

Klamath National Forest

Best Management Practices

**REGION 5
EVALUATION PROGRAM
WATER QUALITY
MONITORING REPORT**

Evaluation of
Forest Service Administered Projects
Including Timber Sales, Roads,
Prescribed Fire, Recreation Sites, and Mining Activities
During 2002
www.r5.fs.fed.us/klamath/mgmt/reports/monitor.html

Natural Resources Staff
1312 Fairlane Road
Yreka, CA 96097

**KLAMATH NATIONAL FOREST
2002
BEST MANAGEMENT PRACTICES (BMP)
EXECUTIVE SUMMARY**

Calendar year 2002 was the eleventh year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest and the Forest Service Pacific Southwest 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 28 evaluation categories that reflect timber, engineering, recreation, grazing, fire, mining, and vegetative activities.

The Klamath 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 concurrent monitoring, in which sites are selected based on management interest in specific ongoing projects. Concurrent evaluations are "real time" and can be qualitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment. The results of these two program parts are summarized here separately.

Randomly sampled sites: In 2002, 53 sites on two dozen projects were randomly drawn from Forest activity pools. Each project or site was reviewed for BMP implementation and effectiveness. Timber (13 sites), road (26 sites), recreation (4 sites), grazing (7 sites), common variety rock pits (5 sites) and fire (5 sites) activities were evaluated. Monitored activities were located on Happy Camp, Salmon River, Scott River, Goosenest and Oak Knoll Ranger Districts.

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 protect water quality. BMP effectiveness determined if water quality protection measures met objectives. Sediment deposition volume, if any, and proximity to the nearest watercourse were used to indicate levels of water quality protection. The following table summarizes the results of the **BMP Random Site Evaluation Program for 1992 through 2002**. Sites that partially meet evaluation criteria are not tallied in the "fully successful" group.

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	61	38	62%	30/35	86%

1999	38	25	66%	34	89%
2000	45	40	89%	43	96%
2001	64	56	88%	61	95%
2002	53	49	92%	47	96%

BMPs were fully implemented at 92% of the sites evaluated and effective at 96% of the sites evaluated (water quality was protected at some sites even if BMPs were not fully implemented). This represents an improvement in BMP implementation and effectiveness compared to 2001. BMP implementation at channel road/bridge construction (evaluation E-13) activity sites needs to be improved.

Concurrent monitoring in 2002 focused on compliance with wet weather operations standards (WWOS) and storm damage repair practices. Four projects ranging from road reconstruction and decommissioning to storm damage repair were visited in November and December. Wet weather protection measures were both fully implemented and effective or not applicable (operations were suspended prior to the onset of wet weather) at these four sites.

Finally, the report recommends how to continue improving monitoring results by further refining the water quality protection effectiveness of BMPs.

BMP MONITORING REPORT

INTRODUCTION

On-site evaluations are the core of the BMP Evaluation Program. There are 30 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. 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. The criteria for sample pool development are Regionally standardized by activity type and described in the BMPEP User's Guide (2000 revision). Some minor changes in the forms for E10 (road decommissioning) and G24 (grazing) resulted from field protocol testing on the Forest in 2002.

Concurrent BMP monitoring is accomplished while the project is actively operating. Projects are selected that are of management interest with regard to timely water quality protection implementation. Feedback is immediate and remedial action can be taken. A comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter to test the protection measures.

BMP monitoring strives for interdisciplinary evaluation of projects, including 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 design. The 2002 field evaluation was used as an informal training opportunity on grazing, timber, engineering and recreation BMPs for employees in those staff areas, fisheries biologists, and earth scientists.

BMP evaluations were conducted by District personnel with coordination help from Tom Laurent, Sharon Koorda, Robbie Van de Water, Polly Haessig, Don Elder, Bill Snively and Juan de la Fuente.

RANDOMLY SAMPLED SITE PROGRAM

Data collection methods are specific for each BMP and are described in the 1999 BMP User's Guide. BMP evaluations that require monitoring soil cover use the Forest's soil cover monitoring procedures developed by the Forest in 1998. The data gathered are identified for each BMP and used to answer specific evaluation questions on each BMP evaluation form. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) require: 1) a prepared EA or EIS; 2) adherence to contract requirements; and 3) the passing of at least one winter (but not more than 3 winters) since contract requirements were met. In-channel construction is an exception because the evaluation (E-13) is done during the activity.

The timber, silviculture and engineering project sample pool was developed from a list of closed timber sales. The prescribed fire sample pool was developed from a list of completed prescribed fire projects.

The recreation sample pools 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 by district.

CONCURRENT MONITORING PROGRAM

Data collection was similar to that used for random sampled sites, however narrative reports may have been used in lieu of evaluation forms. The data may be more qualitative than that collected using the strict Regional protocol, although often the same forms are used. The primary difference from the randomly selected sites is that no significant runoff has occurred since project implementation. However, in 2002, some follow-up field visits were made after one or more winters to assess effectiveness of stream crossing projects (see page 8-9).

SUMMARY BY PROJECT TYPE

Unless otherwise stated, the following results are from random sampled sites,

T01 Streamside Management Zones (SMZ)

Three harvest units were reviewed from the Dogbark Timber Sale on the Oak Knoll District. The SMZ as located on the ground varied from 140 to 150 feet, which exceeded the environmental assessment requirement of 100 feet. All evaluated SMZs were 110' or greater. All of the sampled SMZs met BMP implementation and effectiveness evaluation requirements.

T02 Skid Trails

Randomly selected skid trails at 3 sites in one harvest unit on the Dogbark Sale were evaluated. The skid trails met all evaluation criteria for BMP implementation and effectiveness. The water bar failure rate was 0%. The review team noted that the sample trails were in "very good locations; scarcely visible on the landscape." The one channel crossing encountered, an ephemeral draw, had been mulched. (See T06.)

T04 Landings

Three log landings were reviewed in two units on the Dogbark Sale. Two of the three were deemed "excellent, involving almost no earthwork, nearly invisible" by the reviewers. The third involved minimal earthwork in a gentle area. As with the other landings, it met implementation criteria, but the effectiveness of the practice of locating landings on road switchback was less than optimal. As in the case of this landing, there are commonly road drainage-initiated effects on switchback-located landings.

T06 Special Erosion Control and Revegetation

One timber sale unit that was mulched was evaluated on the Dogbark Sale. The mulched areas included a skid trail, landing and temporary road. The post-treatment soil cover objective of 50% was met. This

site met all evaluation criteria for BMP implementation and effectiveness requirements. The review team observed that post-sale work using a brush masticator disturbed the original mulching somewhat.

E08 Road Surface, Drainage and Slope Protection

A Dogbark timber sale road maintenance project was evaluated. Three sites on 2 roads (Forest Road 12 and 40S01) were sampled and all three sites met BMP implementation and effectiveness requirements. Reconstruction measures to reduce maintenance needs and improve water quality were recommended by the review team. Recommendations included installing a drop inlet near Dogget Creek where the crossdrain has been prone to plugging since the 1997 flood and a 2000 wildfire. Scour at the pipe outlet has been mitigated by placing riprap although a longer term fix would need to address the cause(s) of the problem, e.g. reducing the amount of drainage concentrated at that crossdrain.

E09 Stream Crossing

Three stream crossings were evaluated that were associated with the 3 sites identified under E08. Stream crossings were located on roads 12 (2) and 40S01 (1) within the Dogbark Sale. Crossing type was a culvert on a perennial and 2 intermittent streams. All 3 sites met BMP implementation and effectiveness requirements.

E10 Road Decommissioning

Road decommissioning projects on the Happy Camp (46N62), Salmon River (39N56), and Oak Knoll (46N78) Districts were evaluated. All three projects met implementation and effectiveness criteria. On 46N62, 2 of the 3 channels observed were “stable” regarding adjustment potential. One side of the crossing sideslope was returned to natural ground slope, meeting the contract specification of 1 ½:1 or natural ground. However, the reviewers felt that in this case natural ground was overly steep and suggested an improvement in the accepted standard. See Adaptive Management Discussion.

E11 Control of Sidecast Material

Sidecasting at the 3 road sites identified under E08 was evaluated. All sites met BMP implementation requirements to control sidecast. However, two of the sites evidenced a minor amount of sidecast (material along approximately 10% of the surveyed streamside zone length). One of the two sites had sidecast material deposited within 25 feet of the nearest channel.

E13 In-Channel Construction Practices

Six in-channel construction sites on two road reconstruction projects (one on Salmon River RD and one on Oak Knoll RD) were evaluated. The three sites on Salmon River RD met implementation criteria with one minor and temporary shortcoming during project activities. At an ephemeral draw where the culvert was being replaced, some excavated material was stockpiled within the floodplain, and a small amount was at the culvert outlet. The material was cleared prior to the end of the dry season. The three sites met all effectiveness criteria. At 2 of the 3 Oak Knoll RD sites there were more serious problems resulting from delayed implementation of dewatering plans called for in the contract. This was corrected

when the contractor was required to comply and place straw bale silt traps in crossings below the construction zone. When straw bale silt traps were removed, the contractor was required to hand-remove silt from the channel. At one of the sites, the shoveled material was removed to the floodplain and remained there at the time of the “after project” evaluation. This led to a minor deficiency in the effectiveness rating. Background turbidity, suspended sediment, and bedload levels in Walker Creek are high, so the additional material (less than 1 cubic yard) is not likely to be measurable.

E14 Temporary Roads

Two temporary roads that accessed one unit within the Dogbark Sale were evaluated. One old road was decommissioned as part of the sale by ripping and constructing waterbars. Two crossings were removed per the environmental planning documents. The strict definition of implementation compliance was met (we instituted the design we said we would). However, the evaluation team determined that crossing removal was not consistent with a Forest policy paper on decommissioning practices because there wasn’t full removal of high risk fills. The second road skirts a ridgetop with virtually no earthwork, employing steep grades and adverse haul. The review team observed that the road involved less disturbance than tractor skidding would have required. The road involves little earthwork to build or decommission, and consequently resulted in a low resource risk. Both temporary roads met BMP requirements for implementation and effectiveness.

E16 Water Source Development

One old water drafting site, located below Forest Road 12 on a short spur off Road 47N54, was evaluated. Roughly 210 cubic yards fill in the channel impounds flow. The site includes a small wetland, and the pond receives a small amount of water from the wetland, in addition to stream water. Although the team did report concern for diversion potential and associated risk of road fill failure, the site met BMP implementation and effectiveness criteria.

E17 Snow Removal

Snow removal activities on roads in the Pine Martin #1 (Oak Knoll RD) and Canon (Scott River RD) Timber Sale projects were evaluated. All BMP requirements for implementation and effectiveness were met.

R22 Developed Recreation Sites

Two developed recreation sites, Kelly Lake Trailhead (Happy Camp RD) and Sarah Totten Campground (Oak Knoll RD), were sampled and met implementation and effectiveness requirements. A toilet was recently upgraded at Sarah Totten, improving sanitation water quality protection from the last BMP assessment in 2000. Unfortunately, the site regrading worsened a preexisting sediment risk, where runoff concentrates from compacted areas onto a river access ramp. Minor grading of a small area within the campground, and surface rocking of the access ramp would improve drainage and fix this chronic source of sediment to the Klamath River.

R30 Dispersed Recreation Sites

Gottville River Access (Oak Knoll RD) had recently been upgraded with a new toilet facility and paved walkway/boat put-in. The site met or exceeded all dispersed recreation site criteria. Mulch was placed around the toilet construction site to mitigate the minimal soil disturbance. The Canyon Creek River Access (Scott River RD) had a minor problem with implementation of a maintenance practice, since the toilet was in need of pumping. This was accomplished prior to the winter rainy season.

M27 Common Variety Minerals

Five rock pits associated with road projects on Salmon River RD and Oak Knoll RD were evaluated and all met BMP implementation requirements. The Siskiyou ERFO project had a BMP effectiveness problem, the rock pit was located in a sensitive area and sidecast was evident. A minor quantity of sediment entered Long John Creek. The contractor was instructed to straw mulch the raw fill slope above the channel. A short gully was also observed in the excavation off of the bench at the top of the pit.

G24 Range Management

The 2001 BMPEP Handbook draft procedure was used to evaluate South Russian, Cuddihy, Ball Mountain/Kuck, Dry Lake and Mt. Hebron range allotments on the Scott River RD, Happy Camp RD, and Goosenest RD. All sampled sites met both implementation and effectiveness criteria. Some needs for improved implementation identified were: 1) on Dry Lake Allotment, utilization standards were not met, and trampling of wetland habitat exceeded 10%. This is attributed to the limited amount of pasture in this otherwise large allotment; 2) On Ball Mountain, there was some wetland and streambank trampling, but it was not severe enough to be in non-compliance with either implementation or effectiveness of BMPs; and 3) On Mt. Hebron Allotment, bank stability and wetland habitat was affected. In all these cases, the degree and extent was minor, and of short duration. The new evaluation protocol requires measuring specific stream bank disturbance and woody plant utilization against Forest or Annual Operating Plan (AOP) objectives. The specific objectives do not exist on the Klamath NF AOPs. (See Adaptive Management Discussion, section 3 - Practices for Possible Modification).

F25 Prescribed Fire

Five prescribed burn units were monitored on the Scott River RD Canon TS (# 21, 22, 54, 59 and 89). Measured post-burn soil cover varied from 74 to 86% and averaged 82%, exceeding soil cover objectives on all units. These burn units met all BMP requirements for implementation and effectiveness.

Wet Weather Operations and other concurrent site visits

Crawford Creek Road (39N23) Storm proofing, Walker Road Decommissioning, Mill Creek Road emergency storm damage repair, and the Stanza Fire emergency burn treatment maintenance were concurrently assessed during monitoring in fall and winter of 2002. They were not part of the random sample selection pool. In addition, a post-winter follow-up visit was made to Long John Creek Crossing

restoration site in the spring of 2002, and a recent report more closely analyzed inchannel reconstruction and decommissioning effectiveness Forest-wide over a several year period.

Crawford Creek Road (Salmon River RD): Work ceased in October 2002 after the road was winterized; some deficiencies were noted during a site visit in early November. Several culverts in the process of being decommissioned retained connectivity with their inside ditches. This ditching problem was corrected in November. Disturbed outside road shoulders had not been mulched, per contract, for erosion control. Contract administrators agreed to have the contractor correct these as soon as possible. Follow-up visits in December 2002 and early January 2003 following intense winter storms revealed that rilling of the unrocked road surface had occurred from ruts caused by wet season public use. Project effectiveness may have been compromised temporarily due to the timing of construction relative to wet weather, since rock haul could not be accomplished until spring but rilling did not result in measurable sedimentation to Crawford Ck. The hauling of straw was interrupted by wet weather, but was largely accomplished in November, prior to the heavy rains.

Walker Creek Road Decommissioning (Oak Knoll RD) ceased operations prior to winter rains.

Mill Creek Road storm damage (Scott River RD) was repaired by an AT&T crew on Jan. 2, 2003. The road accesses several residences and contains a buried telephone cable suffered a partial fill failure at a stream crossing and along 30 feet of road adjacent to the creek. The repairs, made during wet weather conditions to enable residential access, included removal of culvert inlet debris, adding riprap, and replacing surface rock. Riprap placement resulted in a temporary turbidity plume.

Stanza Fire Emergency Burned Area Treatment Maintenance (Happy Camp RD) was done in response to intense storms on this 2002 burned area, which partially dislodged erosion control materials and structures placed after the fire. The erosion control materials and mobilized sediment, plugged several culverts, which had to be reopened. Wet weather standards were followed during the backhoe operation to open the plugged culverts.

Long John Creek Crossing Removal (Oak Knoll RD) was accomplished in Sept. 2001 as part of the Hungry ERFO and Decommissioning project. Results of project monitoring were previously reported for practice E13 (2001 BMPEP). Although not required by evaluation protocol, we conducted a site visit after the first winter (Spring 2002) to determine the following: 1) how well the restored channel held up in the storms of '01-'02 following pipe and fill removal and channel bank armoring; and 2) if weatherization methods were adequate. Both BMP implementation and effectiveness were confirmed as adequate. Streamflow at bankfull (2-3 year return interval flow) was contained within the rock area of the channel banks and there was no evidence of bank undercutting. Straw mulch from the previous summer was still in place and grass was sprouting throughout the seeded and mulched area.

Monitoring of inchannel reconstruction and road decommissioning projects on the Forest between 1997 and 2002 was reported in the *Summary of First-Year Erosion Delivered to Streams from Crossing/Near Channel Reconstruction and Road Decommissioning, 1997 through 2002, Klamath N.F.* That report compiled Forest and Pacific Southwest Region BMPEP results for 2000 through 2002 for E09 (stream crossings), E10 (decommissioning), and E13 (in-channel construction), road crossing inventories, and an analysis of 1997 ERFO sites (Emergency Relief- Federally Owned). The report concluded that first year activity generated sediment averaged about 0.34 cubic yards per site. Sixty-seven percent of the sites monitored exhibited no measurable signs of sediment delivery. The 80 sites ranged from 0 – 3 cubic yards sediment generated. (Elder, March 5, 2003.)

RESULTS SUMMARY

Overall, 92% of the evaluated sites met all BMP implementation requirements and 96% of the sites met all BMP effectiveness requirements. This is an increase in BMP implementation and effectiveness compared to the 2001. The few problem areas were associated with in channel construction activities, a rock pit site near a stream, and application of the Forest road decommissioning policy on a closed road. There was no evidence of water quality impairment from noncompliant sites.

Summary of 2002 BMP Implementation and Effectiveness Success Rate by Individual BMPs. (Randomly sampled sites)

BMP	Total # of Sites	IMPLEMENTATION		EFFECTIVENESS	
		# of Sites Meeting BMP Criteria	% of Total	# of Sites Meeting BMP Criteria	% of Total
T01	3	3	100	3	100
T02	3	3	100	3	100
T04	3	3	100	3	100
T06	1	1	100	1	100
E08	3	3	100	3	100
E09	3	3	100	3	100
E10	3	3	100	3	100
E11	3	3	100	3	100
E12	1	1	100	1	100
E13	6	2	16	5	83
E14	2	2	100	2	100
E16	1	1	100	1	100
E17	2	2	100	2	100
R22	2	2	100	2	100
R30	2	2	100	2	100
G24	5	5	100	5	100
M27	5	5	100	4	80
F25	5	5	100	5	100
TOTALS	53	48	92	47	96

ADAPTIVE MANAGEMENT DISCUSSION

A large proportion of sites met all BMP criteria, those sites which did not typically had minor or partial insufficiencies. The implications of these results, further field observations for future activities, and the Forest's ability to meet water quality objectives are discussed by activity type. They are presented as practices that: 1) are working well; 2) can be improved; 3) warrant consideration for Forest refinements; and 4) are compared with last year's evaluation.

1. Practices that are working well

The following practices exceeded basic BMP compliance on the projects where they were evaluated. Line and staff should encourage the observed applications on all applicable projects.

- Skid trails (T02) not only met criteria, they were scarcely visible, of low impact and well-located.
- Landings (T04) involved minimal earthwork, and were not entirely flat in grade to accomplish this.
- Temporary roads (E14) were well located, on ridge tops, utilizing steep grades and adverse haul where needed to achieve this.
- Special erosion control (T06) included mastication of slash as well as straw mulching, although the original mulching was disturbed somewhat by the masticator.
- Streamside Management Zone (SMZ; T01) sample sites were rated as "very good" implementation. They were larger than the stated widths in the environmental documents and sale area map. The SMZs were thought to be highly effective, particularly for a burned area.
- Both developed (R22) and dispersed recreation sites (R30) have had sanitation facilities upgraded to sealed vaults on the Forest, including two of the sampled sites: Sarah Totten Campground and Gottville River Access. 16 new toilets (19% of the toilets at recreational sites across the Forest), were installed in 2002. Currently, 85% of the Recreational site toilets have been installed since the new leak-proof design standard was instituted (1990). Erosion control for the winter following construction was exemplary, utilizing straw mulch on all 2001 & 2002 sites.

2. Practices which can be improved

The following practices should be refined or discouraged on future projects.

- Log landings (T04) are frequently located at road switchbacks due to the relative flatness of the terrain, as was seen on one of the Bark T.S. landings. It is understood that many existing landings are so located, however, new construction or reconstruction on switchbacks should be discouraged because of the concentration of water off the road which commonly is designed into switchbacks, leading to landing drainage and erosion control problems.
- Reopening of decommissioned roads for post sale activities suggests inadequate planning, and can compromise the effectiveness of the decommissioning BMP (E10).

- There was minor to moderate sidecast evidenced at two of the three sampled E11 sites. This maintenance practice is straightforward to implement, but needs to be reinforced with vigilance in each maintenance contract.
- Minor compliance problems were observed at half of the in-channel construction sites (E13); one of these also had construction-related material left on the floodplain, a minor effectiveness problem. Although in-channel construction is much more complex than the previous practice (sidecast avoidance), it also requires vigilance, and anticipation of potential problems throughout project planning and implementation. When silt traps are utilized to prevent construction material from being conveyed downstream, the material they trap must be removed from the channel and floodplain prior to winter runoff.
- Developed and some dispersed recreation sites (R22 and R30) close to watercourses, especially river access points, may need extra erosion control downslope from any newly-graded areas. Ideally this would be anticipated in facility improvement planning.
- One common variety mineral extraction (M27) site was located adjacent to a sensitive area. If such location cannot be avoided, the erosion control plan should mitigate this risk so that offsite sedimentation is controlled.

3. Practices to consider for possible modification by the Forest.

- Temporary road obliteration (T14) should be reviewed for consistency with road decommissioning policy paper and practice (E10) on the Forest. For example, two of the sampled roads had stream crossing sites, which did not have the entire high risk fill removed. This inconsistency of intent between Forest policy and project planning occurred in the environmental documentation and design phase. The Forest might consider consistent skid road obliteration standards, with outslipping of roadbed and dips in lieu of permanent water bar construction.
- Temporary roads are not always planned for. In the case of Bark Timber Sale, a low impact temporary road was instituted during the sale administration (AE 1), amounting to less resource damage than the planned skid trail network. Guidance for project revisions should be reviewed by appropriate Forest staff, and consider the potential for reduction versus increase in resources effects. The AE 1 review process, which looks at a project - rather than site - level, would be an opportunity to look at the issue of adaptive management that occurs during project implementation, rather than during planning.
- Range management (G24) problems encountered included trampling of meadows and streambank areas, however these met the BMP compliance criteria because the Forest doesn't have specific water quality/riparian standard and guidelines, thus making this rating factor inapplicable, according to Regional protocol. Forest range staff is formulating objectives for streambank disturbance and woody plant utilization on allotments that have stream vulnerable channels. Line officers should encourage this effort.
- The standard specification for decommissioning channel crossing sideslopes (E10) should be revisited by engineering and earth science staff. For slope stability and water quality protection, 1 ½ : 1 or flatter is recommended, even where natural ground slope is steeper.
- The Forest should consider developing a rock source (common variety mineral) management strategy (M27). A complete Forest rock source inventory would be a useful tool.

- The Forest should consider developing a management strategy for water drafting sources. This would also facilitate meeting Aquatic Conservation Strategy as well as water quality objectives (E16) during future fire suppression activities.
- The Forest should consider developing a landing management strategy for the Forest or each District. The Forest could refine an existing C-clause, which focuses on slope stability, to incorporate drainage and erosion control needs (T04). Beyond landing design, there is a need to systematically optimize landing locations across the Forest for both resource protection and vegetation management/harvest engineering purposes.

4. Progress since the 2001 BMPEP report.

The following problems were identified in last year's report. Of the four problematic practices, only one recurred in 2002.

- (T04) Problems with landings in riparian reserves – was not encountered in 2002. Locations were generally benign.
- (E10) Problems with road decommissioning project designs were not encountered (detailed project design). The minor design problem, which meets standard road specifications for sideslope, is discussed under item #3.
- (E16) Problems with permanent water drafting sites was found again at the 2002 sampled site because of its location adjacent to a wetland. The recommendation under discussion item #3 above would help solve this problem.
- Grazing over utilization (G24) of riparian areas – deficiencies were again noted by the reviewers, although according to the new evaluation protocol, compliance was met. This is because on a “non applicable” rating since there is no Forest standard. This is also addressed under item #3. The effects at the 2002 sites were observed, in each case, to be localized and not likely to persist over time.

CONCLUSIONS AND RECOMMENDATIONS

Implementation standards for BMPs were fully compliant on 92% of the sites evaluated. BMP effectiveness requirements were met on 96% of the sites evaluated. This represents an improvement in BMP implementation and effectiveness from 2001. Further improvement in BMP implementation is needed in channel road/bridge construction practices (evaluation E-13). During the active construction phase, there were minor problems at two thirds of the sites evaluated. BMP effectiveness was compromised at only one of these sites. Another need was found in the common variety minerals category, where one rock pit out of the five sampled had minor problems with BMP effectiveness. Recommendations are made in the Adaptive Management discussion to correct insufficiencies reflected by the numerical results, and to refine practices where deemed possible by evaluation teams. An action plan would have to be formulated to prioritize and strategize how and when these actions might be pursued.

Recommendations also include encouraging several practices that were seen as exemplary, ranging from skid trail, landing, and temporary road locations to special erosion control measures. Recommendations also recognize the value of improved sanitation at several recreational sites across the Forest.