes the results of the BMP Random Site Evaluation Program for 1992 through 2009. Sites that partially meet evaluation criteria are not tallied in the “fully successful” group.

Table 1. BMP Random Site Evaluation Program from 1992 through 2008.

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		# of Sites	% of Total Fully Successful	# of Sites	% of Total Fully Successful
1992	53	29	55%	43	81%
1993	77	61	79%	72	94%
1994	52	39	75%	46	89%
1995	77	64	83%	74	96%
1996	57	48	84%	56	98%
1997	60	60	100%	59	98%
1998	54	35	65%	52	98%
1999	38	25	66%	34	89%
2000	45	40	89%	43	96%
2001	64	56	88%	61	95%
2002	53	49	92%	47	96%
2003	51	51	80%	45	90%
2004	53	50	94%	53	100%
2005	48	46	96%	47	98%
2006	45	42	93%	45	100%
2007	56	56	100%	55	98%
2007*	57	56	98%	55	96%
2008	50	39	78%	46	92%
2009	63	61	97%	62	98%

*One 2007 recreation evaluation (R22) was not reported in 2007. The second row of 2007 numbers reflects the revised 2007 data.

In 2009 BMPs were fully implemented at 97% of the sites evaluated and effective at 98% of the sites evaluated. This represents a notable change in BMP implementation (20% increase) and a 6% increase in effectiveness compared to 2008. Dividing the years 1992-2009 into three 5 to 6-year groupings makes the evaluation trends more apparent. Table 2 shows the improvements made in BMP Implementation and Effectiveness through time.

In 2007, BMPs were originally reported as fully implemented at 100% of the sites evaluated and effective at 98% of the sites evaluated (water quality was not protected at one site where BMPs were fully implemented), however, one recreation evaluation was not included in the analysis. Inclusion of all 2007 evaluations shows 98% of the sites as fully implemented and 96% effective at protecting water quality

Table 2. Implementation and Effectiveness success rate through time.

5-6 Year Increment	Average Implementation Success Rate	Average Effectiveness Success Rate
1992-1997	80%	93%
1998-2003	83%	90%
2004-2009	93%	97%

If the data is analyzed by BMP category, it is clear that certain activity groups have repeatedly failed implementation and/or effectiveness from 2000 to 2009 (Table 3). Some of the problems have been identified and fixed; others continue to cause BMP failures. Changes to practices that continue to produce BMP failures are discussed later in this report in the Adaptive Management section.

BMP evaluations for E10 (Road Decommissioning) have had implementation issues since 2000 with seven failures, and two effectiveness failures (Table 3). The problems identified in implementation have included over-steepened banks along the road and fill left in draws or crossings, though none of these issues have lead to slope failure or sediment delivery to channel.

Difficulty with BMP Implementation and/or Effectiveness had plagued “In-Channel Construction” (BMP E13; Table 3) from 2001 to 2005 years, mostly due to lack of stream flow diversion during project implementation and material piled within the floodplain. Actions taken in 2007 on problems identified in the 2006 annual report led to improvements in in-channel construction. Consequently, in 2007-2008 all seven E13 sites met both implementation and effectiveness criteria. Two in-channel evaluations were conducted in 2009 for pre-project monitoring, thus implementation and effectiveness were not rated.

BMP evaluations for E16 (Water Source Development) have included seven failures in implementation and 5 failures in effectiveness since 2000. Reoccurring problems with implementation include failure to include water drafting sources in project plans, excavation and drafting directly from the stream, and over-steep banks with high risks of erosion. Effectiveness failures include rutting, erosion from steep banks, and drainage from access point into the stream. Water Source Development continues to have effectiveness issues, and possible solutions are discussed further in the Adaptive Management section in this report.

BMP evaluations indicate M26 (Mining Operations) has had chronic implementation problems since 2000, with five failures (Table 3). The sampled sites in this category had problems in 2008 and in 2009. The problems plaguing mining operations include fuel storage and leaks, waste dumps, lack of erosion control measures on access roads, and problems with current Plan of Operation.

Table 3. BMPs with Implementation and Effectiveness problems from 2000 to 2009

BMP	Implementation		Effectiveness	
	Pass	Fail	Pass	Fail
T01	31	4	35	0
T02	32	1	33	0
T03	21	0	21	0
T04	43	1	43	1
T05	2	0	2	0
T06	8	0	8	0
T07	1	0	1	0
E08	34	1	35	0
E09	33	1	33	1
E10	30	7	35	2
E11	30	1	31	0
E12	4	0	4	0
E13	22	9	29	2
E14	10	3	13	0
E16	11	7	13	5
E17	15	2	16	1
E19	7	0	7	0
E20	4	0	4	0
R22	10	2	11	1
R23	1	0	1	0
G24	29	2	26	5
F25	37	0	37	0
M26	3	5	5	3
M27	15	0	14	1
V28	19	0	19	0
V29	9	0	9	0
R30	16	2	17	1

Figures 1 and 2 present BMP evaluation data by 7th field watershed. There is a need to integrate the BMP monitoring process with other, watershed based, monitoring programs on the Klamath National Forest. Analyzing BMP evaluation by watershed allows this type of monitoring to be correlated to in-stream monitoring. Through this process, we can better establish cause and effect relationships between activities on the hillslope and impacts to the stream channel. In Figure 1, the implementation failures for all BMP evaluations from 2000 to 2009 are presented by 7th field watershed. Walker Creek had the most failures with five, followed by McNeal-Glasgow with four. Blue Canyon and Wildcat Creek both had three failures. Thirty other watersheds had either one or two BMP implementation failures.

In Figure 2, the effectiveness failures for all BMP evaluations from 2000 to 2009 are presented by 7th watershed. Cecil Creek had the most failures with three, followed by Bray-Butte Creek and Cougar-Malone with two. Sixteen other watersheds had one BMP implementation failure. In the future, special

attention should be paid to these watersheds to monitor possible effects of BMP implementation or effectiveness failures to in-stream water quality indicators.

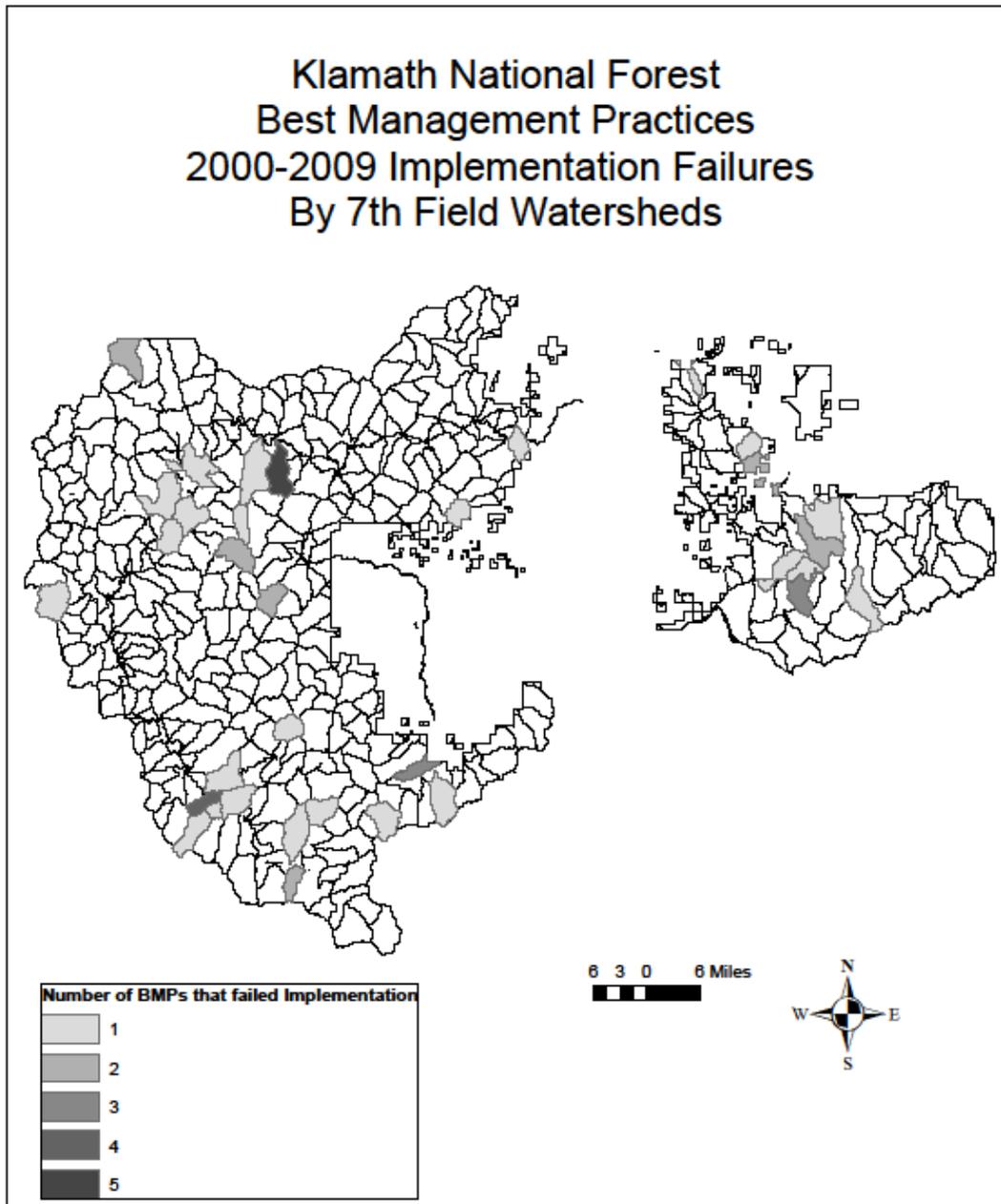


Figure 1. Impementation failures of all evaluations by 7th field watersheds

Klamath National Forest
Best Management Practices
2000-2009 Effectiveness Failures
By 7th Field Watersheds

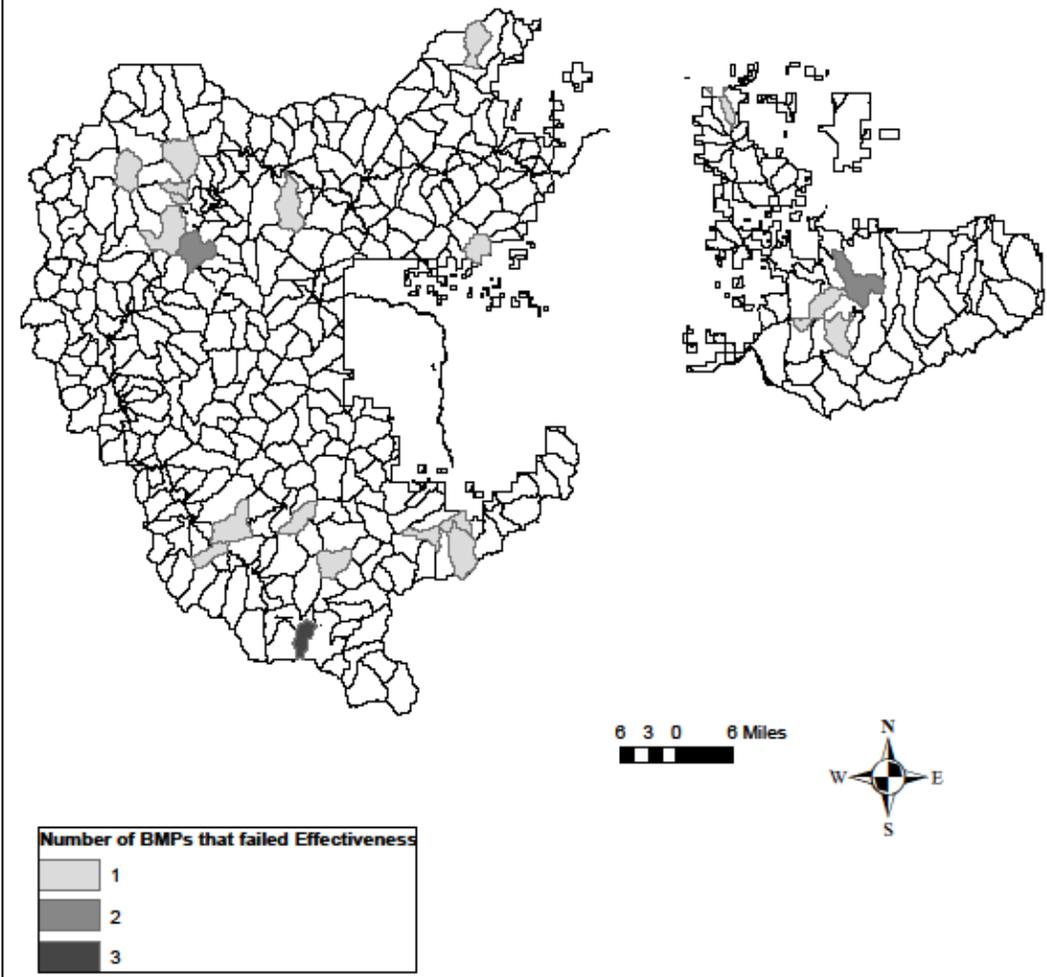


Figure 2. Effectiveness failures of all evaluations by 7th field watersheds

2009 BMP MONITORING REPORT

INTRODUCTION

On-site evaluations are the core of the BMP Evaluation Program. Such evaluations are necessary to meet the requirements of a Management Agency Agreement between the Region and the State of California. There are 29 different evaluation procedures designed to assess a specific practice or set of closely related practices. Though the evaluation criteria vary based on the management activity, the evaluation process is similar amongst activities. The Regional Office annually assigns the type and number of management activities to be evaluated on each Forest. The specific sites for each evaluated management activity are randomly selected from Forest project pools. Statistical analyses are periodically performed from the collective Regional data, and annual reports of Region wide BMP implementation and effectiveness are presented to the State and Regional water boards.

The criteria for sample pool development are Regionally standardized by activity type and described in the BMPEP User's Guide (2002). Some minor changes in the forms for E10 (road decommissioning) and G24 (grazing) forms resulted from field protocol testing on the Forest in 2005.

In addition to the random sample sites, projects are selected that are of management interest with regard to timely water quality protection implementation. Evaluation of these non-randomly selected sites is often called "concurrent" BMP monitoring because it is accomplished while the project is actively operating. Feedback is immediate and remedial action can be taken. However, comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter season to test the protection measures. In addition to the BMPEP, contract compliance monitoring is done concurrently, and assesses BMP implementation along with other project resource protection measures.

BMP monitoring strives for an interdisciplinary evaluation of projects and actively involves project proponents and watershed personnel. This interdisciplinary effort provides direct feedback to the project proponent on how well the BMP was implemented and allows for adaptive management on future project designs.

Earth scientists Juan de la Fuente, Joe Blanchard, Tom Laurent, Gregg Boosfield, Angie Bell, Jules Riley and William Snavely, along with District project leaders conducted the 2009 BMP evaluations.

2009 PROGRAM OVERVIEW AND METHODS

Randomly Sampled Site Monitoring

Sixty-five sites were sampled from within 48 7th field watersheds on the Forest (Table 5). The following is a breakdown of the type of activities sampled on timber, engineering, range, recreation, minerals, grazing, and restoration projects:

Timber

Timber Activities that were sampled that fell into the following activity groups: Streamside Management Zones (T01), Skid Trails (T02), Suspended Yarding (T03), and Landings

(T04), Timber Administration (T05), and Special Erosion Control and Revegetation (T06). Twenty-four sites were sampled on three Districts. Timber monitoring results showed 96% implementation and 100% effectiveness.

Engineering

The following activity groups were sampled: Road surfacing, drainage and protection (E08), Stream Crossings (E09), Road Decommissioning (E10), Control of Sidecast Materials (E11), In-channel Construction Practices (E13), Water Source Development (E16), Restoration of Borrow Pits and Quarries (E19), and Protection of Roads (E20). A total of 28 sites (26 sites evaluated for implementation and effectiveness) distributed across 4 Districts were sampled. Engineering sites were evaluated as 100% implemented and 96% effective.

Fire

One activity Group, Prescribed Fire (F25) was evaluated at four separate sites across two Districts. All prescribed fire sites were evaluated as 100% implemented and 100% effective.

Range

One Activity Group, Range Management (G24) was evaluated at four separate range allotments on three Districts. All prescribed key areas were evaluated as 100% implemented and 100% effective.

Recreation

These two activity groups were evaluated: Developed Recreation (R22) and Dispersed Recreation (R30). A total of 3 sites were sampled on three Districts. All recreation sites were evaluated as 100% implemented and 100% effective.

Minerals

Two activity groups, Mining Operations (M26) and Common Variety Minerals (M27), were evaluated at two sample sites. Fifty percent of the minerals sites were evaluated as implemented and 100% effective.

Sample Pool

Data collection methods are specific for each BMP activity group and are described in the BMPEP User's Guide (USDA, Forest Service, 2002). One Forest modification is that BMP evaluations which require soil cover monitoring use the Forest's soil cover monitoring procedures developed in 1998.

Data gathered for each BMP are used to answer specific questions on BMP evaluation forms. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) to be evaluated must: 1) be implemented under a NEPA decision; 2) adhere to contract requirements; and 3) have been completed at least one but not more than 3 winters prior to evaluation. In-channel construction BMP evaluations (E-13) are conducted during the activity and immediately after completion.

The timber, silvicultural and engineering project sample pools were developed from a list of timber sales logged the previous year. Decommissioned road samples were taken from the Forest-wide Decommissioned Roads Database. The prescribed fire sample pool was developed from a list of completed prescribed fire projects. The recreation sample pool included all known developed and

dispersed recreation sites on the Forest. The grazing sample pool was a list of active grazing allotments on the Forest.

Non-Randomly Sampled Site (“Concurrent”) Monitoring

Data collection was similar to that used for randomly sampled sites; however, some data may be more qualitative than those collected using the strict Regional protocol. Often the same forms are used. Data are stored in a Forest database but are not entered into the regional database or numerically scored. Narrative reports often present or supplement the evaluation. Non-random site evaluations in 2009 were completed because the reviewer was on-site to evaluate other random BMP.

SUMMARY OF RANDOM SAMPLING RESULTS BY ACTIVITY GROUP

Timber Activities

T01 Streamside Management Zones (4 sites)

Four harvest units, on the Switchback, Loop Hazard, Colestine Stewardship, and Tennis Thin projects were reviewed. These projects were on the Scott River, Salmon River, and Happy Camp (2 evaluations) Ranger Districts. All streams monitored for protection zones were well-buffered by layout of the units. **The sampled SMZ met BMP implementation and effectiveness evaluation requirements.**

T02 Skid Trails (6 sites)

A total of six evaluations were conducted on skid trails for the HCFP Project, Phase 2 on the Happy Camp Ranger District. One of the six sites (17%) was rated as not implemented. Five of the six skid trails had minor or major departure from project requirements. All issues identified were related to drainage and erosion control. Nearly all documented concerns were the poor design of waterbars or failure of waterbars from ATV use. Design issues were noted as related to poor location, no drainage outlets, and low-angled waterbars. In one location slash had been deposited in the middle of a waterbar. Corrective action to repair waterbars was taken after issues were discovered during monitoring.

T03 Suspended Yarding (2 sites)

Two units were reviewed in the Tennis Thin Timber Sale (Units 1 and 6) on Happy Camp Ranger District. **Each unit met project BMP and contract requirements and BMP effectiveness criteria.** None of the corridors had rills present and “very little ground disturbance from logs” was noted. Whole tree yarding was used to create slash to provide adequate cover on granitic soils.

T04 Landings (7 sites)

Log landings were reviewed in the HCFP Phase II Project (Units 3, 10, 26, 27, 30, 31, 32) on the Happy Camp Ranger District. **All evaluations met project BMP and contract requirements.**

Unit 26

Minor rilling of fillslopes was noted on unit 26.

Unit 31

Unit 31 had two failed waterbars from vehicular traffic. The temporary road which accessed the landing crosses the inside ditch of the main road. Sediment from the temporary road was deposited approximately 35 feet down the road ditch.

T05 Timber Administration (2 sites)

Erosion control was reviewed on the Elk Hazard sale within the Happy Camp Ranger District and the Caribou BAER within the Salmon River Ranger District. Both evaluations met project BMP and contract requirements.

Caribou BAER

Operations were completed in late November as snow started. Extra protection measures were taken to protect resources during wet weather operations. Runoff from the Caribou was higher than anticipated and dips were installed to protect the road surface.

Elk Hazard

Extra protection measures were taken during wet weather. Extra measures included having a hydrologist on site at all times of operation and limiting hauling and loading operations. Wet weather operations were necessary because of public safety.

T06 Special Erosion Control (3 sites)

Special erosion control measures implemented on the HCFP Phase II Project on the Happy Camp Ranger District were evaluated. All objectives were met or exceeded.

Road Engineering Activities

E08 Road Surface, Drainage and Slope Protection (6 sites)

Road reconstruction and/or maintenance were randomly selected and evaluated on four system roads (40N51, 1517Y, 17N32 and 18N30) on three different projects. **All sites fully met BMP implementation and effectiveness requirements.** Project-specific details follow.

A fourth, non-system road was evaluated as a requirement for a randomly selected Mining Operations (M26) evaluation performed on Salmon River Ranger District.

Road 40N51 (2 sites) on Salmon River District was reconstructed in 2008 for the Little North Fork ERFO Project. **All implementation and effectiveness criteria were met.**

Road 15N17Y on Happy Camp District was reconstructed in 2008 for the Panther BAER. **All implementation and effectiveness criteria were met.**

Road 17N32 on Happy Camp District was reconstructed for the Happy Camp ERFO Project. **All implementation and effectiveness criteria were met.**

Road 18N30 on Happy Camp District underwent **reconstruction for the Happy Camp ERFO Project**. Minor rilling on fillslopes was noted. **All implementation and effectiveness criteria were met.**

Discovery Day Mine Access Road

The Discovery Day access mine was selected randomly. An evaluation for the road surface was completed in tandem. Road is well designed and maintained by the mine operators. Special drainage features implemented to protect the road surface and sideslopes below the road. **All implementation and effectiveness criteria were met.**

E09 Stream Crossing (5 sites)

The road-stream crossing sites were on the three projects in tandem with the E08 sites of Little NorthFork ERFO, Panther BAER, and Happy Camp ERFO. The crossings occur on roads 40N51, 15N17 and 17N32 on Salmon River and Happy Camp Ranger Districts, respectively. **All five sites passed the evaluation criteria for Stream Crossing Protocol implementation and effectiveness.** No evidence of erosion or sedimentation due to construction or maintenance was observed on 4 of the five sites. Minor rilling was noted on fillslopes and both scour and debris were found at the culvert.

E10 Road Decommissioning (6 sites)

All six sites passed evaluation criteria for implementation and effectiveness. For each case, project-specific notes follow.

Road 35N05 – Decommissioning involved moderate to major earthwork. Rilling was noted on the road surface, fillslope, and the sideslope at a stream crossing. Most of the rilling did not reach channel. Project is located on Ukonom Ranger District.

Road 46N64 – Decommissioning involved moderate to major earthwork and was completed in 2000. Two segments of the decommissioning were evaluated. Sites were found to be stable with minimal erosion. Project is located on the Oak Knoll Ranger District.

Road 46N63 – Decommissioning involved moderate to major earthwork and was completed in 2000. ATV use was documented on the decommissioned road. Project is located on the Oak Knoll Ranger District.

Road 46N70Y – This road was decommissioned in 2000. The project involved moderate to major earthwork. Minor slope failure was noted, but sediment had not reached the channel. The project is located on the Oak Knoll Ranger District.

Road 46N71Y- This road was decommissioned in 2000. The project involved little or no earthwork. The project involved moderate to major earthwork. Minor slope failure was noted, but sediment had not reached the channel. The project is located on the Oak Knoll Ranger District.

E11 Control of Sidecast Material (5 sites)

Three of the roads evaluated for E08 and E09 were also evaluated for E11 (46N92, 46N92.2 and 41S03). All maintenance projects fully met BMP Implementation and Effectiveness requirements to control sidecast.

E13 In-Channel Construction Practices (2 sites)

Individual sites, rather than entire road segments, comprise the sample pool. In 2009 two sites were sampled. The protocol requires pre-, active-, and post-project observations. For the 2009 sites, both sites were sampled pre-project. BMP were not evaluated for the pre-project stage.

E16 Water Source Development (2 sites)

Two water sites were monitored. Both of the water sources evaluated met BMP implementation criteria. One site was evaluated as not effective. The sites were located on the Happy Camp District. Improvements to the water sources could be implemented to meet BMPs with minimal resource investments.

17N32 – This site is located on the Happy Camp Ranger District. The water source was recently maintained and is for the most part well designed. The streambank at the end of the access road where hoses are placed to obtain water is made from small, unconsolidated material. This bank is rilled and the material is entering the stream.

16N10 – This site is located on the Happy Camp Ranger District. The water source is located in the channel. The channel and access are stable.

E19 Restoration of Borrow Pits and Quarries (1 site)

The site is the Caribou Pit Quarry on the Salmon River Ranger District, restored in 2008 and is complete. A minor amount of erosion was noted, but does not reach the channel. **All requirements for BMP Implementation and Effectiveness were fully met for this quarry.**

E20 Protection of Roads (1 site)

Road 16N05. All requirements for BMP Implementation and Effectiveness were fully met for wet weather operations on this road.

Recreation Activities

R22 Developed Recreation Sites (1 sites)

One site was randomly selected for evaluation. Two different areas are located at the Mule Bridge Access. The public area was randomly selected. The site fully met BMP implementation and effectiveness criteria.

R30 Dispersed Recreation Sites (2 sites)

Two dispersed recreation sites were visited, Antelope Dispersed Recreation Area on the Goosenest Ranger District and China Point River Access on the Happy Camp Ranger District. Both sites met all BMPEP evaluation criteria.

China Point River Access

Streamside Management Zone (SMZ) protection could be improved at the China Point River Access. Most vehicular use within the SMZ is occurring on the designated access route, however, user defined roads exist on the floodplain. The use is not excessive, but potential exists for a large area to be denuded and compacted.

Antelope Dispersed recreation Area

The Antelope Dispersed Recreation Area is a forest designated dispersed streamside recreation and camping area. Impacts to the stream and riparian area have occurred in the past, however, protective measures were implemented and the area is recovering. Minimal trash was found in a couple of the dispersed camping sites. Another site being used as a dispersed area is located directly across the stream from the designated Antelope site. Within this location, drainage issues on access roads were noted. The density of access roads was also high. Camping and driving adjacent to the stream was observed for several hundred feet. Riparian vegetation was impacted.

Range Management Activities

G24 Range Management (4 sites)

Allotments on the Scott River, Salmon River, and Happy Camp Ranger Districts were sampled. Samples were taken at long term condition and trend reference sites. Range herbaceous and woody utilization standards were met at four of the four sites. The G24 streambank alteration measurement protocol was followed for each effectiveness evaluation; however, the Forest Plan contains no streambank alteration standard and guideline against which to accurately gauge implementation. Table 1 gives the effectiveness rating for each sample site for this criterion, according to the BMPEP form. Recommendations were made for the two allotments where samples indicated less than 80% stable streambank observed (see Table 4 and adaptive management discussion). Shade measurements for the streams were also conducted using a solar pathfinder. Shade was measured at 50 transects unless otherwise noted. Percent shade for August was calculated for each of the transects.

Dry Lake Allotment, Dead Cow –Streambank alteration standards and guidelines were not met. Streambank stability was measured at 57%. The stability component came from primarily from intermittent alders and sedges. A few trampled areas in wet areas causing pooling and channeling of water were noted. Cattle trailing within the unit was observed. Dead Cow Meadow is a small benched meadow high in the watershed. The stream is intermittent, but flows most of the year. The percent shade was measured at 57%. The shade component came from alders along the stream channel. There was no observed browse on the alders.

Big Meadow Allotment, The evaluation was conducted in Big Meadow within the Marble Mountain Wilderness. Herbaceous and woody utilization and streambank alteration guidelines were met. The stream was well armored by rock and mature alder. Streambank stability was measured at 100% Stream shade was measured as 100% except at the trail crossing.

Marble Valley Allotment, South Fork Kelsey – Herbaceous and woody utilization and streambank alteration guidelines were met. The stream was a steep, incised, boulder channel that was well armored

and supported diverse riparian vegetation. Four shade measurements were taken ranging from 65-80%. Cattle access the stream for water, but do not linger to graze in the riparian area.

Little North Fork Allotment, Hamilton Camp – Herbaceous and woody utilization standards and guidelines were met. Streambank alteration standards and guidelines were not met. Streambank stability was measured at 69%. The stream has a good width-depth ratio with frequent undercut banks. There are a number of active headcuts in the channels. Trampling and headcuts have both resulted in the loss of bank stability and undercut banks.

Table 4. Summary of Bank Stability ratings for range management samples.

Allotment and District	Pasture Unit	Bank stability rating per G24 form		
		>80 % stable	70-80 % stable	<=70 % stable
Dry Lake, Happy Camp	Dead Cow			x
Big Meadow, Scott River	Big Meadow	x		
Marble Valley, Scott River	South Fork Kelsey	x		
Little North Fork, Salmon River	Hamilton Camp			x

Fire and Fuels Management Activities

F25 Prescribed Fire (4 sites)

Four sites were evaluated; Scott Mountain Underburn (Scott River Ranger District), Glassups Timber Sale (2 sites), and Long/Gibson Underburn on the Salmon River ranger District. All sites met implementation and effectiveness criteria. No unusual circumstances or concerns were noted.

Minerals Management Activities

M26 Mining Operations (1 site)

The Discovery Day mine on the Salmon River District was evaluated. The mine has been in operation for several years and includes a mill site, hazmat storage, and settling ponds. All relevant BMP criteria on the evaluation were documented as being implemented, however, the evaluation was rated as not implemented in the regional database. This is likely an error in the scoring criteria values in the database application. Application of the new rating system which will be formally adopted next year rated the site as Implemented. The site was also rated as effective.

M27 Common Variety Minerals (1 site)

Some rilling on site occurred, however, all rills contained within the catchment area and did not reach Methodist Creek. Currently, the site is in “restored” status. The evaluation indicated that the operation had fully met all BMP Implementation and Effectiveness requirements.

Table 5. Summary of 2009 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 7th Field Watershed Location. (Randomly sampled sites only)

BMP	#of BMP Sites	7th Field Watershed Name	Implementation		Effectiveness	
			# of Sites Meeting BMP Criteria	% of Total	# of Sites Meeting BMP Criteria	% of Total
T01	1	Buckhorn Creek	1	100	1	100
T01	1	Cottonwood/Mill Creek	1	100	1	100
T01	1	Deadwood Creek	1	100	1	100
T01	1	Headwaters Cottonwood Creek	1	100	1	100
T02	4	Cade Creek	4	100	4	100
T02	2	Frying Pan-Klamath River	1	50	2	100
T03	1	Middle Cottonwood Creek	1	100	1	100
T03	1	Spaulding Creek	1	100	1	100
T04	3	Cade Creek	3	100	3	100
T04	4	Frying Pan-Klamath River	4	100	4	100
T05	1	Elk/Bear Creek	1	100	1	100
T05	1	Rays-Gibson	1	100	1	100
T06	3	Cade Creek	3	100	3	100
E08	1	East Fork Indian Creek	1	100	1	100
E08	1	King Creek	1	100	1	100
E08	1	Little SF Indian Creek	1	100	1	100
E08	2	Sur Cree-Garden	2	100	2	100
E08	1	West Fork Knownothing Creek	1	100	1	100
E09	1	King Creek	1	100	1	100
E09	1	Little SF Indian Creek	1	100	1	100
E09	2	Sur Cree-Garden	2	100	2	100
E09	1	West Branch Indian Creek	1	100	1	100
E10	1	Lower Grider Creek	1	100	1	100
E10	1	Lower Grider Creek	1	100	1	100
E10	1	McCash Creek	1	100	1	100
E10	2	Walker Creek	2	100	2	100
E10	1	West Grider-Bittenbender	1	100	1	100
E11	1	King Creek	1	100	1	100
E11	1	Little SF Indian Creek	1	100	1	100
E11	2	Sur Cree-Garden	2	100	2	100
E11	1	West Branch Indian Creek	1	100	1	100
E13	1	Klamath-China Creek	1	100	1	100
E13	1	Lower Horse Creek	1	100	1	100
E16	1	Benjamin-Wingate	1	100	1	100
E16	1	Little SF Indian Creek	1	100	0	0
E19	1	Rays-Gibson	1	100	1	100
E20	1	Stanza-Bishop	1	100	1	100
F25	1	Eddy Gulch	1	100	1	100
F25	1	Indian Scotty-Scott River	1	100	1	100
F25	1	Rays-Gibson	1	100	1	100
F25	1	Tanner-Jessups	1	100	1	100
R22	1	Yellow Dog-Sawmill	1	100	1	100
R30	1	Lower Humbug Creek	1	100	1	100
R30	1	Tennant-Antelope Creek	1	100	1	100
G24	1	Big-Pollocks	1	100	1	100
G24	1	Jaynes Canyon	1	100	1	100
G24	1	Lower Shackelford Creek	1	100	1	100
G24	1	South Fork Kelsey Creek	1	100	1	100
M26	1	West Fork Knownothing Creek	0	0	1	100
M27	1	Methodist Creek	1	100	1	100
Totals	65	48	63	97%	64	98%

SUMMARY OF NON-RANDOM SITE EVALUATIONS

1. High Bar Mine.

The High Bar Mine #1 & #2 on the Salmon River Ranger District was randomly selected for evaluation in 2008 and revisited in 2009. At the time of evaluation, the mine was in exploratory status and the operators were to apply for permit to begin mining operations. Most Implementation criteria were adequately addressed, however, at the time of evaluation erosion control measures were not implemented. The access road was constructed at least partially on an existing skid trail. **The road is steep for much of the grade, and at the time of evaluation, erosion control measures had not been implemented, and removed vegetation had not been properly treated. Effectiveness could not be adequately evaluated because no precipitation events had occurred since the road construction.** Requirements for erosion control measures were clearly identified during the permit process for the mine. The recommendation to revisit the site was made in last year's report. There are still concerns with the site, primarily the access road. Straw was spread on some denuded areas, but had limited success with erosion control. Multiple invasive plants have colonized on disturbed areas.

2. High Bar Mine Access Road.

The access road was constructed at least partially on an existing skid trail. **The road is steep for much of the grade, and at the time of evaluation, erosion control measures had not been implemented, and removed vegetation had not been properly treated. Effectiveness could not be adequately evaluated because no precipitation events had occurred since the road construction.** Requirements for erosion control measures were clearly identified during the permit process for the mine. Responsibility for implemented of these erosion controls measures was delegated to the mine operators as part of the permit approval. At the time of evaluation in 2009, erosion control measures had not been implemented on the road.

ADAPTIVE MANAGEMENT DISCUSSION AND CONSIDERATIONS

The following discussion is divided into 1) practices that are working well, 2) practice applications that can be improved, 3) practices to consider for possible modification at the Forest level, and 4) Oracle database problems that need solving at the Regional level.

1. Practices that are working well

Most of the 19 activities evaluated in 2009 met BMP compliance and were effective at controlling nonpoint pollution. These included all timber sale activities except skid trails; minerals management activities, fire and fuels activities, and recreation sites; and most road engineering activities. Management should continue to use these practices on all future projects.

The KNF has successfully applied adaptive management to eliminate grazing impacts that prevent attainment of the Aquatic Conservation Strategy Objectives. Where monitoring shows that standards are not attained, adaptive management actions such as fencing, herding, and slating are used to improve water quality. Where long-term monitoring shows that conditions are declining, cattle numbers have been reduced (Shackleford Creek) or the allotment has been cancelled (Kidder Creek).

2. Practice applications that can be improved

The 2009 project BMPs were largely implemented as planned and effective. For a few practices, effectiveness could be improved even further.

E16 Water Sources

One of two water sources evaluated showed effectiveness issues. In the last eight years, only 50% of the evaluations fully met implementation and effectiveness. Maintenance and management practices could be implemented at these sites to meet guidelines for water sources. Capital and labor investments to implement improvements would be minor.

T02 Skid Trails

One of six skid trail evaluations had effectiveness issues in 2009, however, most of the evaluations noted some percentage of failed waterbars. All of these evaluations were performed on the same timber sale and more likely reflect isolated problems with the operator and/or administration. In the last eight years, 2009 is the only year for the Klamath to have BMP failures on skid trails. Design specifications are well developed for skid trails and waterbars. The Klamath will continue to monitor timber sale activities and take necessary corrective actions.

G24 Grazing

Although four of the four grazing allotments evaluated were found to protect water quality, two of the four sites visited demonstrated bank instability. The streambank instability at two sites is likely due to past and or present grazing activity. Both of the sites still possess components that provide stability, however the instability is persistent and the systems remain at greater risk than a site meeting forest standards and guidelines. In the last eight years, Best Management Practices were rated as Not Effective on one grazing allotment, however, effects from grazing have been documented. Consequently, the Klamath is undergoing multiple efforts to improve grazing management on the forest.

3. Practices to consider for possible modification at the Forest level

E16 Water Sources

Many of the water sources on the Klamath were constructed before more stringent water source design specifications were established. Other sites need only minor design changes to better protect water quality. The forest has an opportunity to target water source improvements in conjunction with other forest projects.

E10 Road Decommissioning

Limiting rock armoring to only culvert outlets may be less effective than armoring all channels on a road restoration project. An interdisciplinary team of an earth scientist, a fish biologist and an engineer should develop Forest wide criteria for use of riprap which would lead to better project consistency. A review of the “design test” by the 2006 flood flows is recommended on decommissioned crossings may provide a learning opportunity that can result in better decommissioning designs. Similar evaluations of storm proofing projects post 1997 was done by Elder in 2003.

G24 Grazing

The Klamath National Forest Plan lacks specific standards for stream bank alteration or stream shade. The G24 evaluation protocol is structured as if such a standard is already in place on each Forest. This makes the implementation rating “not applicable” by default. The Forest Range, Watershed and Fisheries staff need to develop new standards for streambank disturbance and shade for inclusion in the next Forest Plan revision.

CONCLUSIONS AND CONSIDERATIONS

In 2009, implementation standards for BMPs were 97% compliant on all evaluated sites. BMP effectiveness requirements were met on 98% of the sites evaluated. This represents an increase in comparison to 2007 and 2008, and the trend since monitoring began in 1992 is favorable. Further improvement in BMP implementation is needed for water sources (E16), grazing practices (G24) and mining operations (M26). Activities that occur in proximity to streams and those which create relatively large amounts of disturbance have the greatest potential to impact water quality.

The majority of practices evaluated in 2009 were highly successful, owing to management’s commitment and the training and experience of project planners and implementers. This needs to be encouraged in order to continue the Forest’s BMP successes. Suggestions made in the Adaptive Management discussion can improve BMP performance even further.

REFERENCES

USDA, Forest Service, 2002, Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User’s Guide, USDA, Forest Service, Pacific Southwest Region.

Appendix A. BMP Evaluation Procedure Names and Descriptions.

<i>Procedure #</i>	<i>Procedure Name (BMPs Monitored)</i>
T01	Streamside Management Zones* (BMP 1.8, 1.19, 1.22)
T02	Skid trails (BMP 1.10, 1.17)
T03	Suspended yarding (BMP 1.11)
T04	Landings (BMP 1.12, 1.16)
T05	Timber sale administration (BMP 1.13, 1.20, 1.25)
T06	Special erosion control and revegetation (BMP 1.14, 1.15)
T07	Meadow protection (BMP 1.18, 1.22, 5.3)
E08	Road surface, drainage and slope protection (BMP 2.2, 4, 5, 10, 23)
E09	Stream crossings (BMP 2.1)
E10	Road Decommissioning (BMP 2.26)
E11	Control of side cast material (BMP 2.11)
E12	Servicing and refueling (BMP 2.12)
E13	In-channel construction practices (BMP 2.14, 2.15, 2.17)
E14	Temporary roads (BMP 2.16, 2.26)
E15	Rip rap composition (BMP 2.20)
E16	Water source development (BMP 2.21)
E17	Snow removal (BMP 2.25)
E18	Pioneer road construction (BMP 2.3, 2.8, 2.9, 2.19)
E19	Restoration of borrow pits and quarries (BMP 2.27, 2.18)
E20	Management of roads during wet periods (BMP 2.24, 7.7)
R22	Developed recreation sites (BMP 4.3, 4, 5, 6, 9, 10)
R23	Location of stock facilities in wilderness (BMP 4.11)
G24	Range management (BMP 8.1, 8.2, 8.3)
F25	Prescribed fire (BMP 6.3)
M26	Mining operations (Locatable minerals) (BMP 3.1, 3.2)
M27	Common variety minerals (BMP 3.3)
V28	Vegetation manipulation (BMP 5.1, 5.2, 5.5, 5.7)
V29	Revegetation of surface disturbed areas (BMP 5.4)
R30	Dispersed Recreation Sites (BMP 4.5, 4.6, 4.10)

(page 1 of 1)

Appendix B Non-Random BMP Monitoring

FY 08 Season Notes

Wet Weather Operations BMP Monitoring

T05 Timber Operations and E20 Management of Roads during Wet Periods

Documentation of monitoring is found in timber sale contract folders in *BMP – WWO Seasonal Report Tables* and *SF 181 (Contract Daily Diary)* referenced by its file number in the table.

Monitoring of wet weather operations was favorable. Monitoring documented that when timber activities would result in potential impacts to water quality, corrective actions were taken before resource damage could occur.

Table summarizing Wet Weather Operations and related BMP monitoring

Project	BMPEP Status	Location	Date	WWO comments/Corrective action	Reference source (year and number-for-year of SF 181)*
Shovel	Meets	Temp Rd 3	10/14	100' minor ruts, water staying on road	BMP-WWO Seasonal Report
	Meets	Road 46N05	10/14	Looks good	BMP-WWO Seasonal Report
	Meets	Road 46N06	10/14	Looks good	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1F	10/14	Looks good	BMP-WWO Seasonal Report
	Meets	Temp Rd 3	10/19	Light showers, no rutting	BMP-WWO Seasonal Report
	Meets	Road 46N05	10/19	Looks good	BMP-WWO Seasonal Report
	Meets	Road 46N06	10/19	Looks good	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1F	10/19	No Puddles	BMP-WWO Seasonal Report
	Meets	Temp Rd 3	10/26	Heavy showers	BMP-WWO Seasonal Report
	Meets	Road 46N05	10/26	Starting to puddle	BMP-WWO Seasonal Report
	Meets	Road 46N06	10/26	Starting to puddle	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1F	10/26	No Puddles	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1E	11/17	A couple 2'-5' soft spots	BMP-WWO Seasonal Report

	Meets	Road 46N05	11/17	90% staying frozen	BMP-WWO Seasonal Report
	Meets	Road 46N06	11/17	90% staying frozen	BMP-WWO Seasonal Report
	Meets	Temp Rd 3	11/17	85% Staying frozen, packed snow, landings only spots not staying frozen solid	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1F	11/17	Operations complete, skid trails stayed solid or dry	BMP-WWO Seasonal Report
	Meets	Road 46N05	11/23	6"-8" new snow	BMP-WWO Seasonal Report
	Meets	Road 46N06	11/23	Packed snow and ice	BMP-WWO Seasonal Report
	Meets	Temp Rd 3	11/23	Frozen	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1E	11/23	Solid, no rutting	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1E	12/4	98% of skid trails staying solid. Operator to hold when trails thaw in the afternoon	BMP-WWO Seasonal Report
	Meets	Temp Rd 3	12/14	Snow over the weekend, roads and skid trails packed snow	BMP-WWO Seasonal Report
	Meets	Road 46N05	12/14	Snow over the weekend, roads and skid trails packed snow	BMP-WWO Seasonal Report
	Meets	Road 46N06	12/14	Snow over the weekend, roads and skid trails packed snow	BMP-WWO Seasonal Report
	Meets	Skid trails, Landing 1D	12/14	Snow over the weekend, roads and skid trails packed snow	BMP-WWO Seasonal Report
	Meets	Temp Rd 3	12/16	Packed snow and frozen ground	BMP-WWO Seasonal Report
	Meets	Road 46N05	12/16	Packed snow and frozen ground	BMP-WWO Seasonal Report
	Meets	Road 46N06	12/16	Packed snow and frozen ground	BMP-WWO Seasonal Report
	Meets	Landing	12/16	Packed snow and frozen ground	BMP-WWO Seasonal Report
Leasee	Meets	Road 77	11/17	Snow flurries and showers, have not received enough moisture. Graded 11/11 and 11/17, moisture was perfect	BMP-WWO Seasonal Report
	Meets	Road 77	11/17	Snow flurries and showers, have not received enough moisture. Graded 11/11 and 11/17, moisture was perfect	BMP-WWO Seasonal Report

	Meets	Road 43N46	11/17	Snow flurries and showers, have not received enough moisture. Graded 11/11, moisture was perfect	BMP-WWO Seasonal Report
	Meets	Road 43N43	11/17	Snow flurries and showers, have not received enough moisture. Looks good	BMP-WWO Seasonal Report
	Meets	Road 43N43A	11/17	Snow flurries and showers, have not received enough moisture. Looks good	BMP-WWO Seasonal Report
	Meets	Road 43N43B	11/17	Snow flurries and showers, have not received enough moisture. Looks good	BMP-WWO Seasonal Report
	Meets	Road 43N50	11/17	Snow flurries and showers, have not received enough moisture. Looks good	BMP-WWO Seasonal Report
	Meets	Road 43N03	11/17	Snow flurries and showers, have not received enough moisture. Looks good	BMP-WWO Seasonal Report
Westside	Meets	Road 17N32	10/15	Rain, can't blade road	BMP-WWO Seasonal Report
	Meets	Road 17N11	10/15	Rain, can't blade road	BMP-WWO Seasonal Report
	Meets	Road 17N11, 17N32	10/27	Rain, can't blade road	BMP-WWO Seasonal Report
Bogus Piles	Meets	Road 47N12, 47N06Y	11/17	Roads good, packed snow-frozen	BMP-WWO Seasonal Report
	Meets	Road 47N12, 47N06Y	11/23	Roads graded, 2" packed snow, frozen	BMP-WWO Seasonal Report
Larch	Meets	Landing unit 50, 28	5/4	Ruts and mud, landings too wet to operate	BMP-WWO Seasonal Report
	Meets	Landing unit 20	5/14	Looks good	BMP-WWO Seasonal Report
Round Sink	Meets	Timber units 23, 26, 27, 33	11/9	No Hauling, only cutting biomass with 3 wheeler. Ground still dry. No effect to soil from felling operations	BMP-WWO Seasonal Report
	Meets	Timber units 25, 28	11/24	Received 3"-4" of new snow. Ground still very dry under snow. No effects to soil from felling operation	BMP-WWO Seasonal Report
	Meets	Timber units 56, 68	12/15	Light showers over the weekend. Patchy snow still on ground. 3 wheelers very little disturbance if any to soil	BMP-WWO Seasonal Report

	Meets	Timber unit 68	12/29	Temperatures have remained very cold, teens and single digits. Ground frozen	BMP-WWO Seasonal Report
Lookout Butte	Meets	Roads 44N01, 44N64, 44N64C, 44N65	6/30	Hot and dry. Roads being watered. Water hole at bridge before Tennent improved so no water would flow back into Antelope Creek	BMP-WWO Seasonal Report
	Meets	Landings, Skid trails units 1-4	6/30		BMP-WWO Seasonal Report
	Meets	Roads 44N01, 44N64, 44N64C, 44N65	8/6	Thunder storms with light showers on sale area. Medium to heavy showers on 44N01. Puddles were filled, no rutting. Rain reduced dust and pack roads, good hauling conditions	BMP-WWO Seasonal Report
	Meets	Landings, Skid trails units 1-4	8/6		BMP-WWO Seasonal Report
Van Horn Fules Reduction	Meets		9/9	Hydrologist worked with TSA to establish SMZ	T01
Van Horn Fules Reduction	Meets		9/9		T05
Greenhorn Fire Protection	Meets		9/4		T01
Greenhorn Fire Protection	Meets		9/4	All waterbars functioning, some rills below outlet	T02
Greenhorn Fire Protection	Meets		9/4	Hydrologist worked with TSA on landings and SMZ. Review of landings, skid trails, and streamcourse protection showed no problems, or mobilization of sediment	T04
Greenhorn Fire Protection	Meets		9/4	Rills present below waterbars, but no sediment reaches any swale	T05

* Except where other source is given

Appendix C – Comparison of Evaluation Accomplishment with Target for KNF

Evaluations were accomplished for a total of 63 sites, using 19 protocols to assess timber, engineering, recreation, grazing, and minerals management. The Klamath had a target of 57 sites using 26 protocols.

Shortfalls occurred in these protocols:

T01 – 4 of 4 were done.

T02 - 6 of 3 were done

T03 – 2 of 2 were done

T04 - 7 of 3 were done

T05 – 2 of 2 were done

T06 -3 of 1 were done.

T07 – 0 of 1 were done.

E08 – 6 of 3 were done.

E09 - 5 of 4 were done.

E10 – 6 of 4 were done.

E11 – 5 of the 3 were done.

E12 – 0 of 1 were done.

E13 – 2 of 2 were done.

E14 – 0 of 1 were done.

E16 – 2 of 2 were done.

E17 – 0 of 3 were done.

E19 – 1 of 1 were done.

E20 - 1 of 1 were done.

R22 – 1 of 1 were done.

R30 – 2 of 2 were done.

Appendix C – continued

G24 – 4 of 4 were done.

F25 – 4 of 5 were done.

M26 – 1 of 1 were done.

M27 – 1 of 1 were done.

V28 – 0 of 1 were done.

V29 – 0 of 1 were done.

The KNF exceeded the target in these protocols:

T02 – 6 sites instead of the assigned 3

T04 – 7 sites instead of the assigned 3

T06 – 3 sites instead of the assigned 1

E08 – 6 sites instead of the assigned 3

E09 - 5 sites instead of the assigned 4

E10 - 6 sites instead of the assigned 4

E11 - 5 sites instead of the assigned 3