

## Appendix E – Best Management Practices

### Misery Lake Environmental Assessment Best Management Practices (BMPs) Bert Wasson, Hydrologist July 29, 2004

#### INTRODUCTION:

Mitigation measures are actions taken to reduce the impact of the project on resources and protect beneficial uses. Mitigation may be accomplished by: avoiding, minimizing, rectifying, reducing, or compensating for the impact using a variety of techniques. Best Management Practices (BMP's) are mitigation measures used to protect water quality. The selection and design of BMPs are an integral part of the Colville National Forest's Land and Resource Management Plan Standards and Guidelines for Soil, Water, and Air (Forest Plan, pg. 4-50 to 4-54). The BMP process, including monitoring, is described in the Forest Plan, page 4-51 item 3; and the Forest Plan FCE Appendix G. Appropriate BMPs are selected for each project by an interdisciplinary team. BMP selection and design are dictated by site-specific water quality objectives, soils, topography, geology, vegetation, climate, economics, institutional constraints, etc.

The following were documented for each BMP selected:

- Title of general BMP as defined in "General Water Quality Best Management Practices"
- Objective of the BMP
- Explanation of the need for the BMP
- Implementation and Responsibility - an explanation of how the BMP will be achieved and who will be responsible for implementation of the BMP

These BMPs were rated by the team according to their ability to implement. The ratings are:

**High:** Almost certain the BMP can be implemented as planned. These BMPs are usually implemented using the Planning Process, Timber Sale Contract Provisions, road-building specifications, Forest Service manual direction, environmental documents, and Forest Plan Standards and Guidelines.

**Moderate:** Greater than 75% certainty the BMP can be implemented as planned. Implementation of the BMP may be dependent on factors such as funding, or unidentified

physical constraints, such as soil or topographic conditions, or extreme weather events, such as a 50- or 100- year flood occurring in the Project Area.

**Low:** Less than 75% certainty the BMP can be implemented as planned. An example of a low ability to implement might be conflicting regulatory requirements, excessive project restrictions, or lack of funding.

BMPs were also rated by their effectiveness. The ratings are:

**High:** Practice is highly effective (> 90%) and one or more of the following types of documentation are available:

- Literature/Research - must be applicable to the area.
- Administrative studies - local or within similar ecosystem.
- Experience - judgment of an expert based on education and/or experience. During the BMP selection design process, qualified personnel such as the Interdisciplinary Team, Sale Administrators, etc will review BMPs.
- Fact - obvious by reasoned (logical) response.

Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

**Moderate:** Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time or logic indicates that this practice is highly effective, but there is little or no documentation to back it up. Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

**Low:** Effectiveness unknown or unverified, and there is little or no documentation or applied logic is uncertain in this case, or the practice is estimated to be less than 75% effective. This practice is speculative and needs both effectiveness and validation monitoring.

- Monitoring plan for the specific BMP

The following BMPs were selected and designed to meet water quality standards for the Burnt Valley WUI Categorical Exclusion by the ID team. These BMPs include an estimate of their effectiveness. These effectiveness ratings are based on literature, research, administrative studies, professional experience, and logic.

## TIMBER MANAGEMENT

**PT-1. Title:** Timber Sale Planning Process

**Objective:** To introduce water quality and hydrologic considerations into the timber sale

planning process.

**Explanation:** The timber sale planning process identifies problems and provides for administrative controls, corrective treatments, and preventive measures. This process defines and estimates the potential changes to water quality and instream beneficial uses. An analysis of cumulative watershed effects is also completed. The result is an EA or EIS and a sale plan or analysis files. These documents will describe how to avoid potential damage during and following the sale layout and subsequent logging operations. Mitigation of damaging effects for those treated areas where damage is unavoidable will be required. The EA or EIS will also preclude treatment of environmentally sensitive areas where damage from proposed treatments cannot be mitigated to conform to Federal, State and Local water quality criteria.

**Implementation and responsibility:** Hydrologists, fish biologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed timber harvest and related activities. The timber sale project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent TSC will include provisions to meet water quality criteria and other resource protection requirements as provided by the EA or EIS.

**Ability to Implement:** High since these functions are totally within Forest Service control.

**Effectiveness:** High

**Monitoring:** As described for the remaining Timber, Road System, Watershed, Vegetative Manipulation, and Fire Suppression and Fuel Management BMPs, as well as Forest EA reviews of timber sales.

**PT-2. Title:** Timber Harvest Unit Design. See INFISH S & G TM-1.

**Objective:** To ensure that timber harvest unit design will secure favorable conditions of water flow, water quality and fish habitat.

**Explanation:** This is an administrative and preventive practice. The proposed timber harvest units are evaluated to estimate the response of the watersheds involved to the proposed timber sale. This includes examining the ability of the watershed to absorb the impacts of the proposed harvest. Characteristics to be evaluated can include the recovery from past harvests; wildfire: the allowable area that can be harvested; the protection of channels; the number, size, and location of harvest units; estimated location and size of roads and skid trails; logging system design; and the potential natural recovery rate of the watershed. Where adverse impacts on the water resource can result, the harvest unit design is modified, and/or watershed treatment measures are applied to accelerate the natural recovery rate.

**Implementation and responsibility:** The hydrologic survey and evaluation of proposed

timber harvest is accomplished through the interdisciplinary process of timber sale planning. Prescriptions to assure acceptable watershed conditions are incorporated into the EA, sale plan, or analysis files. On-the-ground accomplishment of the EA or sale plan direction is carried out by the Sale Preparation Forester, the Sale Administrator, and the administrator of post-sale slash disposal and cultural activities, with follow-up review by qualified resource specialists (hydrologists, fisheries biologists, soil scientists, and geologists). The need for water quality monitoring is identified in the EA or EIS when necessary for water quality control. Periodic EA (NEPA) field reviews evaluate timber harvest unit design.

**Ability to Implement:** High, since this planning function is within the Forest Service control.

**Effectiveness:** High

**Monitoring:** See implementation and responsibilities section. Also see Forest Plan monitoring plan.

**PT-3. Title:** Use of Erosion Potential Assessment for Timber Harvest Unit Design

**Objective:** To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.

**Explanation:** This is a preventive practice. The potential for erosion and mass wasting for an area are estimated by evaluating the soil, topography, rock type, drainage patterns, water conditions, and plant community. Where the potential for erosion and mass wasting is high, special practices and mitigation measures would be applied. Where the potential is low to moderate, some special practices and mitigation measures would be applied, but generally fewer than for areas having high erosion and mass wasting potential.

**Implementation and responsibility:** The determination of the potential for erosion and mass wasting is part of the pre-sale planning process and is evaluated for each timber harvest unit by a watershed specialist. The interdisciplinary team then uses the information to help design the timber sale.

**Ability to Implement:** High since this is a planning function.

**Effectiveness:** High

**Monitoring:** Watershed specialists will evaluate the post-harvest condition of selected harvest units. Also see Forest Plan monitoring plan.

**PT-4. Title:** Use of Sale Area Maps for Designating Water Quality Protection Needs

**Objective:** To delineate the location of protection areas and available water sources as a

guide for both the Purchaser and the Sale Administrator, and to ensure their recognition and proper consideration and protection on the ground.

**Explanation:** The following features are designated on the Sale Area Map, which is an integral part of the TSC.

- a. Location of stream courses to be protected
- b. Wetlands (meadows, lakes, bogs, etc.), if any, to be protected
- c. Boundaries of harvest units
- d. Specified roads
- e. Roads where log hauling is prohibited or restricted
- f. Structural improvements
- g. Areas for different skidding, felling, and yarding methods
- h. Sources of rock for road work, riprapping, etc.
- i. Water sources available for Purchaser's use
- j. Other features required by Division "C" contract provisions

This is an administrative and preventive practice.

**Implementation and responsibility:** The interdisciplinary team identifies and delineates these and other features on maps which are included in the sale plan or analysis files, along with a discussion of each area. The Sale Preparation Forester includes them on the Sale Area Map at the time of contract preparation. The areas are reviewed on-the-ground by the Purchaser and the Sale Administrator prior to harvesting.

**Ability to Implement:** High, but depends on field verification of map work.

**Effectiveness:** High

**Monitoring:** The Sale Area Map is checked by the Sale Preparation Forester, engineers, and watershed specialists to assure accuracy. Also see Forest Plan monitoring plan.

**PT-5. Title:** Limiting the Operating Period of Timber Sale Activities

**Objective:** To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

**Explanation:** Use TSC provisions BT 6.3, CT 6.315, and AT 17.

**Implementation & Responsibility:** Limited operating periods are identified and recommended during the Timber Sale Planning Process by the interdisciplinary team and followed through the life of the timber sale primarily by the Sale Administrator.

**Ability to Implement:** Moderate, since judgment is needed to identify potential damaging conditions.

**Effectiveness:** High

**Monitoring:** During implementation of timber sale activities by the Sale Administrator, Forest Service Representative (FSR), engineers, and watershed specialists. Also see Forest Plan monitoring plan.

**PT-6. Title:** Protection of Unstable Lands

**Objective:** To provide for identification and appropriate management prescriptions for unstable lands.

**Explanation:** Unstable lands (Timber Marginal Lands, TML) are designated as unsuitable to be managed for timber production, but where appropriate, may be suitable for timber harvest following catastrophic events, such as wildfire or blowdown. Lands designated as unsuitable will be reviewed and analyzed as part of the forest planning process. The final decision regarding suitability will become part of the Forest Plan. Small unstable areas are frequently not identified until project level planning occurs.

**Implementation and responsibility:** The Forest or Ranger District interdisciplinary team uses input provided by watershed specialists. Where unstable lands are presently classified as suitable forest lands and this is found to be in error, they are changed to the classification of unsuitable forest lands.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed and silviculture specialists will assist sale layout personnel in an advisory capacity during sale layout. EA (NEPA) field reviews will also be used to evaluate the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-7. Title:** Streamside Management Unit Designation

**Objective:** To designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential adverse effects of nearby logging and related land disturbance activities on water quality and beneficial uses.

**Explanation:** See TSC provisions BT 6.5,6.6, CT 6.4 and 6.42.

**Implementation and responsibility:** The SMU requirements are identified by an interdisciplinary team during the environmental analysis. The timber sale project is designed to include site-specific BMP prescriptions for the prevention of sedimentation and other stream damage from logging debris. The TSC will be designed to implement the SMU prescriptions and areas of avoidance. The Sale Preparation Forester is responsible for the inclusion of the special management areas in the TSC and Sale Area Map, as identified in the EA or EIS and analysis files. The Sale Administrator is

responsible for TSC compliance during harvest operations.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Specialists will assist in evaluating the effectiveness of this BMP. EA (NEPA) field reviews will also be used to evaluate the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-8. Title:** Streamcourse Protection (Implementation and Enforcement)

**Objective:** (1) To protect the natural flow of streams, (2) to provide unobstructed passage of stormflows, and (3) to prevent sediment and other pollutants from entering streams.

**Explanation:** This management practice employs administrative, preventive, and corrective measures to meet the objectives. The following points are fundamental to protecting streams and streamcourses:

- a. Location, method and timing of streamcourse crossings must be agreed to prior to construction. This is done when locations of skid trails, tractor roads, and temporary roads are agreed on by the Forest Service and the Purchaser.
- b. Purchaser shall repair all unavoidable damage to a streamcourse, including damage to banks and channel, to the extent practicable.
- c. All project debris shall be removed from streamcourses, unless otherwise agreed, and in an agreed manner that will cause the least disturbance.
- d. Equipment shall not operate within SMUs or protected streamcourses, as identified on the Sale Area Map.
- e. Equipment is permitted to enter streamside areas only at locations agreed to by the Sale Administrator and the Purchaser.
- f. Water bars and other erosion control structures will be located so as to prevent water and sediment from being channeled into streamcourses, and to dissipate concentrated flows.
- g. Logs will normally be fully or partially suspended in cable log harvesting operations within the SMU of protected streamcourses.

**Implementation and responsibility:** The Sale Administrator works with the Purchaser's representative to ensure that the TSC provisions covering the above items are carried out

on the ground. Specialists can be called upon to help the Sale Administrator with decisions.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Specialists will assist in evaluating the effectiveness of this BMP. EA (NEPA) field reviews will also be used to evaluate the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-9. Title:** Determining Tractor Loggable Ground

**Objective:** To protect water quality from degradation caused by tractor logging ground disturbance.

**Explanation:** Tractor logging is restricted to lands that can be harvested with a minimum of soil compaction and erosion. Factors considered when selecting tractor operable land are: slope, topography, soil texture, soil drainage, and drainage pattern.

**Implementation and responsibility:** Land suitable for tractor logging is identified in the pre-sale phase of the timber sale planning process. Provisions in the TSC specify the areas and conditions upon which tractors can operate. Requirements governing tractor operations are incorporated in the TSC.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** The Sale Administrator oversees the operation to ensure compliance. Specialists conducted field evaluations of selected tractor logging units. Also see Forest Plan monitoring plan.

**PT-10. Title:** Log Landing Location

**Objective:** To locate landings in such a way as to minimize creation of hazardous watershed conditions.

**Explanation:** See TSC provisions BT 6.422 and CT 6.4.

**Implementation and Responsibility:** The majority of landings are constructed by the Forest Service during road construction of specified roads. The Sale Administrator ensures that the landings are located and constructed according to the TSC.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists will assist in evaluating the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-11. Title:** Tractor Skid Trail Location and Design

**Objective:** To minimize the area compacted, erosion, and runoff water.

**Explanation:** See TSC provisions BT 6.422, CT 6.4, 6.41 and 6.42.

**Implementation and Responsibility:** Sensitive areas, including steep and unstable ground, drainages, and high water table soils are identified in silvicultural prescriptions and logging plans. Prescriptions, including skid trail patterns, may be included in the TSC and on the Timber Sale Map. The Sale Administrator executes the prescription on-the-ground by locating the skid trails with the timber Purchaser or by agreeing to the Purchaser's proposed locations prior to construction.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** The Sale Administrator observes operations and watershed specialists visually monitor implementation of this BMP periodically throughout implementation. Also see Forest Plan monitoring plan.

**PT-12. Title:** Suspended Log Yarding in Timber Harvesting

**Objective:** To protect soils from excessive disturbance.

To maintain the integrity of the SMU and other sensitive watershed areas.

**Explanation:** Suspended log yarding includes skyline and helicopter yarding systems. Ground disturbance is reduced by suspending logs either partially or wholly above the ground while transporting them to the landing. These yarding systems require fewer truck roads. Less soil disturbance and fewer truck roads will result in less impact on the water resource.

**Implementation and Responsibility:** Areas where suspended log yarding is to be used are determined during the environmental analysis, documented in the EA or EIS, and included in the sale plan or analysis files. These specific systems are required in the TSC and designated on the Sale Area Map by the Sale Preparation Forester. The Sale Administrator oversees the project operation using the guidelines and standards established in the TSC.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists periodically evaluate on-going harvest operations. Also see Forest Plan monitoring plan.

**PT-13. Title:** Erosion Prevention and Control Measures During Timber Sale Operations

**Objective:** To ensure that the Purchaser's operations shall be conducted to minimize soil erosion.

**Explanation:** See TSC provisions BT 6.6 and CT 6.6#.

**Implementation and responsibility:** Equipment shall not be operated when ground conditions are such that excessive damage will result. The kinds and intensity of control work done by Purchaser shall be adjusted to ground and weather conditions and the need for controlling runoff. Erosion control work shall be kept current immediately preceding expected seasonal periods of precipitation or runoff. The Sale Administrator and Forest Service Representative oversee implementation by the purchaser. Specialists are available for advice as needed.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** In addition to responsibilities for implementation described above, watershed specialists will evaluate the effectiveness of seasonal erosion control work. Also see Forest Plan monitoring plan.

**PT-14. Title:** Revegetation of Areas Disturbed by Harvest Activities

**Objective:** To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.

**Explanation:** See TSC provision CT 6.6#.

**Implementation and responsibility:** An estimate of the need is included in the sale plan or sale planning records, and in the timber sale appraisal. Where the establishment of vegetation is needed, appropriate language must be included in the TSC. The Forest Service shall annually designate on the ground the disturbed soils, such as logging areas and temporary roads, that must be treated.

The Forest Service, shall provide requirements as to soil preparation and the application of suitable seed mixtures, mulch, and fertilizer, and the timing of such work. It is the responsibility of the Sale Administrator to make sure that revegetation work is done correctly and in a timely manner.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists will assist the Sale Administrator during implementation and also in evaluating the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-15. Title:** Log Landing Erosion Prevention and Control

**Objective:** To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigating measures.

**Explanation:** See TSC provisions BT 6.63 and CT 6.6#. The Sale Preparation or Planning Forester and Sale Administrator assess the need for stabilization, with watershed specialist input as needed.

**Implementation and responsibility:** TSC requirements provide for erosion prevention and control measures on all landings. Provisions are made in the TSC for landings to have proper drainage. After landings have served the Purchaser's purpose, the Purchaser shall ditch or slope the landings to permit the drainage and dispersion of water. Provisions are also made for revegetation, if necessary. The specific work needed on each landing will depend on the actual ground conditions. It is the responsibility of the Sale Administrator to ensure that this practice is properly implemented on the ground.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists will assist in evaluating the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-16. Title:** Erosion Control on Skid Trails

**Objective:** To protect water quality by minimizing erosion and sedimentation derived from skid trails.

**Explanation:** See TSC provisions BT 6.64 and CT 6.6#. Normally, the work involves constructing cross ditches and water spreading ditches. Other methods such as backblading may be agreed to in lieu of cross drains. Grass seeding may also be required in the TSC.

**Implementation and responsibility:** Location of all erosion control measures are designated and agreed to on the ground by the Sale Administrator. The Purchaser is obligated to complete and maintain erosion control work specified in contract provisions.

The Sale Administrator ensures that the Purchaser completes and maintains the erosion control work specified in the TSC.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists assist the Sale Administrator, as needed, with on-going operations and also evaluate the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-17. Title:** Meadow Protection During Timber Harvesting

**Objective:** To avoid locating roads, landings, and skid trails in meadows.

**Explanation:** See TSC provision BT 6.61. To protect watershed and wildlife values, roads should not be located in meadows.

**Implementation and Responsibility:** Sensitive areas, including steep and unstable ground, drainages, and high water table soils are identified in silvicultural prescriptions and logging plans. Prescriptions, including skid trail patterns, may be included in the TSC and on the Timber Sale Map. The Sale Administrator executes the prescription on-the-ground by locating the skid trails with the timber Purchaser or by agreeing to the Purchaser's proposed locations prior to construction.

**Ability to Implement:** High since this is a planning step.

**Effectiveness:** Moderate

**Monitoring:** The Sale Administrator observes operations and watershed specialists visually monitor implementation of this BMP periodically throughout implementation. Also see Forest Plan monitoring plan.

**PT-18. Title:** Erosion Control Structure Maintenance

**Objective:** To ensure that constructed erosion control structures are stabilized and working.

**Explanation:** See TSC provisions BT 6.66 and CT 6.6#.

**Implementation and responsibility:** During the period of the TSC, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser. The Sale Administrator oversees the Purchaser's implementation of this BMP. After one-year, erosion control structure maintenance work may be accomplished through watershed restoration practices by the Forest Service.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists will evaluate the effectiveness of the erosion control structures and recommend additional maintenance or erosion control work. Also see Forest Plan monitoring plan.

**PT-19. Title:** Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

**Objective:** To assure the adequacy of required erosion control work on timber sales.

**Explanation:** See TSC provision BT 6.35.

**Implementation and responsibility:** Specific requirements for erosion control are included in each TSC. Sale Administrators, with assistance as needed from watershed specialists, will ensure erosion control measures conform to the applicable provisions.

**Ability to Implement:** Moderate

**Effectiveness:** High

**Monitoring:** Watershed specialists will evaluate the effectiveness of the soil erosion prevention and control measures. Also see Forest Plan monitoring plan.

**PT-20. Title:** Reforestation

**Objective:** To reforest all suitable land harvested within five years after the regeneration cut and to promptly reforest all other suitable areas not harvested but in need of reforestation.

**Explanation:** Regeneration harvest areas are regenerated with trees within five years after cutting. Natural regeneration is used to supplement planting wherever possible.

The implementation of this practice affects water quality by helping to stabilize soils, increase ground cover, and provide improved infiltration.

**Implementation and responsibility:** During the timber sale planning process, the interdisciplinary team assesses the capability of proposed areas to achieve reforestation within the prescribed period. The silviculturist is responsible for this work and uses information collected by the interdisciplinary team, such as; soil productivity, depth, available moisture holding capacity, microclimate, plant indicators, slope, aspect, shape of slope, position on slope, percent of coarse rock fragments, moisture regime and potential for natural regeneration. This information is used to determine regeneration methods.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Regeneration and stocking surveys will be done by the Forest Service to verify the success of the reforestation.

**PT-21. Title:** Servicing and Refueling of Equipment

**Objective:** To prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water and other harmful materials from being discharged into or near rivers, streams and impoundments or into natural or man-made channels leading thereto.

**Explanation:** See TSC provisions BT 6.34 and CT 6.341.

**Implementation and Responsibility:** The COR, ER, or Sale Administrator will designate the location, size and allowable uses of service and refueling areas. They will also be aware of emergency notification procedures and actions to be taken in case of a hazardous substance spill.

**Ability to Implement:** Moderate

**Effectiveness:** High

**Monitoring:** Watershed specialists will assist in evaluating the effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PT-22. Title:** Modification of the TSC

**Objective:** To modify the TSC if new circumstances or conditions arise and indicate that the timber sale will irreversibly damage soil, water, or watershed values.

**Explanation:** Once timber sales are sold, they are harvested as planned via the TSC. At times, however, it may be necessary to modify a TSC when it is determined that operations would cause serious environmental damage. See TSC provision CT 8.3.

**Implementation and responsibility:** If the timber sale, as determined by the appropriate line officer, will unacceptably affect watershed values, the sale will be modified to protect the watershed through agreement with the timber sale Purchaser; or, the contract may be terminated by the Chief of the Forest Service, if the Purchaser does not agree to the terms of the environmental modification.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** EA (NEPA) review process. Also see Forest Plan monitoring plan.

## ROAD SYSTEMS

### PR-1 General Guidelines for the Location and Design of Roads

**Objective:** To locate and design roads which will cause minimum aquatic resource damage.

**Explanation:** There are several considerations that must be incorporated into the planning of road locations and design. These measures are preventive and indirectly protect water quality and the associated aquatic resources. Road location and design standards will be based on the intended road use.

Road location considerations:

- 1) When possible, roads use non-geometric horizontal and vertical alignment conforming as much as possible to natural ground contours.
- 2) The road grade will be rolled when possible between control points to provide roadbed drainage and minimize the concentration of roadbed runoff.
- 3) Locate roads on flatter side slopes instead of steeper side slopes to limit soil movement outside of the road clearing limits.
- 4) Utilize existing road prisms where possible to minimize the amount of new ground disturbance.
- 5) Minimize road construction in Riparian Habitat Conservation Areas (RHCA) while providing for minimum impact stream crossings.
- 6) Stream crossing structures shall be designed to provide the most efficient drainage facility consistent with resource protection and costs. Locate new stream crossings in areas of lower stream gradient to limit the amount of bank protection needed.

Road design considerations for new and reconstructed roads:

- 1) Road designs will cause minimum site disturbance. Road reconstruction designs will consider the intended season and duration of use, as well as the long-term road management objectives. Existing riparian roads will be reconstructed where they are causing actual or potential damage to riparian resources.
- 2) Roads crossing ephemeral draws should have self-maintaining drainage structures such as a drain dips or outslope drains. Use culverts in ephemeral draws where the cost of stabilizing the roadbed and fill slope on drain dips and outslope drains are greater than for the culvert installation with scour protection. ???

3) Culvert inlets will be designed to minimize plugging. ???

4) New or redesigned culverts may limit livestock watering access where appropriate. Riprap, slash or other barriers could be installed to prevent cattle access. The choice of whether to discourage access to a site is the discretion of the Interdisciplinary Team.

**Implementation and Responsibility:** An interdisciplinary team defines resource objectives and develops mitigative measures, which are then used by the Project Implementation Team in locating and designing roads. Compliance with project plan requirements and the operating plan will be determined with tests, measurements, and observations by the Forest Service Contracting Officers Representative (COR) or Engineering Representative (ER).

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** EA review process, tagline reviews, plan-in-hand reviews, progress reviews during construction, and final inspection.

#### PR-2 Erosion Control Plan

**Objective:** To limit and mitigate erosion and sedimentation through effective planning prior to initiation of road construction activities and through effective contract administration during construction.

**Explanation:** Land disturbing activities, such as road construction, usually result in short-term erosion. By effectively planning for erosion control, sedimentation can be minimized. Require the Contractor, to submit a plan to control erosion within the project boundaries prior to starting road construction work. This plan will be approved and monitored by the Forest Service. Road construction/reconstruction contracts will contain provisions for remedial action if State Water Quality Criteria are exceeded. The erosion control plan will provide for periods of inactivity of construction i.e. winter or rainy periods.

**Implementation and Responsibility:** Mitigative measures are developed by design engineers, using an interdisciplinary approach; the measures are reflected in the contract's specifications and provisions. Implementation of the plan will be monitored by the Forest Service prior to winter or rainy periods.

**Ability to Implement:** High

**Effectiveness:** High

Monitoring: Contract packet review, prework meetings, and operating plans along with tests, measurements, and observations by the COR or ER and watershed specialists.

### PR-3 Timing of Construction Activities

Objective: To minimize erosion and sedimentation by conducting road construction and reconstruction operations during normal operating periods.

Explanation: Since erosion and sedimentation are directly related to runoff, scheduling operations during periods of low rainfall is an essential element of effective erosion control. Equipment shall not be operated when ground conditions are such that excessive damage will result. Road construction and reconstruction work that has the potential to affect aquatic resources will normally occur between June 1 and September 30. Work may be accomplished outside this time period subject to the approval of the Forest Service and the Washington Department of Ecology and may require the following limitations:

- 1) Limit the length of road not built to grade and surfaced, to 1000' outside the appropriate road construction operating season (June 1 to September 30).
- 2) Limit the length of road not built with permanent drainage to 1000' outside the appropriate road construction operating season (June 1 to September 30).

The above limitations may be adjusted at the discretion of the ER based on current weather and ground conditions.

Implementation and Responsibility: The work schedule will be developed by road design engineers, using an interdisciplinary approach and will be incorporated into contracts. Forest Service representatives will monitor road construction activities to ensure Purchaser compliance.

Ability to Implement: High

Effectiveness: High

Monitoring: The work window will be set by the contract. Variations will be authorized as stated above.

### PR-4 Location, Design, and Construction of Stable Road Cut and Fill Slopes

Objective: To construct stable cut and fill slopes and minimize soil erosion. Soil movement associated with roads will remain within construction boundaries.

Explanation: A prerequisite of stabilization is to provide basic mechanical stability of the soil, using data from the site investigations to develop requirements for proper slope

angles, compaction, and adequate drainage. Road location standards that would affect the stability of constructed cut and fill slopes, and waste areas include the following:

- 1) In addition to BMP PR-1, locate roads and waste areas on stable landforms while minimizing the exposed cut and fill slope area.
- 2) Where possible, avoid road locations on inner gorge areas with side slopes over 50% to minimize cut and fill slope area and the risk of intercepting subsurface water.

Road design standards for stable cut and fill slopes, and waste areas include the following:

- 1) Design the steepest slope ratio for a given soil type which is mechanically stable and which provides an adequate seed bed.
- 2) Revegetate cut and fill slopes, waste areas, ditches, and roadbeds with permanent vegetation. See what vegetation is growing adjacent to the site. Give preference to the deepest rooted vegetation. Follow the Colville National Forest Seeding Guidelines. Protect vegetation from disturbance until it is effective in stabilizing slopes.
- 3) Minimize the height of road cuts and fills.
- 4) Armor fill slopes where roadbed drainage is concentrated on it. Evaluate the need for slope protection on existing fills when adding drainage structures to existing roads.
- 5) Embankments will generally be placed using side cast and end haul methods. Added compaction requirements may be required during the pre-construction phase for construction of major embankments to assure the mass stability of the embankment.

Construction standards for stable cut and fill slopes include the following:

- 1) Excavated material will be controlled within the construction limits.
- 2) Cut slopes will not be "undercut" at the toe of the slope to create material for roadbed finishing thereby destabilizing the whole slope.
- 3) Cut slopes should be left in a roughened condition as cut by the bulldozer or excavator to promote revegetation.

**Implementation and Responsibility:** Erosion prevention and slope stabilization must be included in the planning and design for all road construction projects. Stabilization measures should be planned for completion on all disturbed ground prior to the winter season. Project location and mitigative measures are determined during the environmental analysis and road design process, and included in the project plan using an interdisciplinary approach.

Compliance with project plan requirements and the operating plan is determined with tests, measurements, and observations by the COR or ER through inspection.

Ability to Implement: High

Effectiveness: High

Monitoring: NEPA field review process, tagline reviews, plan-in-hand review, design review, road construction review process, and final inspection

#### PR-5. Road Slope and Waste Area Stabilization (Preventive)

Objective: To minimize soil erosion from cut slopes, fill slopes, and waste areas.

Explanation: Depending on various factors such as slope angle, soil type, climate, and proximity to waterways, many fill slopes, some cut slopes, and waste areas will require vegetative and/or physical restraint measures to provide for adequate surface soil stability. The level of stabilization effort needed must be determined on a case-by-case basis by appropriate personnel.

Vegetation measures include the seeding of herbaceous species (grass, legumes, or browse species), or the planting of brush and trees. Vegetative measures may include fertilization and mulching to ensure success. Use the Seeding Guidelines for the Colville National Forest to determine the appropriate measures.

Physical restraint measures may include, but are not limited to grading, ditches, scattering vegetative debris, erosion nets, terraces, side drains, blankets, mats, rip rapping, mulch, tackifiers, pavement, and soil seals.

Implementation and Responsibility: Vegetative measures can improve the effectiveness of physical restraint measures, but may not be effective and complete by themselves for the first several seasons.

Physical restraint and vegetative surface stabilization measures will be periodically inspected, as necessary, to determine effectiveness. In some cases, additional work may be needed to ensure that the vegetative or mechanical surface stabilization measures continue to function as intended.

Initial project location, mitigative measures, and management requirements and needs are normally developed during the environmental analysis process, using an interdisciplinary approach. These requirements and needs are translated into contract provisions and specifications.

Ability to Implement: High

Effectiveness: High

Monitoring: Forest Service work leaders, the forest revegetation group, road inspectors, and their supervisors all monitor work accomplishment and effectiveness, to help ensure that design standards, project plan constraints, and mitigative measures are met. Watershed specialists assist in implementation and effectiveness evaluations.

#### PR-6 Dispersion of Subsurface Drainage Associated with Roads

Objective: To minimize the possibilities of roadbed, cut and fill slope failure and the subsequent production of sediment.

Explanation: Road construction may change the subsurface drainage characteristics of a hillside. Since interruption of natural subsurface flows increase the risk of instability, it is sometimes necessary to provide special drainage (subsurface) to avoid saturation of the sub grade and slopes to reduce subsequent slope failure. The following are some dispersion methods that can be used:

- a. pipe under drains
- b. horizontal drains
- c. stabilization trenches
- d. drainage blankets or rock drains
- e. ditches

Dispersal of collected water should be accomplished in an area capable of withstanding increased flows. On most soils, energy dissipaters need to be placed at pipe outlets.

Implementation and Responsibility: The location of wet areas and road sub surface drainage may involve geologists, engineers, soil scientists, and hydrologists. Compliance with project plan and specifications requirements, and operating plans is determined with tests, measurements, and observations by the COR or ER. Additional wet sites found during construction, or necessary changes to known wet sites, will be designed in the same manner as the original wet sites.

Ability to Implement: High, since these are standard Forest Service practices

Effectiveness: Moderate, due to some subsurface drainage problems not being evident until roads are constructed.

Monitoring: Plan-in-hand review, design review, and road construction review process

#### PR-7 Control of Surface Roadway Drainage

Objective: (1) To minimize the erosive effects of water concentrated by road drainage features, (2) disperse run-off from the road, and (3) minimize soil movement outside the road clearing limits.

Explanation: Minimize the detrimental effects of roadway surface drainage by containing and dispersing the drainage within the road clearing limits. Ditches, cross drains, water bars, dips and grade sags are typical runoff control structures. These structures will be provided at frequent intervals to minimize runoff concentration. Roadbeds will be armored adjacent to riparian areas (RHCAs) to achieve a more practical spacing of drainage structures. The booklet “Guides for Controlling Sediment for Secondary Logging Roads” will be used as a guide to determine structure spacing.

Methods used to reduce erosion at structure outlets include energy dissipaters, aprons, downspouts, gabions, debris racks, and armoring ditches and drain inlets and outlets. Soil stabilization can help reduce sedimentation by reducing the effects of erosion on borrow and waste areas, on fill slopes, and on roadbeds.

Dispersal of runoff from roads can be accomplished by rolling the grade, in sloping with cross drains, out sloping, crowning, installation of water spreading ditches, contour trenching, etc. Dispersal of runoff can reduce peak downstream flows and keep water in its natural drainage area.

Installing measures such as sediment filters, settling ponds, and contour trenches can reduce sediment travel.

Implementation and Responsibility: Soil erosion classification, parent rock, steepness of side slopes, soil type, and road grades are used to assist in project location, design criteria, and mitigative measures used by designers for surface drainage. The Road Locator or Survey Crew will determine areas in need of surface road drainage measures during field reconnaissance. Compliance with plans, specifications, and operating plans is determined with tests, measurements, and observations by the Forest Service Representative or ER. The data is determined using an interdisciplinary approach during the environmental analysis and road design process, and then placed in contracts.

Ability to Implement: High

Effectiveness: High

Monitoring: Tag line review, design review and road construction review process. Watershed specialists assist with implementation and effectiveness evaluations

#### PR-8 Constraints Related to Pioneer Road Construction

Objective: To minimize sediment production and mass wasting problems associated with pioneer road construction.

Explanation: Pioneer roads are built to allow equipment access for removal and treatment of clearing debris, installation of drainage structures, haul of construction materials, and access to special sites. Pioneering is usually done within the prism of the planned road. To meet the objective of minimizing sediment, the following constraints should be followed when constructing pioneer roads:

a. Construction of pioneer roads shall be confined to the final roadway construction limits, unless otherwise approved by the ER. Excavation shall be conducted so as to prevent undercutting the final cut slope and to minimize depositing materials outside the designated roadway limits.

b. Erosion control work will be completed prior to periods of seasonal precipitation and then kept up daily as work progresses. The amount of pioneer road open in construction outside the normal operating season will be limited.

**Implementation and Responsibility:** Special access needs and mitigative measures are determined during the environmental analysis process using an interdisciplinary approach. The contractor will be responsible for implementing mitigation measures. Compliance with plans, specifications, and operating plans is determined with tests, measurements, and observations by the FSR or ER.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Progress reviews during construction and road construction review process.

#### PR-9 Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects

**Objective:** To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

**Explanation:** Protective measures will be applied to all areas of disturbed, ground so that rainstorms occurring during construction do not cause substantial turbidity increases in streams. Incomplete roads will not be abandoned for the winter until soil protection measures are in place. The following preventive erosion control measures will occur in the project area before the wet season:

- a. Removal of temporary culverts, culvert plugs, diversion dams or elevated stream crossing causeways.
- b. Installation of side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, or other facilities needed to control erosion.
- c. Removal of debris, obstructions, and spoil material from channels and floodplains.
- d. Grass seeding, placement of hay bales and mulching.

**Implementation and Responsibility:** Erosion control measures will be kept current with ground disturbance, to the extent that the affected area can be rapidly "closed," if weather conditions deteriorate. Compliance with project plan criteria, contract specifications, and

operating plans is determined with tests, measurements, and observations by the COR or ER.

Project mitigative measures and location are developed and documented during the environmental analysis process using an interdisciplinary approach. Compliance with project plan criteria, contract specifications, and operating plans is determined with tests, measurements, and observations by the FSR or ER.

Ability to Implement: High

Effectiveness: High

Monitoring: Road construction review process and observation during and after project completion.

#### PR-10 Construction of Stable Embankments (Fills)

Objective: To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation?

Explanation: The failure of road embankments and the subsequent deposition of material into waterways may result from the incorporation of slash or other organic matter into fills, from a lack of necessary compaction during the construction of the embankment, from unsuitable soils, and from the use of inappropriate placement methods.

To minimize this occurrence, the roadway should be designed and constructed as a stable and durable earthwork structure with adequate strength to support the pavement structure, shoulders, and traffic. Proper slope ratio design, moisture content of soils, and compaction will normally promote stable embankments, as long as the soil is suitable. Embankments will be constructed of appropriate material and may be placed by one or more of the following methods:

- a. Controlled compaction using density controlled strips
- b. Controlled compaction (with normal testing procedures)
- c. Special project controlled compaction
- d. Layer placement (roller compaction)
- e. Layer placement (hauling and spreading equipment operated uniformly over the entire width)
- f. Sidecasting and end dumping

Method "f" is rarely specified for road construction, except on the lowest construction tolerance and to obtain adequate width for equipment to operate, and only in conformance with BMP R-11.

Implementation and Responsibility: Project constraints and mitigative measures are developed through the environmental analysis and road design process, using an interdisciplinary approach. The appropriate method of embankment placement is chosen

during the design process. Compliance with project plan specifications and the operating plan is determined with tests, measurements, and observations by the FSR or ER through inspection.

Ability to Implement: High

Effectiveness: High

Monitoring: Design review, progress reviews during construction, and road construction review process.

#### PR-11 Control of Sidecast Material

Objective: To minimize sediment production originating from sidecast material during road construction or maintenance.

Explanation: Sidecasting is not an acceptable embankment placement measure in areas where it will adversely affect water quality. Sidecasting will not occur within the RHCA of streams. All embankment material will be layer placed within the RHCA. Road surface on full bench ground should not include any width on side cast material without prior approval of the FSR or ER. During road maintenance operations, the deposition of sidecast material shall not occur where it will weaken stabilized slopes. Disposal of slide debris shall occur only at designated waste areas. Waste areas shall be revegetated using the Colville National Forest Seeding Guides immediately after disposal of waste materials.

Implementation and Responsibility: Mitigative measures are developed through the environmental analysis and road design process, using an interdisciplinary approach, and are included in the project specifications, drawings, or guidelines. Compliance with project criteria, contract specifications, and operating plans is determined with tests, measurements, and observations by the FSR, ER, or maintenance engineer. Contracts and guidelines will address slide and slump repair, surface blading, and the placement of road waste material.

Ability to Implement: High

Effectiveness: High

Monitoring: Road design review, progress review during construction, and maintenance activity reviews.

#### PR-12 Control of Construction in Riparian Habitat Conservation Areas (RHCAs)

Objective: To minimize sedimentation, roads will not be located in RHCAs except for stream crossings.

Explanation: RHCAs are described in BMP PT-7. They include contributing areas adjacent to intermittent stream channels, ponds and wetlands. Contributing areas means that portion of the approach to the stream crossing that drains directly to the stream. See BMP PR-1, PR-4 and PR-7 for additional measures that refer to road work in RHCAs. Locate waste areas outside of the RHCA. Road locations will, to the extent possible, be at least 100 feet from the edge of isolated seeps or wet areas to minimize creating additional livestock access to these sensitive areas. The road designer will include debris barriers in road construction specifications wherever stock access to seeps or wet areas is likely, given topography and vegetative cover, and where adequate road construction debris is expected to be available.

Road design standards for RHCA will include the following:

- 1) Roadway drainage will be designed so that runoff is filtered and sediment settled prior to entering stream channels. Where run-off cannot be effectively filtered by the forest floor, artificial sediment detention structures and/or erosion control measures such as brush blankets, filter windrows or fences, riprap blankets or sediment basins should be installed to accomplish the same goal.
- 2) Minimize length of road surface and ditch line draining directly to stream channels.
- 4) Protect road crossing by armoring with surfacing and other methods to withstand the 100-year flood.
- 5) Roads crossing streams and RHCAs will be designed such that stream flow is not diverted down the road in the event of high flow and crossing failure. Existing crossings will be evaluated with respect to their level of failure risk, and will be reconstructed if substantial risk exists.

Road construction standards for RHCA will include the following:

- a) See BMP PR-2 for minimum construction methods required for construction in sensitive areas.
- b) Stream crossings will be constructed “in the dry”. Water flowing into the construction area will be diverted around the area prior to pioneer road construction across the RHCA. Diverted water will be treated to remove sediment prior to flowing back into the creek
- c) No unprotected soil surfaces, such as road embankments, will be left within the 100-year flood plain.
- d) Temporary bypass roads at creek crossings will be stabilized and revegetated after use.
- e) Culverts will be bedded into the streambed sufficiently to avoid piping under the culvert.

f) Construction slash may be placed in slash mats mulching the fill slope

**Implementation and Responsibility:** Project location and mitigative measures are developed by the interdisciplinary team. Disposal of right-of-way and roadside debris will be established in the project plan by the responsible forest official with the help of the interdisciplinary team. Disposal locations will be identified by the Contractor and approved by the Forest Service. Changes in disposal locations may require other resource personnel or interdisciplinary team review. Compliance with environmental criteria, contract specifications, and operating plans is determined with tests, measurements, and observations by the FSR or ER.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** NEPA field review process, preliminary road location review, design review, and progress review during construction.

#### PR-13 Diversion of Flows Around Construction Sites

**Objective:** To minimize sediment transport from disturbed sites during in-channel excavation and construction work, and to minimize turbidity and sedimentation in downstream areas.

**Explanation:** Best management practices required by the State for in-channel excavation on fish-bearing streams may include diverting flow around worksites so that work is done in dry conditions. On all streams, operations must be conducted to avoid sedimentation. Most in-channel construction work will include construction of a sandbag or other diversion, and flow diversion by pumping or another method. Flow diversions will be removed as soon as construction is ended.

**Implementation and Responsibility:** Road construction and reconstruction contracts include this provision, and the Engineering Representative is responsible for assuring timely implementation and the use of methods best suited to each worksite. Where road maintenance requires replacement of stream crossing structures, the road maintenance supervisor is responsible to ensure this practice is properly implemented.

**Ability to Implement:** Moderate; Flow diversions can be physically difficult to construct on steep, very incised streams and in coarse-particle streambeds.

**Effectiveness:** High; where diversions can be constructed and sealed. Moderate; in cobble and boulder-bed streams and in deeply incised channels; Ineffective; (because often not implemented) in streams with very low summer flows where sediment transport during construction is small.

Monitoring: Implementation is documented by the Engineering Representative in the contract inspection reports. Effectiveness is monitored qualitatively on an occasional basis by interdisciplinary teams, and may be documented in the Forest Monitoring Report.

#### PR-14 Bridge and Culvert Installation and Protection of Fisheries

Objective: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

Explanation: Excavation will be used for the installation of culverts and minor streamside structures such as riprap. Waste material developed in such operations should neither obstruct the streamcourse (including natural floodplains) nor the efficiency of the associated structures. The following preventive and corrective measures will be used in the project planning area.

- a. Excavated materials shall be kept out of streams unless they are designed to be placed there. (i.e. riprap, etc.)
- b. Sediment-producing materials will not be left within reach of anticipated flood flows. It will be necessary to pay particular attention during the installation of culverts and temporary bridges.
- c. When needed, bypass and access roads shall be suitably located with plans made for their subsequent obliteration and stabilization.

Implementation and Responsibility: Project location and mitigative measures will be developed during the road design process to meet the project criteria, using an interdisciplinary approach when deemed necessary. Compliance with project criteria and the operating plan is determined with tests, measurements, and observations by the Forest Service FSR or ER through inspection.

Ability to Implement: High

Effectiveness: High

Monitoring: NEPA field review process, plan in hand review, design review, progress review during construction and road construction review process.

#### PR-15 Disposal of Right-of-Way and Roadside Debris

Objective: (1) To ensuring that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing channels; and (2) to prevent debris dams which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.

Explanation: As a preventive measure, construction debris developed along roads near streams shall be disposed of outside of the RHCA.

Implementation and Responsibility: Disposal of right-of-way and roadside debris criteria will be established in the project plan by the responsible forest official with the help of the interdisciplinary team. Disposal locations will be identified by the Contractor and approved by the Forest Service. Compliance with plans, specifications, and operating plans is determined with tests, measurements, and observations by the Forest FSR or ER. Changes in disposal locations may require other resource personnel or interdisciplinary team review.

Ability to Implement: High

Effectiveness: High

Monitoring: NEPA field review process, plan in hand review, progress review during construction, and road construction review process.

#### PR-16 Specifying Riprap Composition

Objective: To minimize sediment production associated with the installation and utilization of riprap material.

Explanation: Riprap is commonly used to armor streambanks and drainage ways from the erosive forces of flowing water. Riprap must be sized and installed in such a way that it effectively resists erosive water velocities. Stone used for riprap should be free of weakly structured rock, soil, and organic material.

Implementation and Responsibility: Project location and mitigative measures will be developed through the road design process to meet the constraints and requirements of the project plan. Compliance with project criteria and operating plans is determined with tests, measurements, and observations by the Forest Service FSR or ER.

Ability to Implement: High

Effectiveness: High

Monitoring: Design review, progress review during construction and road construction review process.

#### PR-17 Water Source Development to Protect Water Quality

Objective: To supply water for roads and fire protection while maintaining water quality.

Explanation: Water source development is normally needed to supply water for road construction, dust control and fire control. Permanently designed sources will normally

result in the lowest long-term impact to the affected streams. Sites where occasional stream access is needed for fire suppression are also seasonally used by stock on grazing allotments. Trampling often keeps the soils churned up so they are chronic sediment sources, and emergency vehicle access is impeded. Design considerations include:

- a) Downstream flow should not be reduced so as to detrimentally affect aquatic resources, fish passage, or other uses.
- b) Small, temporary structures for gathering water might be constructed with sandbags or similar material that would not add sediment to the stream.
- c) Overflow should go directly back into the stream.
- e) Road approaches to the water source should be located and designed to minimize sedimentation and livestock access where appropriate.

**Implementation and Responsibility:** The District fire management officer and resource assistant are responsible for planning and implementation of this BMP. An interdisciplinary team including fire, range, watershed and road design specialists will review site design.

**Ability to Implement:** High.

**Effectiveness:** High; many geotextiles are available for this purpose. Geotextiles have been successfully used on the Colville National Forest to construct water access points.

**Monitoring:** Implementation and apparent effectiveness of this BMP will be reviewed following construction. Corrective action will be taken if sedimentation is observed.

#### PR-18 Maintenance of Roads

**Objective:** To maintain roads in a manner that provides for water quality protection by controlling the placement of waste material, keeping drainage facilities open, and by repairing ruts and failures to reduce erosion and sedimentation.

**Explanation:** Roads normally deteriorate because of use and weather impacts. This deterioration can be reduced through adequate maintenance or restriction of use. All system roads will be maintained to at least the basic custodial care required to maintain drainage, protect the road investment, and minimize damage to adjacent land and resources. This level is the normal prescription for roads that are closed to traffic. Higher levels of maintenance may be chosen to reflect greater use or resource protection. Additional maintenance measures could include resurfacing, outsloping, clearing debris from ditches and cross drains, restoration of ditches, and spot rocking.

Annually, the Forest Service determines the maintenance needs of each road. Roads to be maintained by commercial users are considered.

Road maintenance, except for snow removal, would be completed after snow melt and the road firms up after spring break-up, and before ground freezes in the fall to reduce potential sediment delivery from project roads during the wet season and to assure required road maintenance is completed.

On road segments in or immediately adjacent to RHCAs, excess material removed from sloughed cutslopes or ditches, which cannot be worked onto the road surface, will be hauled to a controlled disposal site designated by the Forest Service.

After final road maintenance is completed, all disturbed surfaces on roads to be closed, including shoulders, will be revegetated according to the Colville National Forest Seeding Guide.

**Implementation and Responsibility:** The work will be controlled by a road maintenance plan. Maintenance levels for each road will be documented in road management objectives. Road maintenance work is accomplished with Forest Service crews or by contract. Compliance with the contract provisions is determined with tests, measurements, and observations by the FSR or ER.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** On the ground review of road maintenance practices on the Forest.

**PR-19. Title:** Road Surface Treatment to Prevent Loss of Materials

**Objective:** To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.

**Explanation:** Unconsolidated road surface material is susceptible to erosion during periods of precipitation. Likewise, dust derived from road use may settle onto adjacent water bodies.

Road surface treatments may include grading, watering, dust oiling, penetration oiling, sealing, aggregate surfacing, chip-sealing, or paving, depending on traffic, soils, geology, road design standards, the road objectives, and available funding.

**Implementation and Responsibility:** Project location and mitigative measures are developed by the design or maintenance engineer to meet project criteria. Compliance with project criteria, contract specifications, and operating plans is determined with tests, measurements, and observations by the COR or ER.

## **Ability to Implement: High**

Effectiveness: High

Monitoring: Road construction review process.

### **PR-20 Traffic Control During Wet Periods**

Objective: To minimize road surface damage and rutting, and lessen sediment washing from road surfaces.

Explanation: Roads shall not be used when conditions are such that excessive damage or erosion may result. Resource damage includes disturbance and erosion of the roadbed that causes soil movement outside of the road prism or accelerated sedimentation of streams. The District Ranger authorizes traffic control. Road surfacing can be used to upgrade roads for all season use.

Implementation and Responsibility: Project implementation procedures will usually be enforced by Forest Service personnel. The decision for restricted use will be based on local weather, soil moisture conditions, and road damage criteria. Mitigative measures will be developed by engineers using an interdisciplinary approach as necessary. Compliance with plans, specifications, and operating plans is determined with tests, measurements, and observations by the Forest Service FSR, SA or ER.

Ability to Implement: High

Effectiveness: High

Monitoring: District road managers will monitor roadway use during wet periods and advise the District Ranger.

### **PR-21 Snow Removal Controls to Avoid Resource Damage**

Objective: To minimize the impact of melt water on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

Explanation: If roads are used during the winter, the following measures may be employed to meet the objectives of this practice:

- a. The road user is responsible for snow removal in a manner that will protect roads and adjacent resources.
- b. Snow berms shall be breached to avoid accumulation or channelization of melt water on the road and prevent water concentration on erosive slopes or soils. If the road surface is damaged, lost surface material will be replaced with similar quality material.

Implementation and Responsibility: Project location and mitigative measures will be developed by the maintenance engineer and District resource assistant. Compliance with developed criteria and the operating plan will be determined with tests, measurements, and observations by the FSR, ER or maintenance engineer.

Ability to Implement: High

Effectiveness: High

Monitoring: Forest road management inspection trips.

#### PR-22 Restoration of Borrow Pits and Quarries

Objective: To minimize erosion and sedimentation from borrow pits and quarry sites.

Explanation: Borrow pits and quarries are sometimes susceptible to erosion and sedimentation due to steep side slopes, lack of vegetation, or their proximity to watercourses. Environmental effects of access roads to the site shall be included in the plans and specifications for the pits.

The Interdisciplinary Team shall review pit development and operating plans. Topsoil will be conserved where feasible (stripped, stockpiled, shaped and seeded to prevent noxious weed infestation) for later pit reclamation.

Drainage from borrow pits will not be permitted to leave the pit site or to enter stream channels or wetlands without filtration through a buffer strip of intact forest ground. If no buffer strip exists, alternative sediment control measures will be used as necessary to ensure that sediment-laden water does not directly enter streams. Sediment basins should be considered.

Borrow pits and quarries will not be located in RHCAs.

After an entry, when a pit will be left inactive for a period of time, drainage and sediment control measures will be inspected to ensure they will function properly during the snowmelt season. Sediment control measures will be inspected after the first winter season to ensure that they are stable and are meeting erosion control objectives.

Implementation and Responsibility: Borrow pit location and mitigative measures (such as the pit plan) will be developed through the road design process, using an interdisciplinary approach. Compliance with project criteria, contract specifications, and operating plans is determined by observations by the FSR or ER.

Ability to Implement: High

Effectiveness: High

Monitoring: NEPA field review process, plan in hand review, design review, progress review during construction and road construction review process.

### PR-23 Obliteration of Temporary Roads and Landings

Objective: To reduce sediment and restore productivity of the land at the completion of intended use.

Explanation: Temporary roads are constructed for a specific short-term purpose, such as, ski area development roads and logging spurs on a timber sale. In order to prevent continued low-level casual use, such roads and landings are obliterated at the completion of their intended use. Due to the location, grades, and drainage are often inadequate for long-term use and maintenance. Temporary roads that are allowed to remain in use beyond their prescribed time are subject to continued, uncorrected damage, and they can become chronic sediment sources.

Effective obliteration is generally achieved through a combination of these measures:

- a. Temporary culverts and bridges removed and natural drainage configuration reestablished.
- b. Road surface deep ripped.
- c. Side slopes reshaped and stabilized.
- d. Road effectively drained and blocked.
- e. Road returned to resource production through revegetation (grass, browse, or trees).
- f. Recon touring or obliterating road template.

The National Forest Management Act requires that all closed temporary roads be returned to resource production within ten years.

Decompaction (ripping to 18" or depth of compaction, whichever is less, with spacing between ripping teeth not more than 24 inches) would be required on all landings where detrimental compaction is identified. Where slash is available, it can be scattered over the decompacted and reseeded landing as mulch. This will discourage stock trampling on these disturbed sites.

Implementation and Responsibility: Obliteration of the road, blocking it to vehicular traffic, removal of bridges and culverts, and stabilization/revegetation of the roadway will usually be required by the Timber Sale Contract. The sale administrator may request the advice of a watershed specialist in determining the most appropriate location and stabilization measures required. District Rangers or their representatives are responsible for assuring the obliteration of such roads is accomplished.

Ability to Implement: High

Effectiveness: High

Monitoring: Post-sale reviews by the Sale Administrator.

## RANGE MANAGEMENT

Grazing can be used as a means of managing vegetation to meet resource management objectives such as fuels management and reducing competing vegetation in plantations. Range management involves range analysis, allotment management planning and improvement and a grazing permit system. It includes controlling overall livestock numbers and season of use, controlling livestock distribution, structural and non-structural improvements, providing for wildlife and other uses and restoration of deteriorated range lands.

**PRM-1. Title:** Range Analysis, Allotment Management Plan, Grazing Permit System, and Permittee Operating Plan

**Objective:** To safeguard water quality under sustained forage production, and managed forage harvest by livestock and wildlife.

**Explanation:** An analysis of existing and estimated potential grazing capacity is conducted by an interdisciplinary team to evaluate environmental concerns, resource values, and uses. Following this analysis, the responsible Forest Officer, in cooperation with the permittee, prepares a written allotment management plan and issues a permit to authorize livestock grazing as per stipulations in the management plan. Allotment Management Plans include measures to protect other resource values, such as water quality, and to coordinate livestock grazing with other resource uses. Range management BMPs will be specified in the plan. Also included are needed rangeland improvements, an implementation schedule and a monitoring plan. (See Colville National Forest Range Allotment Administration "Standards" 5/95)

A permittee operating plan is prepared, reviewed, and revised annually as needed to reflect direction in the allotment management plan and to account for current allotment conditions and trends. The amount of livestock use is determined primarily through measurement of vegetative utilization. Allowable use is determined by research and experience and is that which maintains soil protection and stability and is consistent with other resource uses.

**Implementation and Responsibility:** The District Ranger is responsible for analysis of range allotments, determining the need for an environmental assessment, preparation of management plans, and processing of grazing applications. The Forest Supervisor approves management plans after appropriate environmental analysis, and issues grazing permits with stipulations and conditions. Most permits are issued for ten year terms. Allotment management plans are revised as needed. Permittee operating plans are prepared or revised annually to allow for current allotment conditions and trends and to incorporate current instructions. The permittee carries out the plans under the immediate

direction and supervision of the District Ranger or the Range Staff Officer. Corrective action is taken if a permittee does not comply with grazing permit conditions designed to protect soil and water resources.

**Ability to implement:** High

**Effectiveness:** High

**Monitoring:** The Range Officer, Range Conservationist, or Range Technician, survey range condition and monitor compliance with the terms of the grazing permit. Watershed specialists evaluate the effectiveness of the Range Management BMPs for protecting the soil and water resource. Also see Forest Plan monitoring plan.

**PRM-2. Title:** Controlling Livestock Numbers and Season of Use

**Objective:** To maintain and protect soil and water resources through management of livestock numbers and season of use.

**Explanation:** In addition to proper stocking rate and season of use specified in the grazing permit, adequate field checks are made to identify needed adjustments in season and livestock numbers. Checks include:

- a. Range readiness evaluations to assure that the soil is not too wet and that sufficient forage growth has occurred.
- b. Stock counts or other measures to assure that only permitted livestock enter the allotment.
- c. Forage utilization measurements to provide data for improved livestock distribution and stocking.
- d. Periodic assessment of rangeland to verify soil and vegetative stream condition and trend.

The timing of animal turnout and roundup can be critical for minimizing range and riparian damage. Riparian areas are most vulnerable when soils are at their wettest. Season-long grazing may not be a feasible alternative for protecting streams. Time the season of use to meet Forest Plan Standards and Guidelines.

**Implementation and Responsibility:** Allotments are administered by the District Ranger or the Range Staff Officer, or their representative. Provisions are carried out by the grazing permittee as permit requirements. The Forest Supervisor approves grazing permits and allotment management plans. Field check and measurements are made annually by the Forest Service. Numbers and seasons may be changed annually to reflect current allotment conditions and trends, and if necessary, the permit may be modified, canceled, or suspended in whole or in part.

**Ability to implement:** High

**Effectiveness:** High

**Monitoring:** In addition to verifying the implementation of permit conditions, range condition checks are used to evaluate the effectiveness of the site-specific BMPs. Watershed specialists assist the Range Staff Officer or their representative in evaluating selected allotments. Also see Forest Plan monitoring plan.

**PRM-3. Title:** Controlling Livestock Distribution within Allotments

**Objective:** Limit the intensity and duration of stock use in areas sensitive to concentrated use; preclude prolonged use of any area that would result in lost vegetative cover and soil compaction. Limit livestock impacts in riparian areas to levels that will permit recovery toward or maintenance of desired riparian conditions.

**Explanation:** Livestock use within allotments is typically not uniform due to variations in topography, water availability, vegetation type and condition. Several techniques are used to achieve proper distribution, or lessen the impact on areas which are sensitive or which would naturally be overused. These techniques include:

- a. Construction and maintenance of fences or slash barriers to limit cattle movement.
- b. Water development and maintenance in areas that receive little use or where riparian area damage is occurring.
- c. Riding and herding to shift livestock locations (especially from riparian areas).
- d. Whenever possible, salt and supplements will be placed at least 1/2 mile from riparian areas below desired condition. They will be placed no closer than 1/4 mile from other riparian areas, including intermittent and ephemeral drainages.
- e. Range improvements such as construction of shade structures, fertilization, prescribed burning, or seeding.
- f. Moving livestock when prescribed utilization levels are reached.
- g. When stock are moved to a new pasture, the previous one will be cleared of sock according to the annual plan of work.
- h. Bulls will be managed so that their presence does not cause damage to riparian areas.

- i. Protect riparian areas at stream crossings using structures such as: wing fences, slash filter windrows and armored approaches to streams.

**Implementation and Responsibility:** All requirements above will be included in the grazing permit and will be accomplished by the permittee. The District Range Conservationist is responsible for tracking riparian condition and verifying that standards are not exceeded. Frequency of field checks required to track riparian condition will vary throughout the season depending on the relative attractiveness of riparian areas to stock, and on how closely a standard is being approached at any time. At all times, inspections will be frequent enough to preclude exceedance of impact standards. Riparian condition checks will be documented in the allotment inspection diary.

**Ability to implement:** Moderate since livestock can move and breach the best barriers at times.

**Effectiveness:** High

**Monitoring:** Forest and District range and watershed personnel will evaluate the distribution of livestock within the allotment and their effect on upland and riparian ecosystems. Also see Forest Plan monitoring plan.

**PRM-4. Title:** Rangeland Improvements

**Objective:** Safeguard water quality under sustained forage production and manage forage harvest by livestock and wildlife.

**Explanation:** Rangeland improvements are intended to restore or improve forage quality, quantity, and/or availability. They may consist simply of providing rest through rotation grazing, or fencing, or lighter grazing use by changing the grazing season, kind, class, or permitted number of livestock. Other measures may include stream channel stabilization efforts such as riprapping, gully plugging, and planting. Reseeding and/or fertilization may be done alone or in conjunction with any of these measures. Water developments are often included in rangeland improvement projects. Improvement efforts are directed at increasing the ability of the range to produce at or as near its potential as possible; to make the forage available to livestock and wildlife; to foster decreased livestock use of streamside riparian areas as watering areas by providing alternate water sources located away from streams; and to provide protection to the other resources. Practices used for improvement of watershed conditions, which include the exclusion of livestock, are described in Watershed BMPs: W-1. Watershed Restoration and W-8. Management by Closure to Use.

**Implementation and Responsibility:** The permittee is a cooperator in rangeland improvements and may actually complete the work under Forest Service direction. Implementation may also be done by Forest Service crews or contractors. Range

improvement needs are usually recognized in the range allotment planning process and are scheduled for implementation in the allotment plan. Watershed condition assessments developed by an interdisciplinary team should be used in development of range improvement treatments and programs.

**Ability to implement:** High

**Effectiveness:** High

**Monitoring:** Implementation of this BMP will be monitored by the district range conservationist and documented in the allotment inspection diary.

## VEGETATIVE MANIPULATION

Vegetative manipulation on the Forest is conducted in the course of forest reestablishment, conversion of some hardwood stands to conifers, and wildlife habitat improvement. Most of the work is done during timber sale activities on the Forest. Methods of treatment may include chemical, mechanical, burning, and biological (grazing). General preventive practices and mitigative measures for all methods of type conversion are described in the Managing Competing and Unwanted Vegetation EIS program EIS, as well as in other BMPs. Each project is evaluated by an interdisciplinary team through an environmental analysis, and documented in an Environmental Assessment (EA).

The project EA specifies where, when, and in most cases, how management practices should be applied to meet project, administrative, and environmental objectives. An implementation plan is developed for all projects and outlines all site-specific application methods and safety, monitoring and evaluation requirements.

PVM-1. Title: Slope Limitations for Tractor Operation

**Objective:** To reduce gully and sheet erosion and associated sediment production by limiting tractor use.

**Explanation:** This is a preventive measure that limits excessive surface disturbance and prevents surface water from concentrating. The measure limits tractor operation to gentle slopes to prevent disturbance and erosion. Evaluation criteria used to determine slope restrictions are climate, soil condition, soil stability, and mass stability, as determined by field and office analysis. These determinations made during the environmental analysis.

**Implementation and responsibility:** The Sale Administrator or COR is responsible for ensuring implementation of the contract provisions that apply to tractor operation on steep slopes. Project planners have the responsibility to ensure that appropriate tractor operation provisions are included in the contract. This practice is implemented on vegetative manipulation projects where appropriate. For in-service projects, the project supervisor is responsible for the project and for identifying areas where operations should

be limited. The supervisor's direction is taken from the project work plan and project EA or EIS.

Ability to Implement: High

Effectiveness: High

Monitoring: Implementation monitoring will be done by the COR, Project Supervisor, Sale Administrator, FSR, and watershed specialists. Watershed specialists will evaluate post-project soil condition on selected projects to verify the effectiveness of the site-specific project BMPs. Also see Forest Plan monitoring plan.

PVM-2. Title: Tractor Operation Excluded from Wetlands and Meadows

Objective: To limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.

Explanation: This practice is a preventive measure designed to keep from concentrating surface water and to keep from compacting soil surfaces which may lead to rill or gully erosion with associated turbidity and sediment production.

This measure is intended to prevent or reduce the need for corrective measures to prevent water concentration problems. BMP PT-17, Meadow Protection During Timber Harvest, is related to this practice.

Implementation and responsibility: The application is mandatory on all vegetation manipulation projects unless specifically excepted in the environmental analysis (NEPA) process. The COR is responsible for identifying wet areas and meadows not previously identified by the project planners. For force account projects, the project supervisor is responsible for identifying wet areas and meadows not previously identified by the project planner. The supervisor is also responsible for following project management requirements pertaining to wet areas and meadows. The project planners are responsible for including appropriate contract specifications and identifying management constraints in the project work plan and EA.

Ability to Implement: High

Effectiveness: High

Monitoring: The COR or project supervisor will monitor implementation of this BMP.

PVM-3. Title: Revegetation of Surface Disturbed Areas

Objective: To protect water quality by minimizing soil erosion through the stabilizing influence of vegetation.

Explanation: This is a corrective practice to stabilize the soil surface of the disturbed area. The vegetation selected will be a mix best suited to meet the management objective for the area. Fertilization, irrigation, tackifier, netting, jute or other material may be necessary to ensure plant growth.

Grass or browse species may be seeded between recently planted trees where appropriate for aesthetics, erosion prevention or wildlife needs. The factors evaluated are soil fertility, slope, aspect, erosion hazard, soil water holding capacity, climatic and weather variables, and suitable species selection. These are both field determinations and office interpretations made by an interdisciplinary team. Timber BMP T-15, Revegetation of Area Disturbed by Harvest Activities, is related to this BMP.

Implementation and responsibility: The identification of disturbed areas and treatment needs will be determined through an environmental analysis. Projects are subsequently monitored to assess their effectiveness, and need for follow-up action. The responsible line officer assembles an interdisciplinary team when appropriate or assigns specific individuals or work teams to plan and execute the project.

Ability to Implement: High

Effectiveness: High

Monitoring: Implementation monitoring will be done by the COR, Sale Administrator, FSR, and watershed specialists. Watershed specialists will evaluate the effectiveness of the treatment measures for selected projects. Also see Forest Plan monitoring plan.

PVM-4. Title: Soil Moisture Limitations for Tractor Operation

Objective: The objective of this measure is to prevent compaction, rutting, and gullyng and production of sediment and turbidity.

Explanation: This is a preventive measure that reduces surface disturbance during wet soil conditions which would result in compaction, rutting, and gullyng. This measure reduces the need to later correct rutting and gullyng problems. Soil erodibility, climatic factors, soil/water relationships, and mass stability are constraining factors which are identified by soil scientists, geologists, and hydrologists during the environmental analysis (NEPA) process.

Implementation and responsibility: The COR is responsible for determining when the soil surface is unstable and susceptible to damage and is responsible for suspending or terminating operations for contracted projects. For in-service projects, the project supervisor is responsible for determining when the soil surface is unstable and susceptible to damage, and is then responsible for terminating operations. Project planners are responsible for including appropriate contract provisions and management requirements in project work plans and EAs.

Ability to Implement: High

Effectiveness: High

Monitoring: Implementation monitoring is done by either the COR or project supervisor, with assistance as needed from watershed specialists. Also see Forest Plan monitoring plan.

## FIRE AND FUELS MANAGEMENT

Emergency fire suppression activities on National Forest lands are conducted to prevent the loss of life and property, minimize erosion, loss of soil productivity and water quality degradation. Suppression activities include fireline construction, access road construction, firing operations and aerial or ground application of fire retardants. Water quality objectives are weighed with the need for rapid suppression during the development of suppression activities. Therefore, one of the objectives of the fire suppression program is to rehabilitate suppression-related damage.

Burned area rehabilitation surveys are conducted by an interdisciplinary team on all fires that exceed 300 acres, as well as on smaller fires if significant resource damage has, or could occur. Approved rehabilitation work is accomplished by both the Forest Service and/or through contracts.

Fuels management activities are intended to reduce the size, cost and damage from wildfire and enhance resource values. Fuels management encompasses both natural vegetation and activity-related residues. In natural fuels programs, a form of vegetative manipulation, vegetation is manipulated by changing fuel type, creating fuel breaks or by reducing or altering fuels over extensive areas. Fuels management in activity fuels is concerned with the manipulation of dead fuels such as cull logs and slash associated with the various management activities on the Forest. These materials may be utilized, removed or burned to reduce fuel loading.

### **PF-1. Title:** Fire and Fuel Management Activities

**Objective:** An objective of fire management activities is to reduce the potential public and private losses which could result from wildfire and/or subsequent flooding and erosion, by reducing the frequency, intensity and destructiveness of wildfire.

**Explanation:** These administrative, corrective and preventive measures include:

- a. Fuelbreak construction.
- b. Vegetation type conversions or manipulation.
- c. Greenbelt establishment to separate urban areas from wildlands.
- d. Fuel reduction units.
- e. Access roads for rapid ingress and egress.
- f. Fire suppression activities.
- g. Fuel utilization and modification programs.
- h. Public information and education programs.

**Implementation and Responsibility:** Suppression activities are emergency actions conducted in response to wildfires. Fuel Management is implemented through normal program planning and budgeting and NEPA processes, predominantly by the Forest Service fire management organization. Other resources such as timber range, and wildlife may initiate fuel modification projects that also benefit Fire Management. Fuel management projects are evaluated by an interdisciplinary team. The management constraints and multiple resource protection prescriptions are documented in the project EA or EIS. Application of constraints and prescriptions are the responsibility of the project officer.

**Ability to Implement:** Moderate

**Effectiveness:** Moderate

**Monitoring:** Implementation and effectiveness monitoring is done by fuel management and other specialists within the Forest Service fire organization. Watershed specialists evaluate effectiveness of the soil and water mitigation measures for selected projects. Also see Forest Plan monitoring plan.

**PF-2. Title:** Consideration of Water Quality in Formulating Prescribed Fire Prescriptions

**Objective:** To provide for water quality protection while achieving the management objectives through the use of prescribed fire.

**Explanation:** Prescription elements include, but are not limited to such factors as, fire weather, slope, aspect, soil moisture, and fuel moisture. These elements influence the fire intensity and thus have a direct effect on whether or not a desired ground cover remains after burning, and whether or not a water repellent layer is formed. The amount of remaining ground cover and extensiveness of water repellent soil can significantly affect erosion rates on certain sensitive sites.

**Implementation and Responsibility:** Field investigations are conducted as required to identify site-specific conditions which may affect the prescription. Water quality objectives are established prior to preparation of the burn plan. The prescription elements are assessed by an interdisciplinary team and the fire prescription prepared by the fire management officer. The fire prescription should be reviewed by the interdisciplinary team, and shall be approved by the appropriate line officer.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** See implementation and responsibility section.

**PF-3. Title:** Protection of Water Quality during Prescribed Fire Operations

**Objective:** To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering water bodies.

**Explanation:** Some of the techniques used to prevent water quality degradation are:

- a. Constructing water bars in fire lines.
- b. Maintaining the integrity of the SMU or streamcourse.
- c. Planning prescribed fires with intensities that will not result in soils becoming hydrophobic.
- d. Retaining or re-establishing ground cover to prevent erosion of the burned site.

**Implementation and Responsibility:** Forest Service and/or other crews are used to prepare the units for burning. This includes water barring firelines and reducing fuel concentrations. The interdisciplinary team will identify Streamside Management Units and soils with high risk of becoming hydrophobic as part of project planning.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Forest Service fire organization personnel and watershed specialists monitor implementation and effectiveness of this BMP. Also see Forest Plan monitoring plan.

**PF-4. Title:** Minimizing Watershed Damage from Fire Suppression Efforts

**Objective:** To avoid watershed damage in excess of that which would be caused by the fire itself.

**Explanation:** Heavy equipment operation on fragile soils and steep slopes is avoided when possible. Project fires use a Resource Advisor and watershed specialists to advise the Incident Commander on resource values during the suppression effort. National fire management policies were changed in 1978, to provide in part for an Escaped Fire Situation Analysis if containment of the fire is not expected prior to the second burning period. The analysis is prepared by a line officer with Incident Management Team input. Watershed considerations are part of the analysis.

**Implementation and Responsibility:** A Resource Advisor and technical specialists can be assigned by the Forest Supervisor to the Incident Management Team. They specifically work for the Planning Section Chief. A soil scientist, geologist, or hydrologist is normally available to identify fragile soils and unstable areas and would be assigned to the fire as a technical specialist.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Implementation monitoring is done on an on-going basis throughout the fire suppression effort, by the fire organization, Resource Advisors, and watershed specialists. Effectiveness monitoring is done following the fire by the same individuals.

**PF-5. Title:** Repair or Stabilization of Fire Suppression Related Watershed Damage

**Objective:** To stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by suppression related activities.

**Explanation:** Treatments for fire-suppression damages include, but are not limited to, installing water bars and other drainage diversions in fire roads, firelines, and other cleared areas; seeding, planting and fertilizing to provide vegetative cover, spreading slash or mulch to protect bare soil; repairing damaged road drainage facilities; and clearing stream channels of structures or debris that is deposited by suppression activities.

**Implementation and responsibility:** This work is done by the fire fighting forces either as a part of the suppression effort or before personnel and equipment are released from the wildfire incident. The Incident Commander is responsible under the direction of the local Line Officer for repair of suppression related resource damage.

**Ability to Implement:** Moderate

**Effectiveness:** Moderate

**Monitoring:** Implementation is monitored by the fire organization, Resource Advisors, and watershed specialists. Effectiveness and rehabilitation of fire lines will be evaluated annually until the watershed is stabilized. Also see Forest Plan monitoring plan.

## WATERSHED MANAGEMENT

Watershed management is the art and science of protecting, maintaining and enhancing soil, water and geologic resources. Management is oriented towards maintaining or improving watershed conditions favorable for water yield and timing, water quality and soil productivity. It also includes the rehabilitation and restoration of National Forest lands damaged by catastrophic events or degraded by past use.

**PW-1. Title:** Watershed Restoration

**Objective:** To repair degraded watershed conditions and improve water quality and soil stability.

Explanation: Watershed restoration is a corrective measure to:

- a. Improve ground cover.
- b. Improve infiltration.
- c. Prevent overland flow and conserve the soil resource.
- d. Stabilize stream banks and stream channels.
- e. Improve soil productivity.
- f. Reduce flood occurrence and flood damage.
- g. Enhance economic, social, and/or aesthetic values of the watershed.

The following factors shall be considered during development of restoration projects: predicted changes in water quality, downstream values, site productivity, threats to life and property, any direct or indirect economic returns and social or scenic benefits.

Watershed restoration measures should reflect the state of the art and must be chosen to reflect the unique hydrologic and climatic characteristics of each watershed. Examples of watershed restoration measures are streambank stabilization, landing pullback, and ripping and planting unused temporary roads and landings.

**Implementation and Responsibility:** This management practice is implemented through the development of a Watershed Improvement Needs (WIN) inventory identification of projects, the approval of restoration plans and related environmental assessments, and the funding and implementing of the restoration actions. The Forest Supervisor shall ensure that a WIN inventory is completed and prioritized.

Planning should be done through an interdisciplinary effort. Multifunctional funding of projects should be pursued where improvement of watershed conditions will benefit multiple resource areas. The actual work may be done by force account or through contract. Effectiveness should be monitored by project proponents.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed specialists and Ranger District resource personnel will evaluate the performance and effectiveness of the watershed restoration measures.

PW-3. Title: Protection of Wetlands

**Objective:** To avoid adverse water quality impacts associated with destruction or modification of wetlands.

**Explanation:** The Forest Service does not permit the implementation of activities and new construction in wetlands whenever there is a practical alternative. Evaluation of proposed actions in wetlands will consider factors relevant to the proposal's effect on the survival and quality of the wetlands. Factors to be evaluated include water supply, water quality, recharge areas, flood and storm hazards, flora and fauna species, habitat diversity and stability, and hydrologic utility.

**Implementation and Responsibility:** The Regional Forester is responsible for ensuring that wetland values are considered and documented as an integral part of all planning processes. The Forest Supervisor will determine whether proposed actions will be located in wetlands and, if so, whether there is a viable alternative. The Forest Supervisor must ensure that all mitigating measures are incorporated into the plans and designs and that the actions maintain the function of the wetlands. During project planning, all potentially-impacted wetlands should be identified on maps. Identification and mapping of wetlands are part of the land management planning data inventory process.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Watershed, wildlife, and resource specialists verify that all wetlands requiring protection have been identified either at the Forest Planning or project level. The land management planning data inventory is updated when non-mapped wetlands are identified at the project level.

**PW-4. Title:** Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control & Countermeasure (SPCC) Plan

**Objective:** To prevent contamination of waters from accidental spills.

**Explanation:** A contingency plan is a predetermined organization and action plan to be implemented in the event of a hazardous substance spill. Factors considered for each spill are the specific substance spilled, the quantity, its toxicity, proximity of the spill to waters, and the hazard to life and property.

The SPCC Plan is a document which requires appropriate measures (40 CFR 112) to prevent oil products from entering the navigable waters of the United States. An SPCC Plan is needed if the total oil products on site above-ground storage exceeds 1320 gallons or if a single container exceeds a capacity of 660 gallons.

**Implementation and Responsibility:** The hazardous spill contingency plan identifies coordination responsibilities for various kinds of spills, as well as the names and telephone numbers of agencies to call for spill reporting and cleanup. Most spills are

cleaned up by agencies or spill cleanup contractors specially equipped for the job. Disposal methods and sites will be coordinated with EPA, State, and local officials responsible for safe disposal.

SPCC Plans are required for Forest Service owned and special use permitted facilities, as well as by timber sale operators and other contractors who store petroleum products. They must be reviewed and certified by a registered professional engineer.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** The Sale Administrator and Engineering Representative will track the implementation of this BMP throughout the timber sale. In the event of a spill, watershed specialists will be on hand to monitor the situation and provide advice.

**PW-7. Title:** Water Quality Monitoring

**Objective:** To determine effects of land management activities on the beneficial uses of water; to monitor baseline watershed conditions for comparison with State Water Quality standards, Forest Plan standards, and estimation of long-term trends; to ensure the health and safety of water users; to evaluate BMP effectiveness; and to determine the adequacy of data, assumptions, and coefficients in the Forest Plan.

**Explanation:** The Forest will manage watersheds to produce water of quality and quantity sufficient to maintain beneficial uses and comply with applicable State requirements for protection of waters.

Water quality monitoring is a mechanism which evaluates the effectiveness of a management prescription in protecting water quality. A water quality monitoring plan may be made a part of an EA or EIS, a management plan, a special use permit, or it may be developed in response to other needs.

**Implementation and Responsibility:** A water quality monitoring plan is written, reviewed, and implemented by qualified Forest personnel. Interpretation of the data and any reporting is also done by qualified personnel. The EPA STORET system should be used for computer storage of most water quality data collected.

Specific monitoring and evaluation plans should include such items as:

- a. Monitoring objectives.
- b. Review of existing data and information.
- c. Location of monitoring sites.

- d. Soil or water quality characteristics that are to be monitored and evaluated.
- e. Type(s) or technique(s) of monitoring.
- f. Intensity of monitoring (frequency and duration).
- g. Responsibilities and roles of monitoring personnel.
- h. Methodology for analysis and evaluation.
- i. Estimated cost.
- j. Report preparation.

When changes and effects from management activity are detected, the Forest will evaluate their significance and determine appropriate action. Where project level activities will not meet Forest Plan standards or water quality objectives requirements for the protection of waters of the State, they will be redesigned, rescheduled, or dropped.

**Ability to Implement:** High

**Effectiveness:** High

**Monitoring:** Project environmental documents are reviewed prior to approval to ensure that adequate monitoring is proposed. Water quality monitoring plans are developed or reviewed by Forest watershed personnel and/or Forest NEPA coordinator and/or Forest Watershed Staff Officer. Also see Forest Plan monitoring plan.