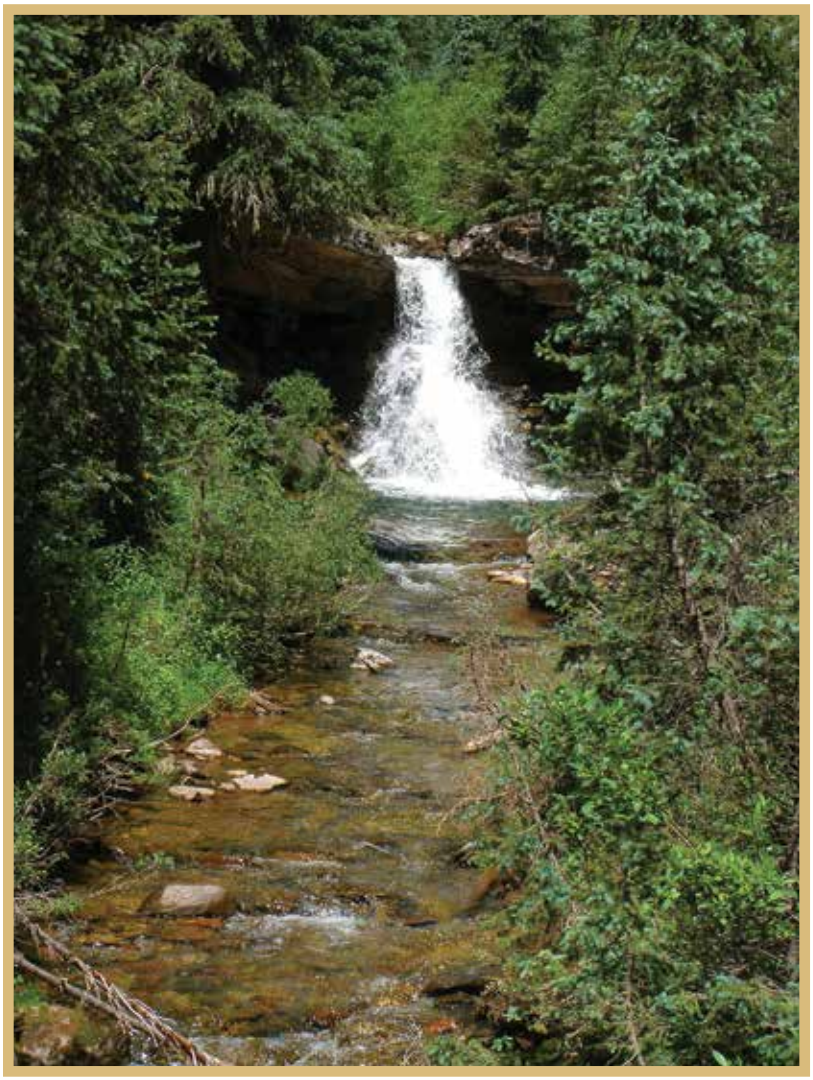
Colorado Forestry Best Management Practices

Forest Stewardship Guidelines for Water Quality Protection

2012 Field Audit Report



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Colorado State Forest Service

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Executive Summary

Water is a valuable commodity in Colorado that must be protected from nonpoint source pollution. In an effort to proactively protect water quality, Colorado has implemented Best Management Practices (BMPs) for forestry activities. BMPs are a set of water-quality protection measures and guidelines that provide direction on planning, roads, Streamside Management Zones (SMZs), timber harvesting, pesticides and fertilizers, stream crossings and fire management. Compliance with BMPs is voluntary and administered within a non-regulatory framework.

In September 2012, an interdisciplinary team visited six timber-harvest sites in southwest Colorado to assess Colorado forestry BMP application and effectiveness. Sites were selected from a combination of federal, private and state lands. Each site was evaluated on planning, roads, SMZs, timber harvesting, hazardous substances, stream crossings and fire management, according to written criteria in the *Field Audit Rating Guide*.

The 2012 audit found that the general application of BMPs were met or exceeded 86 percent of the time. In addition, minor departures from the application of the BMPs occurred 10 percent of the time and major departures occurred 4 percent of the time; no gross neglect of BMPs was found. BMPs also were found to be effective overall in providing adequate or improved resource condition 88 percent of the time. In addition, minor and temporary effects were observed 12 percent of the time, with no major and prolonged effects observed on any of the sites.

Federal timber sales scored the highest in BMP application, having met or exceeded BMP standards 96 percent of the time. Only minor departures occurred on federal sites for the remaining 4 percent of BMP applications. Private and state sites scored 82 and 68 percent, respectively, meeting or exceeding BMP standards. Most departures from BMP application on private (12 percent) and state (25 percent) lands were minor. Similarly, major departures from BMP application occurred 6 and 7 percent of the time on the private and state ownerships.

BMPs on federal forest lands provided adequate protection or improved conditions 99 percent of the time. Minor and temporary effects accounted for the other 1 percent on federal sites. Private and state sites scored 83 and 71 percent, respectively, in adequately protecting or improving conditions. Minor and temporary effects were observed 17 and 29 percent, respectively, on private and state lands for the remainder of the practices.

Based on its findings, the audit team made several recommendations to address specific questions or concerns related to SMZs, ranking criteria, spatial limits and existing landings/skid trails.

Acknowledgements

As part of its continuing efforts to protect water quality through the monitoring of Best Management Practices (BMPs) during forestry and silviculture operations, the Colorado State Forest Service (CSFS) facilitated coordination of the 2012 BMP field audit. An ongoing effort, the Field Audit Program began in 2008 with the initiation of the first audit. In 2011, a follow-up re-audit report was written to document the effectiveness of several BMPs on four of the six original sites.

The following individuals served on the 2012 field audit team:

- Casey Cooley, Colorado Parks and Wildlife
- Rich Edwards, Colorado State Forest Service
- Randy Frank, Jefferson County Open Space
- Keith Harding, Colorado Timber Industry Association
- Marcella Hutchinson, US Environmental Protection Agency
- John Janowski, Colorado Tree Farmers
- Randal Ristau, Colorado Department of Public Health and Environment
- Greg Sundstrom, Colorado State Forest Service
- Ann-Marie Verde, US Forest Service

The CSFS is grateful to all of these individuals and their agencies/organizations for contributing to the CSFS 2012 forestry BMP field audit. The CSFS also values the assistance and cooperation of the contractors and landowners who participated in the audit. Out of respect for their privacy, confidentiality was maintained throughout this document.

Editing assistance was provided by Dr. John D. Stednick, Warner College of Natural Resources, Colorado State University. Photos for this report were provided by Rich Edwards and Kent Grant, CSFS; Ann-Marie Verde, US Forest Service; and Pam Wilson, Firewise Council of Southwest Colorado. Editing and design assistance was provided by Katherine Timm and Lisa Mason, CSFS Outreach Division.

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Introduction

The forested lands of Colorado produce large quantities of high-quality water and include the headwaters of several major rivers. In Colorado, at least 80 percent of the population relies on these surface waters for their domestic water supply. These waters also provide for irrigation, livestock, recreation and industrial uses, and support important fisheries in the western United States. Therefore, it is essential that landowners and managers take the necessary measures to maintain surface water quality.

Forest timber is harvested from federal, private and state lands in Colorado. The US Environmental Protection Agency (EPA) classifies forestry and silviculture activities as potential sources of nonpoint source pollution (NPS) under the Clean Water Act (http://www.epa.gov/owow/nps/qa.html). The EPA defines nonpoint source pollution as follows:

> "Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. Nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water."

Excessive sediment entering waterways, usually from roads and skid trails, is the most significant NPS pollution from forestry and silviculture activities. Common timber harvesting practices include construction and use of forest roads, skid trails and landings. Such activities remove vegetative cover and can result in soil compaction, thus reducing precipitation infiltration rates. If improperly planned, located or constructed, these structures can intercept other surface waters, concentrating surface flow and transporting sediment over land and into receiving waters. However, these potential sources of pollution are preventable if forestry and timber harvest best management practices are implemented.

Forestry Best Management Practices (BMPs) are a set of water-quality protection measures and guidelines. BMPs provide direction on planning, roads, Streamside Management Zones (SMZs), timber harvesting, hazardous substances, stream crossings and fire management. Implementation of BMPs can limit the NPS pollution that forestry operations produce. Compliance with forestry BMPs is voluntary in Colorado and is administered within a non-regulatory framework. BMP implementation monitoring serves as an acceptable surrogate for water-quality monitoring, which is a more quantitative, time consuming and expensive approach.

In 1998, the Colorado Timber Industry Association (CTIA) and the Colorado State Forest Service (CSFS) developed *Colorado Forest Stewardship Guidelines to Protect Water Quality, Best Management Practices (BMPs) for Colorado*. The CTIA, CSFS, Colorado NPS Task Force and US EPA provided funding for this publication, which is now out of print.

Following the inaugural 2008 BMP field audit, the CSFS received funding from the Colorado Water Quality Control Division of the Colorado Department of Public Health and Environment to update forestry BMPs for Colorado. The resulting booklet, *Forestry Best Management Practices to Protect Water Quality in Colorado 2010,* is available in print at all CSFS locations throughout the state and on the CSFS website at www.csfs.colostate.edu.

In addition, the *Colorado Forestry Best Management Practices, Forest Stewardship Guidelines for Water Quality, 2008 Field Audit Report* is available on the CSFS website at www.csfs.colostate.edu.

The Colorado forestry BMP audit process is designed to represent BMP compliance across the state. The 2010 CSFS "Colorado Statewide Forest Resource Assessment" identifies 24.4 million acres of forest and woodlands, with nearly 68 percent in federal ownership. "Approximately 186,000 private landowners control 30 percent or 7.1 million acres of the state's forested landscapes." *Colorado's Nonpoint Source Program 2012 Management Plan* states that "nearly 37 percent of the surface land and water of the state is federally owned, largely in headwaters areas," however, much of the timber harvesting takes place on private lands. Consequently, BMP audit sites on timber sales were selected from each major landowner group in the state: federal, private and state.

Using the field audit rating guide criteria (Appendix A), each site was evaluated on key components of the timber sale, including planning, roads, SMZs, timber harvesting, hazardous substances, stream crossings and fire management. BMP compliance was evaluated on the basis of two criteria for each practice – application and effectiveness. The application rating indicated the degree of compliance with suggested BMP methodology, and the effectiveness rating established whether the practice, as applied, was sufficient to achieve the intended protection of water resources.

The 2012 Colorado forestry BMP audit was the second comprehensive BMP audit for the state. The audit was conducted on a total of six timber harvest sites (two from each landowner group) by a team comprised of professionals in the fields of engineering, forestry, geology, hydrology, soil science and wildlife from federal, state and private sectors. Industry and landowners also were represented on the team.

2012 Audit Objectives

The role of the 2012 audit team was to evaluate the voluntary compliance to BMP standards detailed in the publication *Forestry Best Management Practices to Protect Water Quality in Colorado 2010*. The overall goal was to proactively monitor the implementation of the state forestry BMPs and evaluate the effectiveness of each. The 2012 audit report objectives include:

1. Monitoring the effects of silviculture activities on water quality.
2. Monitoring the avoidance and protection of wetland soil and water resources during harvest and road construction.
3. Monitoring road-building effects (temporary/permanent roads/trails) in riparian areas.
4. Evaluating the level of timber harvest planning and design needed to maintain or improve the hydrographic character of timberlands; protecting soils from erosion and streams from sedimentation during runoff periods.
5. Evaluating the protection of SMZs under the BMPs.

Audit Process

Site Selection

The CSFS selected sites from a pool of timber sales on federal, private and state forestland. To establish equal representation of each of these landowner groups and to focus on timber sales with the greatest potential to affect water quality, baseline criteria were used to select timber

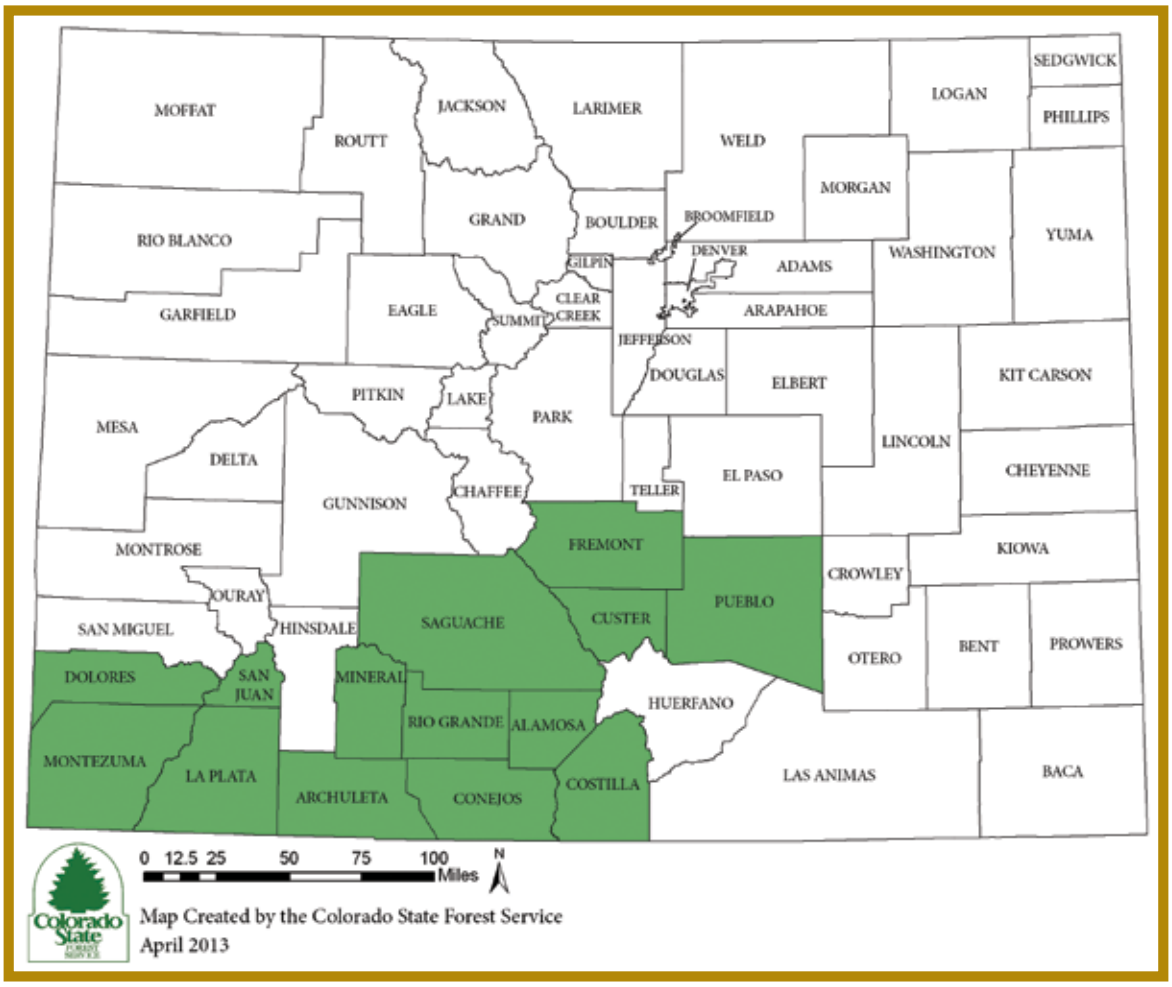

Figure 1: Counties that participated in the 2012 Colorado forestry BMPs field audit (©CSFS)

sales from a list of possible sites. Following are the baseline criteria:

1. Sale has the potential to affect water quality.

2. Minimum of 1,000 board feet per acre was harvested.

3. Sale was completed within the last 2 years.

4. Sale was located in Alamosa, Archuleta, Conejos, Costilla, Custer, Dolores, Fremont, La Plata, Mineral, Montezuma, Pueblo, Rio Grande, Saguache or San Juan counties.

The minimum requirement of 1,000 board feet harvested per acre was used to ensure that sales with only marginal potential to affect water quality were not selected. In addition, many of the timber sales in the state occur in areas where little or no live water or other sensitive hydrologic resources are present. While many BMPs are applicable to such timber sales, the audits focused on sales with the potential to affect water quality. This selection method created bias in the results, as audits took place where sales were likely to result in departures from the BMPs.

The location criteria consist of counties within three CSFS districts (Alamosa, Cañon City and Durango). Previous audits have been conducted in other areas of the state. The long-term intent is to eventually audit all forested areas within Colorado that satisfy the first three criteria of site selection.

Overview of Selected Sites

For logistical purposes, and in order to complete the audit within one week, the six timber sales selected for the audit were located on three CSFS districts (Figure 1).

Site nominations were solicited from two USDA Forest Service supervisor offices, three CSFS district offices, and the CTIA Executive Committee and local membership list. One state site was eliminated during the audit because it did not have the potential to affect water quality as originally thought. Another recently harvested site on private land (#3) was selected as a replacement on the final day of the audit because it satisfied all baseline criteria.

Due to privacy issues, ownership and specific locations of the selected sites are not identified in this report. A different logging company (also not identified) harvested each site, except for private sale #1 and state sale #1, which were harvested by the same contractor.

Audit Procedure

Field audits were conducted over 4 days, and the audit team spent approximately 2-3 hours on each timber sale. Five of the nine audit team members had participated in at least one other BMP audit and/or federal BMP consistency review in one or more states over the last 4 years. This allowed significant cross-training of newer team members and helped improve understanding of rating criteria and applicability of the guide.

Personnel directly associated with each timber sale (either compliance forester or sale administrator) briefed the audit team on details of the harvest at each location. Areas of particular importance, such as SMZs, roads and landing areas near the riparian corridor were identified, as were sale administration details. The audit team was given an opportunity to inspect the area. No effort was made to inspect each acre of the harvested area or each mile of road; rather, the audit focused on the critical portions of the timber sale where proper BMP application was most important.

The sale administrator briefs the audit team and answers questions prior to a site visit.

After inspecting these areas, the audit team reconvened to rate the compliance of the timber sale with the BMP, according to their observations and discussions. After reaching consensus on applicability, an on-site team leader recorded the application and effectiveness rating for each of the BMP items. A different member of the audit team acted as team leader at each location. The BMP Field Audit Data and Rating Guide Criteria are attached (Appendix A).

The audit team inspects skid trails and the Streamside Management Zone (SMZ).

The audit team works to reach consensus on BMP application and effectiveness ratings.

The rating process conducted for each BMP begins with establishing whether the BMP in question is applicable to the harvest activities under consideration (Figure 2). For example, not all harvest sites require the construction of temporary roads. In these cases, the BMPs that pertain to temporary roads are not applicable. Once the audit team establishes that a given BMP is applicable, the application rating for the BMP is determined, based on written criteria (Table 1).

Table 1: BMP Application Ratings and Criteria

Rating	Criteria
5	Operation exceeds requirements of BMP.
4	Operation meets the standard requirement of BMP.
3	Minor departure from BMP.
2	Major departure from BMP.
1	Gross neglect of BMP.

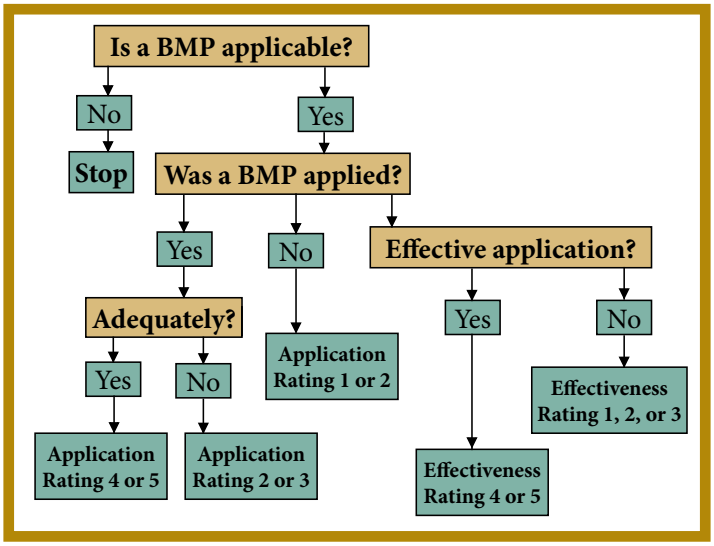

Figure 2: Colorado BMP Audit Ranking System (©CSFS)

The audit team then evaluated the BMP effectiveness, which determined whether the BMP was successful in protecting water quality, again based on written criteria (Table 2).

Table 2: BMP Effectiveness Ratings and Criteria

Rating	Criteria
5	Improves protection of soil and water resources over pre-project conditions.
4	Adequate protection of soil and water resources.
3	Minor and temporary impact to soil and water resources.
2	Major and temporary or minor and prolonged impacts to soil and water resources.
1	Major and prolonged impacts to soil and water resources.

Definition of Effectiveness Terms

Adequate: Small amount of material eroded, but does not reach draws, channels or floodplain

Minor: Some material erodes and is delivered to stream or annual floodplain

Major: Material erodes and is delivered to stream or annual floodplain

Temporary: Impacts last less than one season

Prolonged: Impacts last more than one year

As audit sites were visited, the team kept notes about how the *Forestry Best Management Practices to Protect Water Quality in Colorado 2010* might be improved and how future audit processes might be conducted. Those findings are included in the recommendations portion of this report.

Limitations of the Audit Process

As previously explained, practicality, time and resources prohibit evaluation of each timber sale from initiation to completion for compliance with BMPs. Instead, the audit process is designed to act as a "spot check," which is limited to areas of the timber sale that have the greatest potential to affect water quality. The timing of the audit in the life of the timber sale also is limited, in that the audits cannot simultaneously monitor the pre-sale, ongoing and post-sale activities to which BMPs apply. Evaluation of BMPs related to time was based on implementation to date, where final results were not yet realized. For example, sites where grass seed mixtures have been applied, but germination has not yet occurred, generally were assumed to germinate successfully.

Field Audit Results

In 2012, BMPs were met or exceeded 86 percent of the time (162 out of 188 rated items [Table 3]). Minor departures occurred 10 percent of the time, and state lands had the highest occurrence. Major departures, seven counts or 4 percent of the total, occurred on private and state land. No gross neglect of any BMP was found. Federal timber sales scored the highest application rates, having met or exceeded the BMP standard 96 percent of the time.

BMPs were effective at providing adequate protection or improved water resource conditions an average of 88 percent over all ownerships (Table 4). BMP effectiveness on federal and private forestlands occurred 99 percent and 83 percent of the time, respectively. State lands were lower, with 71 percent experiencing adequate or improved conditions. Minor and temporary effects were observed 17 percent and 29 percent of the time, respectively, for private and state lands. Minor/prolonged, major/temporary or major/prolonged effects were not observed on any forestland during this audit.

In general, BMPs were properly applied and effective in nearly all cases in 2012. Table 5 illustrates the 2012 BMP application and effectiveness rating results for all landowners, compared to the results of the 2008 audit. The application results remained relatively consistent between the two audits. In comparison, the effectiveness results improved slightly between 2008 and 2012, with more BMPs providing adequate or improved conditions. Also, minor/temporary, major/temporary or major/prolonged effects were reduced to zero in 2012.

Table 3: Colorado Forestry BMP 2012 Field Audit Application Results by Landownership

Ownership	Exceeded BMP	Met BMP Standard	Minor Departure	Major Departure	Gross Neglect	Total
Federal	2	77	3	0	0	82
	2%	94%	4%	0%	0%	100%
Private	1	63	9	5	0	78
	1%	81%	12%	6%	0%	100%
State	0	19	7	2	0	28
	0%	68%	25%	7%	0%	100%
Total	3	159	19	7	0	188
	2%	84%	10%	4%	0%	100%

Table 4: Colorado Forestry BMP 2012 Field Audit Effectiveness Results by Landownership

Ownership	Improved Conditions	Adequate Protection	Minor and Temporary	Minor/ Prolonged or Major/ Temporary	Major and Prolonged	Total
Federal	3	78	1	0	0	82
	4%	95%	1%	0%	0%	100%
Private	1	74	15	0	0	90
	1%	82%	17%	0%	0%	100%
State	0	20	8	0	0	28
	0%	71%	29%	0%	0%	100%
Total	4	172	24	0	0	200
	2%	86%	12%	0%	0%	100%

Table 5: Comparison of BMP Application and Effectiveness Results by Year

Application	Exceeded BMP	Met BMP Standard	Minor Departure	Major Departure	Gross Neglect	Total
2008	3%	84%	11%	3%	0	100%
2012	2%	84%	10%	4%	0	100%
Effectiveness	**Improved Conditions**	**Adequate Protection**	**Minor and Temporary**	**Minor/ Prolonged or Major/ Temporary**	**Major and Prolonged**	Total
2008	1%	81%	15%	3%	0	100%
2012	2%	86%	12%	0	0	100%

Using 2012 Field Audit Data and Rating Guide Criteria (Appendix A), the following comments on audit results can be made.

Planning

Sanitary Guidelines for the Construction of Camps

Camping was not an issue on any of the audited sites. Sale operators and their employees were all locally based and did not stay on the harvest sites.

Roads

Road Design and Location

Most operators recognized the importance of road-stream intersections as a potential water quality concern, so they minimized the number of stream crossings to avoid high-hazard sites (i.e. wet areas, unstable slopes and groundwater). Existing roads were used on most of the sites wherever possible, although one site could have benefited from a better haul road location to avoid low, wet areas.

Road Construction/Reconstruction

Where road construction occurred, operators took precautions to ensure that woody debris was not incorporated into the road fill. They also minimized soil or rock borrow pit usage and earth movement activity. With one exception on a federal site, operators used slash and surface roughness to minimize soil erosion and sediment transport. Road reconstruction on the state site was found to be slightly inadequate to provide for drainage on some sections of access road.

Road Drainage

In general, road drainage was rated adequate, which was accomplished primarily by varying the road grade. In some areas on the state site, road drainage dips were somewhat inadequate for certain sections of the road. Culverts were used on only two of the sites and no water quality issues were noted. Energy dissipaters were utilized where necessary, and adequate filtration zones were used to route road drainage prior to entering a stream or water body on most sites, with the exception of a minor impact on one of the private sites.

Road Maintenance

Most of the sites met the requirements of the maintenance BMPs and provided for adequate protection of soil and water resources. This included erosion control features, avoiding use during wet periods and minimizing road grading. A minor impact occurred on one federal site due to insufficient maintenance of several in-road rolling dips.

Streamside Management Zone (SMZ) Delineation

Most of the departures in BMP application (both minor and major) and effectiveness (minor and temporary) occurred in this category of the audit. Both federal sites scored the highest, with only one minor departure in the application of the "adequate SMZ width identified" BMP. Major departures from the "adequate SMZ width identified" BMP occurred on two of the three private sites and a state site. Major departures from the "SMZ properly marked" BMP occurred on all of the private sites and the state site. In addition, minor departures occurred in the application of the "equipment operation SMZ allowed only per approved practices" BMP on one of the private sites and the state site. Minor and temporary impacts on soil and water resources in the effectiveness of the BMP also occurred on these sites. A similar minor departure on one private site also occurred for the "exclusion of burning in SMZ" BMP, while another private site had identical ratings for the "maintain or provide sufficient ground cover" BMP.

Stream Crossings and Stream Bank Protection

All operators crossed streams at right angles, where practical, avoided the use of unimproved stream crossings and directed road drainage away from the stream crossing sites. One private landowner exceeded the "proper sizing of stream crossings" BMP application requirements and improved the effectiveness and protection of soil and water resources over the pre-project condition.

Installation of Stream Crossings

Only one federal and one private site involved the installation of stream crossings in the form of culverts. In both cases, stream channel disturbance was minimized and no erodible material was deposited within the channels. BMP effectiveness on the private site received a minor and temporary rating due to the placement of a culvert slightly below grade. However, sufficient inlet and outlet armoring, and minimum cover for the culvert were provided.

Timber Harvesting, Thinning, Slash Treatment and Revegetation

Harvest Design

All harvest sites used suitable logging systems with appropriate location, size and number of landings. Minor departures in application of the "design and locate skid trails to minimize soil disturbance" BMP occurred on one

private site and one state site. In addition, the effectiveness of the BMP was rated with minor and temporary impacts on soil and water resources.

Other Harvesting Activities

All harvest sites provided adequate drainage for landings and skid trails. The same two sites referenced above experienced minor departures in application of two BMPs. The practices included the "skidding operation minimizes soil compaction and displacement" and the "avoid tractor skidding on unstable, wet or easily compacted soils and on slopes that exceed 40 percent unless not causing excessive erosion" BMPs. Also, as above, the effectiveness of the BMP was rated with minor and temporary impacts.

Slash Treatment and Site Preparation

Scarification was not used on any of the visited sites. All sites had minimum soil disturbance or left at least adequate slash cover to minimize overland flow and soil erosion. In addition, harvest activities on all sites were limited to frozen or dry conditions. One of the federal sites exceeded requirements of the application and improved the effectiveness of two of the BMPs involving slash treatment. The second federal site improved the effectiveness of the BMP involving the amount and placement of slash on the site.

Revegetation of Disturbed Areas

Grass seeding was being used in many areas. Generally, seeding rates were observed to be adequate, but the team was unable to determine germination and site establishment on one federal site and one private site. These sites may need to be revisited to assess BMP effectiveness on the federal site, and application and effectiveness on the private site. A minor departure in the application of the BMP involving the presence of noxious weeds, and a minor and temporary impact in the effectiveness of the BMP occurred on the other two private sites.

Pesticides, Fertilizers and Chemicals

Fertilizers were not used on any of the sites that were visited. Pesticides were applied on only one of the federal sites and met the application requirement of the BMP regarding adequate protection of soil and water resources in terms of effectiveness. Sale administration personnel on one private site and the state site did now know whether the operator refueled equipment onsite or elsewhere. Other sites showed that operators met the BMP application with respect to knowledge and compliance of regulations that govern the storage, handling, etc. of hazardous substances and proper site-selection for servicing and refueling. Effectiveness ratings also showed adequate protection of soil and water resources on these sites.

Fire Management

Protection of Soil and Water from the Effects of Prescribed Burning

Two of the private sites and the state site had no ratings because prescribed fire was not utilized, nor did wildfires occur. Both federal sites included prescribed fire, and BMP application requirements were met on each. Effectiveness was adequate on one federal site and required reassessment on the other. A minor departure occurred on one private site in the application of the BMP, as did a minor and temporary impact in the effectiveness of the BMP.

Stabilization of Fire Suppression-related Work Damage

This BMP was not applicable on any of the sites because no suppression activities occurred.

Emergency Rehabilitation of Watersheds Impacted by Wildfires

This BMP was not applicable on any of the sites because no emergency rehabilitation of watershed activities occurred.

Recommendations

During the audit, several BMPs required clarification or expansion, and additional BMPs also were suggested. The following recommendations were made for future BMP guide documents and audits:

- Many of the BMP application departures and effectiveness impacts in 2012 occurred in the SMZ. This would imply that additional, focused outreach and training in this subject-matter area is needed for forestry/logging operators, landowners and managers.
- More specific guidance also is needed for forestry/logging operators, landowners and managers on stream types (i.e. perennial, intermittent and ephemeral), and operational guidance should be provided to address acceptable activities within the SMZ.
- Three of the six sites (one federal and two private) indicated that some level of ongoing monitoring was necessary in order to reassess re-vegetation efforts and progress.

- Edit/rewrite the Site Information and Ranking Criteria Field Form (Appendix B) to follow the *Forestry Best Management Practices to Protect Water Quality in Colorado 2010* field handbook; separate the "SMZs" and "Stream Crossings" sections. In addition, a separate "Fire Management" category should be added to the BMP field handbook in order to reflect this change when the handbook is updated. These changes will better facilitate handbook use during the audit and allow for easier general reference.

- Provide supplemental guidance for SMZ width, especially with regards to slope. Other states have more specific guidance for width, depending on side-slope gradient.

- Provide auditors with guidance on spatial limits of BMPs to be audited within a given site. Some confusion occurred during this year's audit regarding whether the team needed to be concerned with areas outside of site boundaries (e.g. between site boundary and county road).

- Add language regarding use of existing landings and skid trails to minimize soil disturbance within BMPs and use the Site Information and Ranking Criteria Field Form (Appendix B).

- Continue to provide additional outreach and training to forestry/logging contractors, landowners and managers on all forestry-related BMPs.

- Continue to make BMPs available to various user groups through online resources and meetings.

Summary

From the 2012 audit, it was determined that application of BMPs in forestry and logging operations in Colorado occurred at a rate of 86 percent, with an effectiveness rate of 88 percent. The audit team is generally pleased with these levels. Although slight overall improvement is noted from the first to second audit (2008 to 2012), the team has made several recommendations and believes that the application and effectiveness rates can be improved. With continuing statewide insect and disease issues, an increase in the incidence of destructive and relatively high-intensity wildfires, and an improving forest products industry infrastructure, the number of acres being harvested and/or treated will increase. It is essential to continually evaluate and adjust BMPs as new issues and information are presented. The BMP audits will serve as the information source for updating state BMPs.

Appendix A

2012 Forestry BMP Field Audit Data and Rating Guide Criteria

Land Ownership/ Timber Sale Identification	Federal Sale #1		Federal Sale #2		Private Sale #1		Private Sale #2		Private Sale #3		State Sale #1	
PLANNING	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
A. Sanitary Guidelines for the Construction of Camps Adequate sewer and soil waste considerations on site to protect water quality if camps are present.	NA	NA	NA	NA	NA	NA	4	4	NA	NA	NA	NA
ROADS	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
A. Road Design and Location Design roads to minimum standard necessary to accommodate anticipated use and equipment.	4	4	NA	NA	4	3	4	4	NA	NA	4	4
Minimize number of roads necessary.	4	4	NA	NA	4	4	4	4	NA	NA	4	4
Use existing roads unless aggravated erosion will be likely.	4	4	4	4	4	4	4	4	4	4	4	4
Avoid long, sustained, steep road grades.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Locations avoid high-hazard sites (i.e., wet areas and unstable slopes).	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Minimize number of stream crossings.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Choose stable stream crossing sites.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Locate roads to provide access to suitable log landing areas.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Locate roads a safe distance from streams when they are parallel.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Keep roads outside of Stream Management Zones.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

B. Road Construction/ Reconstruction	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Construct/reconstruct only to the extent necessary to provide adequate drainage and safety.	4	4	NA	NA	4	4	4	4	NA	NA	4	3
Minimize earth moving activities when soils appear excessively wet.	4	4	4	4	4	4	4	4	NA	NA	4	4
Keep slope stabilization, erosion, sediment control work as current as possible, including "slash filter windrows."	3	4	NA	NA	4	4	NA	NA	NA	NA	4	4
Cut and fill slopes at stable angles.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Stabilize erodible soils (i.e., seeding, benching, mulching).	4	4	NA	NA	4	4	NA	NA	NA	NA	NA	NA
Avoid incorporating woody debris in road fill.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Leave existing rooted trees and shrubs at the toe of fill slope.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Balance cuts and fills or use full bench construction.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sediment from borrow pits and gravel pits minimized.	NA	NA	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Excess materials placed in location that avoid entering stream.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Avoid excavation into ground water.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exclusion of side-casting of road material into a stream, lake, wetland or other body of water.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Road Drainage	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Vary road grade to reduce concentrated drainage.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Provide adequate road surface drainage for all roads.	4	4	4	4	4	4	4	4	4	4	3	3
Space road drainage outlets so peak runoff will not exceed capacity of drainage outlets.	4	4	NA	NA	NA	NA	4	4	NA	NA	3	3

For in-sloped roads, plan ditch gradients of generally greater than 2%, but no more than 8%.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Construct drain dips deep enough into the sub grade so that traffic will not obliterate them.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	3	3
Install culverts at original gradient, otherwise rock armor or anchor downspouts.	NA	NA	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Design all relief culverts with adequate length and appropriate skew. Protect inflow end from erosion. Catch basins where appropriate.	NA	NA	4	4	NA	NA	4	4	NA	NA	NA	NA
Provide energy dissipaters at drainage structure outlets where needed.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	4	4
Route road drainage through adequate filtration zones before entering a stream.	4	4	4	4	NA	NA	4	3	4	4	4	4
D. Road Maintenance	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Maintain erosion control features (dips, ditches and culverts functional).	4	3	4	4	4	4	4	4	4	4	4	4
Avoid use of roads during wet periods.	4	4	4	4	4	4	4	4	4	4	NA	NA
Grade roads only as necessary to maintain drainage.	4	4	4	4	4	4	4	4	NA	NA	NA	NA
Avoid cutting the toe of cut slopes.	4	4	NA	NA	4	4	NA	NA	NA	NA	NA	NA
Exclusion of side-casting of road material into a stream.	4	4	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Abandoned roads in condition to provided adequate drainage without further maintenance.	4	4	4	4	NA	NA	NA	NA	NA	NA	NA	NA

E. Streamside Management Zone Designation	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Adequate SMZ width identified.	4	4	3	4	2	4	3	3	2	3	2	4
SMZ properly marked.	4	4	3	4	2	4	2	3	2	3	2	4
Maintain or provide sufficient ground cover.	4	4	4	4	4	4	4	4	3	3	4	4
Equipment operation in SMZ allowed only per approved practices.	4	4	4	4	3	3	4	4	4	4	3	3
Exclusion of burning in SMZ.	4	4	4	4	3	3	NA	NA	NA	NA	NA	NA
SMZ retention tree requirements met. (Larger trees retained to provide habitat and a source of large woody debris.)	4	4	4	4	4	4	NA	NA	NA	NA	4	4
Exclusion of side-casting of road material into a stream, lake, wetland or other body of water during road maintenance.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exclusion of slash in streams, lakes or other bodies of water.	NA	NA	4	4	NA	NA	NA	NA	NA	NA	NA	NA
SMZ protected during site preparation activities.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Stream Crossings and Stream Bank Protection	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Proper permits for stream crossings obtained.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cross streams at right angles, if practical.	4	4	NA	NA	4	4	4	4	NA	NA	4	4
Proper sizing for stream crossing structures.	4	4	NA	NA	NA	NA	5	5	NA	NA	NA	NA
Direct road drainage away from stream crossing site.	4	4	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Avoid unimproved stream crossings. Use temporary log stream crossings if necessary.	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

G. Installation of Stream Crossings	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Minimize stream channel disturbance.	4	4	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Erodible material not placed in stream channels.	4	4	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Stream crossing culverts conform to natural streambed and slope.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Culverts placed slightly below stream grade.	NA	NA	NA	NA	NA	NA	4	3	NA	NA	NA	NA
Prevent erosion of stream crossing culverts and bridge fills (i.e. armor inlet and outlet).	NA	NA	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Minimum cover for stream crossing culverts provided.	NA	NA	NA	NA	NA	NA	4	4	NA	NA	NA	NA
Stream diversions carefully planned to minimize downstream sedimentation.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TIMBER HARVESTING, THINNING, SLASH TREATMENT AND REVEGETATION	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
A. Harvest Design												
Suitable logging system for topography, soil type and season of operation.	4	4	4	4	4	4	4	4	4	4	4	4
Design and locate skid trails to minimize soil disturbance.	4	4	4	4	3	3	4	4	4	4	3	3
Suitable location, size and number of landings.	4	4	4	4	4	4	4	4	4	4	4	4
B. Other Harvesting Activities	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Skidding operations minimizes soil compaction and displacement.	4	4	4	4	3	3	4	4	4	4	3	3
Avoid tractor skidding on unstable, wet or easily compacted soils and on slopes that exceed 40% unless not causing excessive erosion.	NA	NA	NA	NA	3	3	NA	NA	NA	NA	3	3

Adequate drainage for landing.	4	4	4	4	4	4	4	4	4	4	4	4
Adequate drainage for skid trails.	4	4	4	4	4	4	4	4	4	4	4	4
C. Slash Treatment and Site Preparation	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Scarify only to the extent necessary to meet resource management objective.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Treat slash so as to preserve the surface soil horizon.	5	5	4	4	NA	NA	4	4	4	4	NA	NA
Adequate material left to slow runoff, return soil nutrients and provide shade for seedlings.	5	5	4	5	4	4	4	4	4	4	4	4
Activities limited to frozen or dry conditions to minimize soil compaction and displacement.	4	4	4	4	4	4	4	4	4	4	4	4
Scarification on steep slopes in a manner that minimizes erosion.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Revegetation of Disturbed Areas	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Practices have been completed to ensure adequate revegetation in disturbed areas.	4	Reassess	4	4	3	4	In Progress	In Progress	4	3	4	4
PESTICIDES, FERTILIZERS AND CHEMICALS	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
Know and comply with regulations governing the storage, handling, etc. of hazardous substances.	4	4	4	4	NA	NA	4	4	4	4	NA	NA
Proper sites were selected for servicing and refueling to prevent contamination of waters from accidental spills.	4	4	4	4	Unknown	Unknown	4	4	4	4	Unknown	Unknown
Pesticide materials have been properly applied and effects monitored.	NA	NA	4	4	NA	NA	NA	NA	NA	NA	NA	NA
Fertilizers have been properly handled and applied so as to reduce possible adverse effects on water quality.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

FIRE MANAGEMENT	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness	Application	Effectiveness
A. Protection of Soil and Water from Prescribed Burning Effects Soil productivity is maintained, erosion is minimized. Ash, sediment, nutrients and debris are prevented from entering surface water. SMZ is maintained with no piling and/or burning permitted within SMZ.	4	Reassess	4	4	3	3	NA	NA	NA	NA	NA	NA
B. Stabilization of Fire Suppression Related Work Damage Areas impacted by fire suppression activities have been stabilized.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Emergency Rehabilitation of Watersheds Impacted by Wildfires Corrective measures have been applied to minimize the loss of soil productivity, deterioration of water quality, and threats to life and property, both on-site and off-site.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COMMENTS: *Federal Sale #1:* Approximately 5 miles from sale; approximately $14,000 of road work on slide area connected with sale and timber marking. *Federal Sale #2:* SMZ marked on map. USFS on this district does not designate SMZs for intermittent streams. Hydrologist does not feel SMZs are needed. They are protected by mapping and practices. No crossing of SMZ allowed without prior approval. *Private Sale #1:* Dry year following harvest.												

Appendix B
Site Information and Ranking Criteria Field Form

CO - BMP1
2012

BMP FIELD AUDITS
SITE INFORMATION and RANKING CRITERIA

Site Number: _____ Meets Selection Criteria: Y/N _____
High Hazard: Y/N _____: Riparian _____ Matrix____

Site Name: _____

Owner(s): _____

Legal Description: RNG. _____ TWP. _____ SEC. _____ County: _____

Primary Drainage: _____ Month/Year Harvested: _____

Stream Within 200 Ft.? Y / N Name: _____ Bankfull Width: _____

Unit Size (Ac): _____ Volume Removed (MBF):_____

Road Construction: YES____ (If yes, when)_____ NO_____ Length: _____

Road Reconstruction: YES____ (If yes, when)_____ NO_____ Length: _____

Slash Disposal Complete: _____ Method: _____

Logging Method: _____

Slope: 0-5%_____; 5-20%_____; 20-40%_____; 40%+_____

Parent Material: _____

Soil Erodibility: High____ Medium____ Low____

Harvest in SMZ: Y / N

Comments:

_____

FIELD AUDIT

Date: _____

Team Leader/Recorder: _____

Team Members:

Observers Present:

Rating Guide

APPLICATION

5—Operation Exceeds Requirements Of BMP
4—Operation Meets Requirements Of BMP
3—Minor Departure From BMP
2—Major Departure From BMP
1—Gross Neglect Of BMP

EFFECTIVENESS

5—Improved Protection of Soil and Water Resources Over Pre-Project Condition
4—Adequate Protection of Soil and Water Resources
3—Minor and Temporary Impacts on Soil and Water Resources
2—Major and Temporary or Minor and Prolonged Impacts on Soil and Water Resources
1—Major and Prolonged Impacts on Soil and Water Resources

DEFINITIONS (BY EXAMPLE)

Adequate—	Small amount of material eroded; material does not reach draws, channels, or floodplain
Minor—	Erosion and delivery of material to draws but not stream
Major—	Erosion and subsequent delivery of sediment to stream or annual floodplain
Temporary—	Impacts lasting one year or less; no more than one runoff season
Prolonged—	Impacts lasting more than one year

NR – Not Reviewed NA – Not Applicable

	Forestry Best Management Practices to Protect Water Quality in Colorado 2010 **(*page reference)**	Application to Site (Y/N)	Application	Effectiveness	**Comments**
	TIMBER SALE PLANNING (Guidelines page reference*)				
	SANITARY GUIDELINES FOR THE CONSTRUCTION OF CAMPS 1. Adequate sewer and soil waste considerations on site to protect water quality if camps are present. (*page 27)				
	ROADS BMPs Applicable to: + New Road Construction # Exisiting Roads ~ Reconstruction				
~+	**ROAD DESIGN AND LOCATION** 1. Design roads to minimum standard necessary to accommodate anticipated use and equipment. (*page 5)				
~+	2. Minimize number of roads necessary. (*page 4)				
#	3. Use existing roads unless aggravated erosion will be likely. (*page 4)				
+	4. Avoid long, sustained, steep road grades. (*page 4)				
+	5. Locations avoid high-hazard sites (i.e., wet areas and unstable slopes). (*page 5)				
+	6. Minimize number of stream crossings. Number_____.(*page 5)				
+	7. Choose stable stream crossing sites. (*page 5)				
+	8. Locate roads to provide access to suitable log landing areas. (*page 5)				
+	9. Locate roads a safe distance from streams when they are parallel. (*page 5)				
+	10. Keep roads outside of Stream Management Zones. (*page 5)				
~#	**ROAD CONSTRUCTION / RECONSTRUCTION** 1. Construct/reconstruct only to the extent necessary to provide adequate drainage and safety. (*page 6)				
~#+	2. Minimize earth moving activities when soils appear excessively wet. (*page 6)				
+~	3. Keep slope stabilization, erosion, sediment control work as current as possible, including "slash filter windrows". (*page 6)				
+~	4. Cut and fill slopes at stable angles. Slope ratio: _____. (*page 7)				
+~	5. Stabilize erodible soils (i.e., seeding, benching, mulching). (*page 7)				
+~	6. Avoid incorporating woody debris in road fill. (*page 7)				
+~	7. Leave existing rooted trees and shrubs at the toe of fill slope. (*page 7)				

+~	8. Balance cuts and fills or use full bench construction. (*page 8)				
+~	9. Sediment from borrow pits and gravel pits minimized. (*page 8)				
+~	10. Excess materials placed in location that avoid entering stream. (*page 8)				
+~	11. Avoid excavation into ground water. (*page 8)				
+~	12. Exclusion of side-casting of road material into a stream, lake, wetland or other body of water. (*page 8)				
+	**ROAD DRAINAGE** 1. Vary road grade to reduce concentrated drainage (*page 8)				
+~#	2. Provide adequate road surface drainage for all roads. (*page 8)				
+~	3. Space road drainage outlets so peak runoff will not exceed capacity of drainage outlets. (*page 8)				
+~	4. For in sloped roads, plan ditch gradients of generally greater than 2%, but no more than 8%.(*page 9)				
+~	5. Construct drain dips deep enough into the sub grade so that traffic will not obliterate them. (*page 9)				
+~	6. Install culverts at original gradient, otherwise rock armor or anchor downspouts. (*page 10)				
+~#	7. Design all relief culverts with adequate length and appropriate skew. Protect inflow end from erosion. Catch basins where appropriate. (*page 10)				
+~#	8. Provide energy dissipaters at drainage structure outlets where needed. (*page 10)				
+~#	9. Route road drainage through adequate filtration zones before entering a stream. (*page 10)				
+~#	**ROAD MAINTENANCE** 1. Maintain erosion control features (dips, ditches and culverts functional). (*page 11)				
+~#	2. Avoid use of roads during wet periods. (*page 11)				
+~#	3. Grade roads only as necessary to maintain drainage. (*page 11)				
#	4. Avoid cutting the toe of cut slopes. (*page 11)				
+~	5. Exclusion of side-casting of road material into a stream. (*page 11)				
+~#	6. Abandoned roads in condition to provide adequate drainage without further maintenance. (*page 11)				
	STREAMSIDE MANAGEMENT ZONE DESIGNATION 1. Adequate SMZ width identified, avg. width _____. (*page 13)				
	2. SMZ properly marked? (*page 13)				
	3. Maintain or provide sufficient ground cover. (*page 14)				
	4. Equipment operation in SMZ allowed only per approved practices. (*page 14)				
	5. Exclusion of burning in SMZ (*page 8).				

	6. SMZ retention tree requirements met. (Larger trees retained to provide habitat and a source of large woody debris). (*page 14)				
	7. Exclusion of side-casting of road material into a stream, lake, wetland or other body of water during road maintenance. (*page 14)				
	8. Exclusion of slash in streams, lakes or other bodies of water. (*page 15)				
	9. SMZ protected during site preparation activities (*page 15)				
~+	**STREAM CROSSINGS AND STREAM BANK PROTECTION** 1. Proper permits for stream crossings obtained. (*page 25)				
~+	2. Cross streams at right angles, if practical. (*page 25)				
~+	3. Proper sizing for stream crossing structures. (*page 25)				
~+	4. Direct road drainage away from stream crossing site. (*page 25)				
~+	5. Avoid unimproved stream crossings. Use temporary log stream crossings if necessary. (*page 26)				
~+	**INSTALLATION OF STREAM CROSSINGS** 1. Minimize stream channel disturbance. (*page 26)				
~+	2. Erodible material not placed in stream channels (*page 26)				
~+	3. Stream crossing culverts conform to natural streambed and slope. (*page 26)				
~+	4. Culverts placed slightly below stream grade. (*page 26)				
~+	5. Prevent erosion of stream crossing culverts and bridge fills (i.e., armor inlet and outlet). (*page 26)				
~+	6. Minimum cover for stream crossing culverts provided. (*page 27)				
+~	7. Stream diversions are carefully planned to minimize downstream sedimentation. (*page 26)				
TIMBER HARVESTING, THINNING, SLASH TREATMENT AND REVEGETATION					
	HARVEST DESIGN 1. Suitable logging system for topography, soil type and season of operation. (*page 16)				
	2. Design and locate skid trails to minimize soil disturbance. (*page 19)				
	3. Suitable location, size, and number of landings. (*page 19)				
	OTHER HARVESTING ACTIVITIES 1. Skidding operations minimizes soil compaction and displacement. (*page 19)				
	2. Avoid tractor skidding on unstable, wet or easily compacted soils and on slope that exceed 40% unless not causing excessive erosion. (*page 19)				

	3. Adequate drainage for landing. (*page 20)				
	4. Adequate drainage for skid trails. (*page 20)				
	SLASH TREATMENT AND SITE PREPARATION 1. Scarify only to the extent necessary to meet resource management objective. (*page 21)				
	2. Treat slash so as to preserve the surface soil horizon. (*page 21)				
	3. Adequate material left to slow runoff, return soil nutrients and provide shade for seedlings. (*page 21)				
	4. Activities limited to frozen or dry conditions to minimize soil compaction and displacement. (*page 21)				
	5. Scarification on steep slopes in a manner that minimizes erosion. (*page 21)				
	REVEGATION OF DISTURBED AREAS 1. Practices have been completed to ensure adequate revegetation in disturbed areas. (*page 7, 20)				
PESTICIDES, FERTILIZERS AND CHEMICALS					
	1. Know and comply with regulations governing the storage, handling, etc. of hazardous substances. (*page 23)				
	2. Proper sites were selected for servicing and refueling to prevent contamination of waters from accidental spills. (*page 24)				
	3. Pesticide materials have been properly applied and effects monitored. (*page 23)				
	4. Fertilizers have been properly handled and applied so as to reduce possible adverse effects on water quality. (*page 23)				
FIRE MANAGEMENT					
	PROTECTION OF SOIL AND WATER FROM PRESCRIBED BURNING EFFECTS 1. Soil productivity is maintained, erosion is minimized. Ash, sediment, nutrients and debris is prevented from entering surface water. SMZ is maintained with no piling and/or burning permitted within SMZ. (*page 22)				
	STABILIZATION OF FIRE SUPPRESSION RELATED WORK DAMAGE 1. Areas impacted by fire suppression activities have been stabilized. (*page 27)				
	EMERGENCY REHABILITATION OF WATERSHEDS IMPACTED BY WILDFIRES 1. Corrective measures have been applied to minimize the loss of soil productivity, deterioration of water quality, and threats to life and property, both on-site and off-site. (*page 27)				
ADDITIONAL COMMENTS: (include significant weather events since the harvest if known)					

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