Appendix J – Best Management Practices

Introduction

A Best Management Practice (BMP) is a practice or combination of practices that have been determined to be the most effective and practicable in preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals (40 CFR 130.2 [m]). Using of BMPs is required by the Clean Water Act (33 U.S.C 1251 *et seq*.) to reduce nonpoint source pollution to the maximum extent practicable. Nonpoint source pollution is defined as pollutants detected in waterbodies, such as a streams or lakes, which come from the landscape in a dispersed manner. The BMPs are the primary controls for achieving Oregon's water quality standards pertaining to nonpoint source pollution. Oregon's narrative and numeric criteria within water quality standards are designed to protect designated beneficial uses such as salmonid spawning and rearing, resident fish and aquatic life, domestic water supplies, and water-contact recreation.

The BLM is responsible for implementing BMPs on the lands it administers.[30] The BMPs provide compliance with the Clean Water Act of 1972, as amended, State of Oregon water quality legislation (Chapter 340), and the O&C Act. For proposed management actions, the BLM would design and implement BMPs in a manner that is consistent with the ODEQ Memorandum of Understanding (ODEQ and USDI BLM 2011), and with the Clean Water Act.

The BLM's and ODEQ's strategy for managing and controlling nonpoint source water pollution from BLM-administered lands in the State of Oregon is managed through a Memorandum of Understanding between the two agencies (ODEQ and USDI BLM 2011). This MOU defines the process by which the BLM and ODEQ will cooperatively meet State and Federal water quality rules and regulations. The physical, chemical, and biological conditions of 'waters of the State' that support beneficial uses[31] would be protected, restored, and maintained by working in a proactive, collaborative, and adaptive manner. The MOU specifies that the BLM would implement site-specific BMPs as specified in management objectives, standards, guidelines, design features, and mitigation developed in RMPs, RMP amendments, project-level plans, and Water Quality Restoration Plans to meet applicable water quality standards. The MOU requires monitoring to ensure that practices are properly designed and applied, to determine the effectiveness of practices in meeting water quality standards, and to provide for adjustment of BMPs when it is found that water quality standards are not being protected.

The RMP contains measures in both management direction and BMPs to prevent and reduce the amount of pollution generated by non-point sources to a level compatible with water quality goals. Where a specific measure would apply to all actions on all sites (either in a specific land use allocation or across the decision area), the BLM presents the measure as management direction.[32] Where the applicability of a specific measure would depend upon site-specific conditions, technical feasibility, resource availability, and the water quality of those waterbodies potentially affected, the BLM presents the measure as a BMP. This appendix only lists the BMPs, which must be considered together with the management direction (**Appendix B**).

[30] The ODEQ has granted Designated Management Agency status to the BLM through a Memorandum of Understanding (ODEQ and USDI BLM 2011).

[31] Beneficial uses are defined in Oregon Revised Statute (ORS), Chapter 468B Water Quality, and Oregon Administrative Rules (OAR), Division 41.

[32] Management direction identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-administered lands and resources (**Appendix B**).

The BMPs described in this appendix are methods, measures, or practices selected based on site-specific conditions to ensure that the BLM would maintain water quality at its highest practicable level to meet water quality standards and TMDL load allocations as set by the State of Oregon's Department of Environmental Quality. These site-specific BMPs are a compilation of commonly employed practices developed through professional experience or research, and designed to minimize water quality degradation and loss of soil productivity. The BMPs include, but are not limited to, avoidance, structural and nonstructural treatments, operations, and maintenance procedures. Although normally preventative, BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation). The implementation of these BMPs would be the beginning of an iterative process that includes the monitoring and modification of BMPs, where needed, to achieve water quality goals. This cyclic process would be the primary mechanism to achieve Oregon's water quality standards.

For vegetation treatments using herbicides on BLM-administered lands in the decision area, BMPs are included in Vegetation Treatments Using Herbicides on BLM Lands in Oregon Record of Decision (USDI BLM 2010) as mitigation measures and standard operating practices, and are incorporated here by reference. Briefly, mitigation and standard operating procedures in Attachment A; General, Soil, Water Resources, Wetlands and Riparian Areas, Fish and Other Aquatic Organisms, Recreation and other beneficial uses and values (pp. 33–45), and additional mitigation measures (pp. 13–15) are considered BMPs for herbicide treatments. For other management activities, including minerals exploration and development, linear transmission projects, and most hazardous materials, the mechanism to achieve Oregon State Water Quality Standards would be guided by RMP management direction, regulations, or project-level design features, and not necessarily be covered by the BMPs contained in this RMP. For example, management of locatable minerals is governed by regulations found in 43 CFR 3809. The BMPs for locatable minerals include language from 43 CFR 3809 that requires operators to prevent unnecessary and undue degradation from mining operations, as defined in 43 CFR 3809.5 and 43 CFR 3809.415.

Selection and Application of BMPs

For implementation actions under this RMP, BLM decision-makers will select the appropriate and applicable BMPs, using input from BLM staff. The BLM will select BMPs based upon site-specific conditions, technical feasibility, resource availability, and the water quality of those waterbodies potentially impacted. Not all of the BMPs listed will be selected for any specific management action. The BMPs below do not provide an exhaustive list of nonpoint source control measures. The BLM may identify additional nonpoint source control measures during project-level planning and analysis. The BLM will apply the selected BMPs in a manner that would be in conformance with all RMP management direction.

The BMPs that relate to instream activities may coincidently be similar to applicable practices specified in applicable permits, such as Army Corps of Engineers, Department of State Lands, and ODFW joint removal/fill permits, ODEQ water quality permits and 401 certifications, or project design criteria contained in biological assessments. The BMPs in the following tables are not specific permit requirements, but rather demonstrate the process by which the BLM would control nonpoint source pollution from instream activities.

Monitoring and Adjustment

The BLM will monitor the application of BMPs through implementation and effectiveness monitoring. Post-project implementation monitoring of selected BMPs will evaluate whether the BLM carries forward

BMPs from the project-level plans. Effectiveness monitoring will evaluate whether selected BMPs meet water quality standards and criteria and assure protection of beneficial uses. The BLM would modify BMPs if monitoring demonstrates that water quality standards are not being protected. The BLM would make changes to individual BMPs, or additions or deletions to the BMP lists below, through plan maintenance, consistent with 43 CFR 1610.5–4.

BMP Lists

Table J-1 through **Table J-14** are organized by core activities on BLM-administered lands in the decision area. For each core activity, the table displays the sequential number and BMP in the left columns, the source or reference in the center column, and the applicable ODEQ narrative or numeric water quality standards in the right column. The table identifies the ODEQ Oregon Administrative Rules (OAR) number(s) in the right column and provides OAR references within the roads and landings section, to compare these BMPs to similar Oregon Department of Forestry OARs. See Oregon Administrative Rules on water pollution (ODEQ OARs, Division 41, 2015) for additional details about the standards and regulations that are associated with the BMPs.

Core activities with BMPs include:

- Road and landing maintenance and construction
- Timber harvest activities
- Silvicultural activities
- Fire and fuels management
- Surface source water for drinking water
- Recreation management
- Range management
- Minerals (salable) development
- Spill prevention and abatement
- Restoration activities
- Dry forest-specific BMPs

The following lists of BMPs are not intended to be all-inclusive nor replace site-specific project planning, which may require the use of different or additional BMP practices.

Roads and Landings

Table J-1. Best management practices for roads and landings

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
General Construction			
R 01	Locate temporary and permanent roads and landings on stable locations, e.g., ridge tops, stable benches, or flats, and gentle-to-moderate side slopes. Minimize road construction on steep slopes (> 60 percent) consult TPCC for FP and FM classifications.	USDI BLM 2008, Appendix I – Water, R 1, p. 270 OAR 629-625-0200 (3)	OAR 629-625-0200–ODF, Road Location ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 02	Locate temporary and permanent road construction or improvement to minimize the number of stream crossings.	USDI BLM 2008, Appendix I – Water, R 2, p. 270 OAR 629-625-0200 (3-4)	OAR 629-625-0200–ODF, Road Location ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 03	Locate roads and landings away from wetlands, Riparian Reserve, floodplains, and waters of the State, unless there is no practicable alternative. Avoid locating landings in areas that contribute runoff to channels.	USDI BLM 2008, Appendix I – Water, R 4, p. 270 OAR 629-625-0200 (2)	OAR 629-625-0200–ODF, Road Location ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 04	Locate roads and landings to reduce total transportation system mileage. Renovate or improve existing roads or landings when it would cause less adverse environmental impact. Where roads traverse land in another ownership, investigate options for using those roads before constructing new roads.	USDI BLM 2008, Appendix I – Water, R 2, p. 270 EPA 2005, p. 3-12, Bullet 1 OAR 629-625-0200 (5) EPA 2005, p. 3-10, Bullet 1	OAR 629-625-0200–ODF, Road Location ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 05	Design roads to the minimum width needed for the intended use as referenced in BLM Manual 9113 – 1 – Roads Design Handbook (USDI BLM 2011).	USDI BLM 2008, Appendix I – Water, R 8, p. 271 OAR 629-625-0310 (3)	OAR 629-625-0310-ODF, Road Prism ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 06	Confine pioneer roads to the construction limits of the permanent roadway to reduce the amount of area disturbed and avoid deposition in wetlands, Riparian Reserve, floodplains, and waters of the State. Install temporary drainage, erosion, and sediment control structures. Storm proof or close pioneer roads prior to the onset of the wet season.	USDI BLM 2008, Appendix I – Water, R 11, p. 271 EPA 2005, p. 3-41, Bullet 2	OAR 629-625-0410-ODF, Disposal of Waste Materials ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 07	Design road cut and fill slopes with stable angles, to reduce erosion and prevent slope failure.	USDI BLM 2008, Appendix I – Water, R 3, p. 270 EPA 2005	OAR 629-625-0310-ODF, Road Prism ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 08	End-haul material excavated during construction, renovation, or maintenance where side slopes generally exceed 60 percent and any slope where side-cast material may enter wetlands, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 10, p. 271 EPA 2005, p. 3-12, Bullet 5	OAR 629-625-0310-ODF, Road Prism ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 09	Construct road fills to prevent fill failure using inorganic material, compaction, buttressing, sub-surface drainage, rock facing, or other effective means.	USDI BLM 2008, Appendix I – Water, R 13, p. 271. OAR 629-625-0310-5	OAR 629-625-0310-ODF, Road Prism ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 10	Design and construct sub-surface drainage (e.g., trench drains using geo-textile fabrics and drain pipes) in landslide-prone areas and saturated soils. Minimize or eliminate new road construction in these areas.	USDI BLM 2008, Appendix I – Water, R 19, p. 272 ODEQ 2005, RC-1, RC-6, pp.4-5, 4-6	OAR 629-625-0300-ODF, Road Design ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 11	Locate waste disposal areas outside wetlands, Riparian Reserve, floodplains, and unstable areas to minimize risk of sediment delivery to waters of the State. Apply surface erosion control prior to the wet season. Prevent overloading areas, which may become unstable.	USDI BLM 2008, Appendix I – Water, R 80, p. 281 OAR 629-625-0340	OAR 629-625-0340-ODF, Waste Disposal Areas ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 12	Use controlled blasting techniques to minimize loss of material on steep slopes or into wetlands, Riparian Reserve, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 12, p. 271	OAR 629-625-0410-ODF, Disposal of Waste Materials ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 13	Use temporary sediment control measures (e.g., check dams, silt fencing, bark bags, filter strips, and mulch) to slow runoff and contain sediment from road construction areas. Remove any accumulated sediment and the control measures when work or haul is complete. When long-term structural sediment control measures are incorporated into the final erosion control plan, remove any accumulated sediment to retain capacity of the control measure.	USDI BLM 2008, Appendix I – Water, R 14, p. 271 ODEQ 2005, RC-11	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 14	Avoid use of road fills for water impoundment dams unless specifically designed for that purpose. Impoundments over 9.2-acre-feet or 10 feet in depth will require a dam safety assessment by a registered engineer. Upgrade existing road fill impoundments to pass 100-year flood events.	OAR 629-625-0310-5	OAR 629-625-0310-ODF, Road Prism ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Permanent Stream Crossings			
R 15	Minimize fill volumes at permanent and temporary stream crossings by restricting width and height of fill to amounts needed for safe travel and adequate cover for culverts. For deep fills (generally greater than 15 feet deep), incorporate additional design criteria (e.g., rock blankets, buttressing, bioengineering techniques) to reduce the susceptibility of fill failures.	USDI BLM 2008, Appendix I – Water, R 47, p. 276 OAR 629-625-0320 (1b)	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 16	Locate stream-crossing culverts on well-defined, unobstructed, and straight reaches of stream. Locate these crossings as close to perpendicular to the streamflow as stream allows. When structure cannot be aligned perpendicular, provide inlet and outlet structures that protect fill, and minimize bank erosion. Choose crossings that have well-defined stream channels with erosion-resistant bed and banks.	USDI BLM 2008, Appendix I – Water, R 48, p. 276 EPA 2005, p. 3-14 Gesford and Anderson 2006, pp. 5–30	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 17	On new construction, install culverts at the natural stream grade, unless a lessor gradient is required for fish passage. Stream crossings with ESA-listed fish must meet ARBO II (USDOC NMFS and USDI FWS 2013) fish passage design criteria.	USDI BLM 2008, Appendix I – Water, R 49, p. 276	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 18	Design stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height.	USDI BLM 2008, Appendix I – Water, R 53, p. 277	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 19	Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces.	USDI BLM 2008, Appendix I – Water, R 31, p. 274 OAR 629-625-0330 (3)	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 20	Place instream grade control structures above or below the crossing structure, if necessary, to prevent stream head cutting, culvert undermining and downstream sedimentation. Employ bioengineering measures to protect the stability of the streambed and banks.	ODEQ 2005 , RC - 2 Gesford and Anderson 2006, pp 5–31 USDA FS 2002 Chapter 20	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 21	Prevent culvert plugging and failure in areas of active debris movement with measures such as beveled culvert inlets, flared inlets, wingwalls, over-sized culverts, trash racks, or slotted risers.	USDI BLM 2008, Appendix I – Water, R 59, p. 278	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 22	To reduce the risk of loss of the road crossing structure and fill causing excessive sedimentation, use bridges or low-water fords when crossing debris-flow susceptible streams. Avoid using culverts when crossing debris-flow susceptible streams when practicable.	USDI BLM 2008, Appendix I – Water, R 59, p. 280	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 23	Utilize stream diversion and isolation techniques when installing stream crossings. Evaluate the physical characteristics of the site, volume of water flowing through the project area and the risk of erosion and sedimentation when selecting the proper techniques.	USDI BLM 2008, Appendix I – Water, R 50, R 51, p. 277	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 24	Limit activities and access points of mechanized equipment to streambank areas or temporary platforms when installing or removing structures. Keep equipment activity in the stream channel to an absolute minimum.	USDI BLM 2008, Appendix I – Water, R 52, p. 277 OAR 629-625-0430 (2)	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 25	Install stream crossing structures before heavy equipment moves beyond the crossing area.	USDI BLM 2008, Appendix I – Water, R 60, p. 278	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 26	Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not possible, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Prevent or reduce ditch flow conveyance to the stream through cross drain placement above the stream crossing.	USDI BLM 2008, Appendix I – Water, R 26, p. 273, R 33 p. 274 Gesford and Anderson 2006, pp. 5–22 OAR 629-625-0330 (4)	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Temporary Stream Crossings for Roads and Skid Trails			
R 27	When installing temporary culverts, use washed rock as a backfill material. Use geotextile fabric as necessary where washed rock will spread with traffic and cannot be practicably retrieved.	USDI BLM 2008, Appendix I – Water, R 63, p. 279 ODEQ 2005, NS-3	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 28	Use no-fill structures (e.g., portable mats, temporary bridges, and improved hardened crossings) for temporary stream crossings. When not practicable, design temporary stream crossings with the least amount of fill and construct with coarse material to facilitate removal upon completion.	OAR 629-625-0320 (2)	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 29	Remove temporary crossing structures promptly after use. Follow practices under the Closure/Decommissioning section for removing stream crossing drainage structures and reestablishing the natural drainage.	USDI BLM 2008, Appendix I – Water, R 65, p. 279 OAR 629-625-0430 (5)	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Surface Drainage			
R 30	Effectively drain the road surface by using crowning, insloping or outsloping, grade reversals (rolling dips), and waterbars or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and erosion-proofed.	USDI BLM 2008, Appendix I – Water, R 22, p. 272 EPA 2005, p. 3-41	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 31	Outslope temporary and permanent low volume roads to provide surface drainage on road gradients up to 6 percent unless there is a traffic hazard from the road shape.	USDI BLM 2008, Appendix I – Water, R 23, R 24, p. 273 EPA 2005, p. 3-42 USDA FS 2002 Chapter 13	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 32	Consider using broad-based drainage dips or leadoff ditches in lieu of cross drains for low volume roads. Locate these surface water drainage measures where they will not drain into wetlands, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 25, R 26, p. 273 EPA 2005, pp. 3-41 – 3-45 USDA FS 2002 Chapter 13	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 33	Avoid use of outside road berms unless designed to protect road fills from runoff. If road berms are used, breach to accommodate drainage where fill slopes are stable.	USDI BLM 2008, Appendix I – Water, R 27, p. 273 Gesford and Anderson 2006, pp. 3–7	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 34	Construct variable road grades and alignments (e.g., roll the grade and grade breaks) which limit water concentration, velocity, flow distance, and associated stream power.	USDI BLM 2008, Appendix I – Water, R 28, p. 273 Gesford and Anderson 2006, pp. 5–20 OAR 629-625-0310 (1)	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 35	Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines.	USDI BLM 2008, Appendix I – Water, R 29, p. 273 OAR 629-625-0330 (5)	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 36	Design roads crossing low-lying areas so that water does not pond on the upslope side of the road. Provide cross drains at short intervals to ensure free drainage.	USDI BLM 2008, Appendix I – Water, R 19, p. 272 EPA 2005, p. 3-14, Bullet 1	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 37	Divert road and landing runoff water away from headwalls, slide areas, high landslide hazard locations, or steep erodible fill slopes.	USDI BLM 2008, Appendix I – Water, R 29, p. 273 OAR 629-625-0330 (2)	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 38	Design landings to disperse surface water to vegetated stable areas.	USDI BLM 2008, Appendix I – Water, R 30, p. 274	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Cross Drains			
R 39	Locate cross drains to prevent or minimize runoff and sediment conveyance to waters of the State. Implement sediment reduction techniques such as settling basins, brush filters, sediment fences, and check dams to prevent or minimize sediment conveyance. Locate cross drains to route ditch flow onto vegetated and undisturbed slopes.	USDI BLM 2008, Appendix I – Water, R 33, p. 274 OAR 629-625-0330 (4)	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 40	Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion. At a minimum, space cross drains at intervals referred to in the BLM Road Design Handbook 9113-1 (USDI BLM 2011), Illustration 11 –'Spacing for Drainage Lateral.' Increase cross drain frequency through erodible soils, steep grades, and unstable areas.	USDI BLM 2008, Appendix I – Water, R 34, p. 274	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 41	Choose cross drain culvert diameter and type according to predicted ditch flow, debris and bedload passage expected from the ditch. Minimum diameter is 18."	USDI BLM 2008, Appendix I – Water, R 35, p. 274 Johansen *et al*. 1997, p. 3	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 42	Locate surface water drainage measures (e.g., cross drain culverts, rolling dips, and water bars) where water flow will be released on convex slopes or other stable and non-erosive areas that will absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the State. Where possible locate surface water drainage structures above road segments with steeper downhill grade. Locate cross drains at least 50 feet from the nearest stream crossing and allow for a sufficient non-compacted soil and vegetative filter.	USDI BLM 2008, Appendix I – Water, R 26, p. 273 Johansen *et al*. 1997, p. 3	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 43	Armor surface drainage structures (e.g., broad based dips, and leadoff ditches) to maintain functionality in areas of erosive and low-strength soils.	USDI BLM 2008, Appendix I – Water, R 38, p. 275	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 44	Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where alternatives to discharging water onto loose material, erodible soils, fills, or steep slopes are not available.	USDI BLM 2008, Appendix I – Water, R 39, R 40, p. 275 ODEQ 2005, RC-2 Gesford and Anderson 2006, pp. 5–31	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 45	Cut protruding ‘shotgun’ culverts at the fill surface or existing ground. Install downspout or energy dissipaters to prevent erosion.	USDI BLM 2008, Appendix I – Water, R 41, p. 275	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 46	Skew cross drain culverts 45–60 degrees from the ditchline and provide pipe gradient slightly greater than ditch gradient to reduce erosion at cross drain inlet.	BLM Road Design Handbook H9113-1 2009	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 47	Provide for unobstructed flow at culvert inlets and within ditch lines during and upon completion of road construction prior to the wet season.	OAR 629-625-0420	OAR 629-625-0330-ODF, Drainage ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Timing of In-water Work			
R 48	Conduct all nonemergency in-water work during the ODFW instream work window. Avoid winter sediment and turbidity entering streams during in-water work to the extent practicable.	USDI BLM 2008, Appendix I – Water, R 44, p. 276, R 65, p. 279 Oregon guidelines for timing of in-water work to protect fish and wildlife resources ODFW 2008 OAR 629-625-0430	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 49	Remove stream crossing culverts and entire in-channel fill material during ODFW instream work period.	USDI BLM 2008, Appendix I – Water, R 93, p. 283 Oregon guidelines for timing of in-water work to protect fish and wildlife resources ODFW 2008	OAR 629-625-0650-ODF,Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Low-water Ford Stream Crossings			
R 50	Harden low-water ford approaches with durable materials. Provide cross drainage on approaches. Limit ford crossings to the ODFW instream work period.	USDI BLM 2008, Appendix I – Water, R 67, p. 279 EPA 2005, p. 3-50	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 51	Restrict access to unimproved low-water stream crossings.	USDI BLM 2008, Appendix I – Water, R 69, p. 280 OAR 629-625-0430 (5)	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 52	Use permanent low-water fords (e.g., concrete and well-anchored concrete mats) in debris-flow susceptible streams.	USDI BLM 2008, Appendix I – Water, R 70, p. 280. EPA 2005, p. 3-50	OAR 629-625-0320-ODF, Stream Crossing Structures ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Maintaining Water Quality - Noxious Weeds			
R 53	Locate equipment-washing sites in areas with no potential for runoff into wetlands, Riparian Reserve, floodplains, and waters of the State. Do not use solvents or detergents to clean equipment on site.	USDI BLM 2008, Appendix I – Water, R 75, p. 280 ODEQ 2005, NS-5	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Water Source Development and Use			
R 54	Limit disturbance to vegetation and modification of streambanks when locating road approaches to in-stream water source developments. Surface these approaches with durable material. Employ erosion and runoff control measures.	USDI BLM 2008, Appendix I – Water, R 102, p. 285	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 55	Direct pass-through flow or overflow from in-channel and any connected off-channel water developments back into the stream.	USDI BLM 2008, Appendix I – Water, R 104, p. 285	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 56	Direct overflow from water harvesting ponds to a safe non-eroding dissipation area, and not into a stream channel.	USDI BLM 2008, Appendix I – Water, R 105, p. 285	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 57	Limit the construction of temporary in-channel water drafting sites. Develop permanent water sources outside of stream channels and wetlands.	USDI BLM 2008, Appendix I – Water, R 106, p. 286 ODEQ 2005, NS-1	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 58	Do not place pump intakes on the substrate or edges of the stream channel. When placing intakes instream, place on hard surfaces (e.g., shovel and rocks) to minimize turbidity. Use a temporary liner to create intake site. After completion of use, remove liner and restore channel to natural condition.	USDI BLM 2008, Appendix I – Water, R 107, p. 286 ODEQ 2005, NS-1	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 59	Do not locate placement of road fill in the proximity of a public water supply intake (404(f) exemption criteria xi) in waters of the State.	USACOE (1972) 404(f) exemption criteria xi	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 60	Avoid water withdrawals from fish-bearing streams whenever possible. Limit water withdrawals in ESA-listed fish habitat and within 1,500 feet of ESA-listed fish habitat to 10 percent of stream flow or less at the point of withdrawal, and in non-ESA-listed fish habitat to 50 percent or less at the point of withdrawal, based on a visual assessment by a fish biologist or hydrologist. The channel must not be dewatered to the point of isolating fish.	USDC NMFS 2013 ARBO II, p. 43 (NWR-2013-9664) USDA FS 2012, p. 146	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Erosion Control Measures			
R 61	During roadside brushing, remove vegetation by cutting rather than uprooting.	OAR 629-625-0430 (4)	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 62	Limit road and landing construction, reconstruction, or renovation activities to the dry season. Keep erosion control measures concurrent with ground disturbance to allow immediate stormproofing.	USDI BLM 2008, Appendix I – Water, R 9, p. 271	OAR 629-625-0440-ODF, Stabilization ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 63	Apply native seed and certified weed-free mulch to cut and fill slopes, ditchlines, and waste disposal sites with the potential for sediment delivery to wetlands, Riparian Reserve, floodplains and waters of the State. If needed to promote a rapid ground cover and prevent aggressive invasive plants, use interim erosion control non-native sterile annuals before attempting to restore natives. Apply seed upon completion of construction and as early as possible to increase germination and growth. Reseed if necessary to accomplish erosion control. Select seed species that are fast-growing, have adequate provide ample ground cover and soil-binding properties. Apply mulch that will stay in place and at site-specific rates to prevent erosion.	USDI BLM 2008, Appendix I – Water, R 17, p. 272	OAR 629-625-0440-ODF, Stabilization ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 64	Place sediment-trapping materials or structures such as straw bales, jute netting, or sediment basins at the base of newly constructed fill or side slopes where sediment could be transported to waters of the State. Keep materials away from culvert inlets or outlets.	USDI BLM 2008, Appendix I – Water, R 14, p. 271, R 21, p. 272 USDA FS 2002 Chapter 18	OAR 629-625-0440-ODF, Stabilization ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 65	Use biotechnical stabilization and soil bioengineering techniques to control bank erosion (e.g., commercially produced matting and blankets, live plants or cuttings, dead plant material, rock, and other inert structures).	USDI BLM 2008, Appendix I – Water, R 54, p. 277 USDA FS 2002, Chapters 18 and 20	OAR 629-625-0440-ODF, Stabilization ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 66	Suspend ground-disturbing activity if projected forecasted rain will saturate soils to the extent that there is potential for movement of sediment from the road to wetlands, floodplains, and waters of the State. Cover or temporarily stabilize exposed soils during work suspension. Upon completion of ground-disturbing activities, immediately stabilize fill material over stream crossing structures. Measures could include but not limited to erosion control blankets and mats, soil binders, soil tackifiers, or placement of slash.	USDI BLM 2008, Appendix I – Water, R 57, p. 278, R 88, p. 282	OAR 629-625-0440-ODF, Stabilization ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 67	Apply fertilizer in a manner to prevent direct fertilizer entry to wetlands, Riparian Reserve, floodplains, and waters of the State.	OAR 629-625-0440 Aquatic Resources Biological Opinion NMFS-ARBO 2013	OAR 629-625-0440-ODF, Stabilization ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Road Use and Dust Abatement			
R 68	Apply water or approved road surface stabilizers/dust control additives to reduce surfacing material loss and buildup of fine sediment that can enter into wetlands, floodplains and waters of the State. Prevent entry of road surface stabilizers/dust control additives into waters of the State during application. For dust abatement, limit applications of lignin sulfonate to a maximum rate of 0.5 gal/yd^2 of road surface, assuming a 50:50 (lignin sulfonate to water) solution.	USDI BLM 2008, Appendix I – Water, R 76, p. 281 ODEQ 2005, EP-13 Western Oregon Programmatic 2011	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Road Maintenance			
R 69	Prior to the wet season, provide effective road surface drainage maintenance. Clear ditch lines in sections where there is lowered capacity or obstructed by dry ravel, sediment wedges, small failures, or fluvial sediment deposition. Remove accumulated sediment and blockages at cross-drain inlets and outlets. Grade natural surface and aggregate roads where the surface is uneven from surface erosion or vehicle rutting. Restore crowning, outsloping or insloping for the road type for effective runoff. Remove or provide outlets through berms on the road shoulder. After ditch cleaning prior to hauling, allow vegetation to reestablish or use sediment entrapment measures (e.g., sediment trapping blankets and silt fences).	USDI BLM 2008, Appendix I – Water, R 81, R 84, R 85, p. 281 OAR 629-625 0600 (2-4) EPA 2005, pp. 3-61 – 3-62	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 70	Retain ground cover in ditch lines, except where sediment deposition or obstructions require maintenance.	USDI BLM 2008, Appendix I – Water, R 86, p. 282	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 71	Maintain water flow conveyance, sediment filtering and ditch line integrity by limiting ditch line disturbance and groundcover destruction when machine cleaning within 200 feet of road stream crossings.	USDA FS 2012, pp. 113–114. EPA 2005, p. 3-62	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 72	Avoid undercutting of cut-slopes when cleaning ditch lines.	USDI BLM 2008, Appendix I – Water, R 78, p. 281 EPA 2005, p. 3-62	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 73	Remove and dispose of slide material when it is obstructing road surface and ditch line drainage. Place material on stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. Seed with native seed and use weed-free mulch.	USDI BLM 2008, Appendix I – Water, R 79, p. 281 OAR 629-625-0600 (6)	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 74	Do not sidecast loose ditch or surface material where it can enter wetlands, Riparian Reserve, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 80, p. 281 OAR 629-625-0600 (7)	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 75	Retain low-growing vegetation on cut-and-fill slopes.	USDI BLM 2008, Appendix I – Water, R 86, p. 282 EPA 2005, EP-6	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 76	Seed and mulch cleaned ditch lines and bare soils that drain directly to wetlands, floodplains, and waters of the State, with native species and weed-free mulch.	USDI BLM 2008, Appendix I – Water, R 78, p. 281	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Road Stormproofing			
R 77	Inspect and maintain culvert inlets and outlets, drainage structures and ditches before and during the wet season to diminish the likelihood of plugged culverts and the possibility of washouts.	USDI BLM 2008, Appendix I – Water, R 81, R 82, p. 281 OAR 629-625-0600 (3)	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 78	Repair damaged culvert inlets and downspouts to maintain drainage design capacity.	USDI BLM 2008, Appendix I – Water, R 82, p. 281 OAR 629-625-0600 (3)	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 79	Blade and shape roads to conserve existing aggregate surface material retain or restore the original cross section, remove berms and other irregularities that impede effective runoff or cause erosion, and ensure that surface runoff is directed into vegetated, stable areas.	USDI BLM 2008, Appendix I – Water, R 84, p. 281 OAR 629-625-0600 (4)	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 80	Stormproof open resource roads receiving infrequent maintenance to reduce road erosion and reduce the risk of washouts by concentrated water flows. Stormproof temporary roads if retained over-winter.	USDI BLM 2008, Appendix I – Water, R 87, p. 282 OAR 629-625-0600 (2)	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 81	Suspend stormproofing/ decommissioning operations and cover or otherwise temporarily stabilize all exposed soil if conditions develop that cause a potential for sediment-laden runoff to enter a wetland, floodplain, or waters of the State. Resume operations when conditions allow turbidity standards to be met.	USDI BLM 2008, Appendix I – Water, R 88, p. 282	OAR 629-625-0600-ODF, Road Maintenance ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Road Closure and Decommissioning			
R 82	Inspect closed roads to ensure that vegetation stabilization measures are operating as planned, drainage structures are operational, and noxious weeds are not providing erosion control. Conduct vegetation treatments and drainage structure maintenance as needed.	OAR 629-625-0650 (2)	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 83	Decommission temporary roads upon completion of use.	USDI BLM 2008, Appendix I – Water, R 90, p. 283	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 84	Prevent use of vehicular traffic utilizing methods such as gates, guard rails, earth/log barricades, to reduce or eliminate erosion and sedimentation due to traffic on roads.	USDI BLM 2008, Appendix I – Water, R 91, p. 283 OAR 629-625-0650 (2)	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 85	Convert existing drainage structures such as ditches and cross drain culverts to a long-term maintenance free drainage configuration such as an outsloped road surface and waterbars.	USDI BLM 2008, Appendix I – Water, R 92, p. 283 OAR 629-625-0650 (3)	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 86	Place and remove temporary stream crossings during the dry season, without overwintering, unless designed to accommodate the 100-year theoretical flood. See also R 49.	OAR 629-625-0430 (5)	OAR 629-625-0430-ODF, Stream Protection ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
R 87	Place excavated material from removed stream crossings on stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. In some cases, the material could be used for recontouring old road cuts or be spread across roadbed and treated to prevent erosion.	USDI BLM 2008, Appendix I – Water, R 94, p. 284	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 88	Reestablish stream crossings to the natural stream gradient. Excavate sideslopes back to the natural bank profile. Reestablish natural channel width and floodplain.	USDI BLM 2008, Appendix I – Water, R 95, p. 284	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 89	Install cross ditches or waterbars upslope from stream crossing to direct runoff and potential sediment to the hillslope rather than deliver it to the stream	USDI BLM 2008, Appendix I – Water, R 96, p. 284 OAR 629-625-0650 (3)	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 90	Following culvert removal and prior to the wet season, apply erosion control and sediment trapping measures (e.g., seeding, mulching, straw bales, jute netting, and native vegetative cuttings) where sediment can be delivered into wetlands, Riparian Reserve, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 97, p. 284 OAR 629-625-0650 (3)	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 91	Implement tillage measures, including ripping or subsoiling to an effective depth. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites.	USDI BLM 2008, Appendix I – Water, R 98, p. 285	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 92	After tilling the road surface, pull back unstable road fill and end-haul or contour to the natural slopes.	USDI BLM 2008, Appendix I – Water, R 99, p. 285	OAR 629-625-0650-ODF, Vacating Forest Roads ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Wet-season Road Use			
R 93	On active haul roads, during the wet season, use durable rock surfacing and sufficient rock depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 71, p. 280 OAR 629-625-0700 (2)	OAR 629-625-0700-ODF, Wet Weather Road Use ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 94	Prior to winter hauling activities, implement structural road treatments such as: increasing the frequency of cross drains, installing sediment barriers or catch basins, applying gravel lifts or asphalt road surfacing at stream crossing approaches, and armoring ditch lines.	USDI BLM 2008, Appendix I – Water, R 72, p. 280 OAR 629-625-0700 (2)	OAR 629-625-0700-ODF, Wet Weather Road Use ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 95	Remove snow on surfaced roads in a manner that will protect the road and adjacent resources. Retain a minimum layer (4") of compacted snow on the road surface. Provide drainage through the snow bank at periodic intervals to allow snowmelt to drain off the road surface.	USDI BLM 2008, Appendix I – Water, R 74, p. 280 BLM snow removal letter	OAR 629-625-0700-ODF, Wet Weather Road Use ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 96	Avoid removing snow from unsurfaced roads where runoff drains to waters of the State.	USDA FS 2012, pp. 120–123 EPA 2005, p. 3-80	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
R 97	Maintain road surface by applying appropriate gradation of aggregate and suitable particle hardness to protect road surfaces from rutting and erosion under active haul where runoff drains to wetlands, Riparian Reserve, floodplains, and waters of the State.	USDI BLM 2008, Appendix I – Water, R 71, p. 280 OAR 629-625-0700 (2)	OAR 629-625-0700-ODF, Wet Weather Road Use ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 98	To reduce sediment tracking from natural surface roads during active haul, provide a gravel approach before entrance onto surfaced roads.	EPA 2005, pp. 3-57 – 3-58	OAR 629-625-0700-ODF, Wet Weather Road Use ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
R 99	Install temporary culverts and washed rock on top of low-water ford to reduce vehicle contact with water during active haul. Remove culverts promptly after use.	USDA FS 2012, pp. 119–120	OAR 629-625-0700-ODF, Wet Weather Road Use ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

Timber Harvest Activities

Table J-2. Best management practices for timber harvest activities

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Cable Yarding			
TH 01	Design yarding corridors crossing streams to limit the number of such corridors, using narrow widths, and using the most perpendicular orientation to the stream feasible. Minimize yarding corridor widths and space corridors as far apart as is practicable given physical and operational limitations, through practices such as setting limitations on corridor width, corridor spacing, or the amount of corridors in an area. For example, such practices could include, as effective and practicable: – Setting yarding corridors at 12–15 foot maximum widths, and – Setting corridor spacing where they cross the streams to no less than 100 feet apart when physical, topography, or operational constraints demand, with an overall desire to keep an average spacing of 200 feet apart.	USDI BLM 2008, Appendix I – Water, TH 2, p. 287	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
TH 02	Trees felled for yarding corridors in the Riparian Reserve would be directed toward the stream and left on site.		ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
TH 03	Require full suspension over flowing streams, non-flowing streams with highly erodible bed and banks, and jurisdictional wetlands.	USDI BLM 2008, Appendix I – Water, TH 3, p. 287	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 04	When logging downhill into Riparian Reserve, design the logging system to prevent converging yarding trails from intersecting the stream network.	USDI BLM 2008, Appendix I – Water, TH 4, p. 287	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 05	Prevent streambank and hillslope disturbance on steep slopes (generally > 60 percent) by requiring full-suspension within 50 feet of definable stream channels. Yard the remaining areas across the Riparian Reserve using at least one-end suspension.	USDI BLM 2008, Appendix I – Water, TH 5, p. 287	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 06	Implement erosion control measures such as waterbars, slash placement, and seeding in cable yarding corridors where the potential for erosion and delivery to waterbodies, floodplains, and wetlands exists.	USDI BLM 2008, Appendix I – Water, TH 6, p. 288	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
Ground-based Harvesting			
TH 07	Exclude ground-based equipment on hydric soils, defined by the Natural Resources Conservation Service.	USDI BLM 2008, Appendix I – Water, TH 8, p. 288	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 08	Limit designated skid trails for thinning or regeneration harvesting to ≤ 15 percent of the harvest unit area to reduce displacement or compaction to acceptable limits.	Soil Quality Standards USDA FS 1998	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 09	Limit width of skid roads to single width of what is operationally necessary for the approved equipment. Where multiple machines are used, provide a minimum-sized pullout for passing.	USDI BLM 2008, Appendix I – Water, TH 10, p. 288	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 10	Ensure leading-end of logs is suspended when skidding.	USDI BLM 2008, Appendix I – Water, TH 11, p. 288	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 11	Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture; generally from May 15 to Oct 15. Low soil moisture varies by texture and is based on site-specific considerations. Low soil moisture limits will be determined by qualified specialists using a qualitative method to determine an estimated soil moisture and soil texture.[33]	USDI BLM 2008, Appendix I – Water, TH 12, p. 288	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 12	Incorporate existing skid trails and landings as a priority over creating new trails where feasible, into a designated trail network for ground-based harvesting equipment, consider proper spacing, skid trail direction and location relative to terrain and stream channel features.	USDI BLM 2008, Appendix I – Water, TH 13, p. 289	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

[33] Soil moisture is the ratio of the weight of the water in the soil to the weight of the solids, expressed as a percentage.

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
TH 13	Limit non-specialized skidders or tracked equipment to slopes less than 35 percent, except when using previously constructed trails or accessing isolated ground based harvest areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow.	USDI BLM 2008, Appendix I – Water, TH 14, p. 289	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 14	Limit the use of specialized ground-based mechanized equipment (those machines specifically designed to operate on slopes greater than 35 percent) to slopes less than 50 percent, except when using previously constructed trails or accessing isolated ground based harvesting areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow.	USDI BLM 2008, Appendix I – Water, TH 15, p. 289	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 15	Designate skid trails in locations that channel water from the trail surface away from waterbodies, floodplains, and wetlands, or unstable areas adjacent to them.	USDI BLM 2008, Appendix I – Water, TH 16, p. 289.	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 16	Directionally fall trees to lead for skidding and skyline yarding to minimize ground disturbance when moving logs to skid trails and skyline corridors.	USDI BLM 2008, Appendix I – Water, TH 17, p. 289	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 17	Apply erosion control measures to skid trails and other disturbed areas with potential for erosion and subsequent sediment delivery to waterbodies, floodplains, or wetlands. These practices may include seeding, mulching, water barring, tillage, and woody debris placement. Use guidelines from the road decommissioning section.	USDI BLM 2008, Appendix I – Water, TH 18, p. 289	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 18	Construct waterbars on skid trails using guidelines in **Table J-6** where potential for soil erosion or delivery to waterbodies, floodplains, and wetlands exists.	USDI BLM 2008, Appendix I – Water, TH 19, p. 289	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 19	Subsoil skid trails, landings, or temporary roads where needed to achieve 20 percent detrimental soil conditions, minimize surface runoff, improve soil structure, and water movement through the roadbed. See also R 92–93.	USDI BLM 2008, Appendix I – Water, R 98, p. 285	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 20	Block skid trails to prevent public motorized vehicle and other unauthorized use at the end of seasonal use.	USDI BLM 2008, Appendix I – Water, TH 21, p. 290	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 21	Allow harvesting operations (cutting and transporting logs) when ground is frozen or adequate snow cover exists to prevent soil compaction and displacement.	USDI BLM 2008, Appendix I – Water, TH 12, p. 288	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
TH 22	Minimize the area where more than half of the depth of the organically-enriched upper horizon (topsoil) is removed when conducting forest management operations	Soil Quality Standards USDA FS 1998	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 23	Maintain the minimum percent of effective ground cover needed to control surface erosion, as shown in **Table J-3**, following forest management operations. Ground cover may be provided by vegetation, slash, duff, medium to large gravels, cobbles, or biological crusts.	Soil Quality Standards USDA FS 1998	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
Helicopter			
TH 24	Consider the use of helicopter or aerial logging systems to prevent water quality impacts from road construction or ground-based timber yarding, where other BMPs would be more costly or have limited effectiveness.	USDI BLM 2008, Appendix I – Water, TH 23, p. 290	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
Horse			
TH 25	Within Riparian Reserve, limit horse logging to slopes less than 20 percent.	USDI BLM 2008, Appendix I – Water, TH 24, p. 290	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
TH 26	Construct waterbars on horse skid trails when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands.	USDI BLM 2008, Appendix I – Water, TH 25, p. 290	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

Table J-3. Soil cover based on erosion hazard ratings

NRCS Erosion Hazard Rating*	Minimum Percent Effective Ground Cover – Year 1	Minimum Percent Effective Ground Cover – Year 2
Very Severe	60%	75%
Severe	45%	60%
Moderate	30%	40%
Slight	20%	30%

* Rating obtained from Natural Resources Conservation Services County Soil Survey information by map unit.

Silvicultural Activities

Table J-4. Best management practices for planting, pre-commercial thinning, and fertilization

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Planting and Pre-commercial Thinning			
S 01	Limit the crossing of stream channels with motorized support vehicles (e.g., OHVs) and mechanized equipment to existing road crossings or temporary ford crossings to the ODFW instream work period.	USDI BLM 2008, Appendix I – Water, S 1, p. 291	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
S 02	Scatter treatment debris on disturbed soils and water bar any equipment access trails that could erode and deposit sediment in waterbodies, floodplains, and wetlands.	USDI BLM 2008, Appendix I – Water, S 4, p. 291	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
Fertilization			
S 03	For streams and waterbodies that support domestic use, apply fertilizer further than 100 feet from the edge of the active channel or shoreline.	USDI BLM 2008, Appendix I – Water, S 5, p. 291	EPA 440/5-86-001,-10 mg/L nitrate nitrogen for domestic water supply. ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
S 04	Locate storage, transfer, and loading sites outside Riparian Reserve and separated from hydrological connections (e.g., road ditches that are linked to stream channels).	USDI BLM 2008, Appendix I – Water, S 6, p. 291	EPA 822-R-13-001 2013,-salmonid acute criterion, 17 mg total ammonia nitrogen/L at pH 7 and temperature of 20 °C. ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033

Fire and Fuels Management

Table J-5. Best management practices for fire and fuel management

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Underburn, Jackpot Burn, and Broadcast Burn			
F 01	Keep broadcast burns and jackpot burns out of Riparian Reserve inner zone, unless prescribed for restoration purposes (e.g., sudden oak death sanitation, improve species composition, and invigorate deciduous trees). Locate ignition lines above large open meadows associated with stream channels, unless prescribed for restoration.	USDI BLM 2008, Appendix I – Water, F 1, p. 293	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
F 02	Reduce fuel loads by whole tree yarding, and piling material, as necessary, prior to under burning in dry forest types where fuel loads are elevated.	USDI BLM 2008, Appendix I – Water, F 2, p. 293	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
F 03	Avoid direct ignition or ignition by a backing-in fire of large woody material that is touching the high water mark of a waterbody or that may be affected by high flows.	USDI BLM 2008, Appendix I – Water, F 3, p. 293	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
F 04	Avoid delivery of chemical retardant foam or additives to waterbodies, and wetlands. Store and dispose of ignition devices/ materials (e.g., flares and plastic spheres) outside Riparian Reserve or a minimum of 150 feet from waterbodies, floodplains, and wetlands. Maintain and refuel equipment (e.g., drip torches and chainsaws) a minimum of 100 feet from waterbodies, floodplains, and wetlands. Portable pumps can be refueled on-site within a spill containment system.	USDI BLM 2008, Appendix I – Water, F 4, p. 293	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
F 05	Limit fire lines inside Riparian Reserve. Construct fire lines by hand on all slopes greater than 35 percent and inside the Riparian Reserve inner zone. Use erosion control techniques such as tilling, waterbarring, or debris placement on fire lines when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands. Space the waterbars as shown in **Table J-6**. Avoid placement of any fire line where water would be directed into waterbodies, floodplains, wetlands, headwalls, or areas of instability.	USDI BLM 2008, Appendix I – Water, F 5, p. 294	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
F 06	In broadcast burning, consume only the upper horizon organic materials and allow no more than 15 percent of the burned area mineral soil surface to change to a reddish color.	Soil Quality Standards USDA FS 1998	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
Pile and Burn			
F 07	Avoid burning piles within 35 feet of a stream channel.	USDI BLM 2008, Appendix I – Water, F 6, p. 294	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
F 08	Avoid creating piles greater than 16 feet in height or diameter. Pile smaller diameter materials and leave larger > 12" pieces within the unit. Reduce burn time and smoldering of piles by extinguishment with water and tool use.	Soil Quality Standards USDA FS 1998	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
F 09	When burning machine-constructed piles, preferably locate and consume organic materials on landings or roads. If piles are within harvested units and more than 15 percent of the burned area mineral soil (the portion beneath the pile) surface changes to a reddish color then consider that amount of area towards the 20 percent detrimental limit.	Soil Quality Standards USDA FS 1998	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Mechanical and Manual Fuels Treatments			
F 10	Prevent mechanical fuel reduction equipment within the Riparian Reserve inner zone, unless prescribed for restoration. Limit mechanical fuel reduction equipment to slopes less than 35 percent. Restrict non-track mechanized equipment (e.g., feller bunchers and horizontal bar masticators) to slopes less than 20 percent.	USDI BLM 2008, Appendix I – Water, F 7, p. 294	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
F 11	Use temporary stream crossings if necessary to access the opposite side with any equipment or vehicles (including OHVs). Follow Temporary Stream Crossing practices under Roads section.	USDI BLM 2008, Appendix I – Water, F 8, p. 294	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
F 12	Place residual slash on severely burned areas, where there is potential for sediment delivery into waterbodies, floodplains and wetlands.	USDI BLM 2008, Appendix I – Water, F 9, p. 294	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Wildfire Suppression			
F 13	Limit fire lines inside Riparian Reserve. Where hand constructed fire lines are necessary in Riparian Reserve, angle the approach, where feasible, rather than have it perpendicular to the Riparian Reserve. Limit heavy equipment to slopes less than 35 percent. Locate fire lines to minimize directing water into waterbodies, wetlands, headwalls, or areas of instability. Use erosion control techniques such as tilling, waterbarring, or debris placement on fire lines when there is potential for soil erosion and delivery to waterbodies, floodplains, and wetlands. Space waterbars as shown in **Table J-6**. Block dozer lines and roads or landing intersections with an approved barricade or scattered slash to preclude public motorized vehicle use.	USDI BLM 2008, Appendix I – Water, F 5, p. 294, F 11, p. 295	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
F 14	Prevent cutting of logs or woody material if any portion of that material extends into the stream channel, unless for restoration. Fall snags in the Riparian Reserve towards the stream channel when felling is necessary for safety or fire suppression activities.	USDI BLM 2008, Appendix I – Water, F 12, p. 295	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
F 15	Avoid locating incident bases, camps, helibases, staging areas, constructed helispots, and other centers for incident activities in Riparian Reserve or within 200 feet of any waterbody, floodplain, or wetland. Water drafting sites for engines and tankers would be permitted.	USDI BLM 2008, Appendix I – Water, F 13, p. 295	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1)) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
F 16	Locate and maintain portable sanitation facilities at incident bases, camps (including spike/remote camps), helibases, staging areas, constructed helispots, and other centers for incident activities in accordance with State and local regulations.	USDI BLM 2008, Appendix I – Water, F 14, p. 295	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009
F 17	Avoid application of chemical retardant, foam, or other chemicals to waterways, maintain a 300 ft. buffer (FA-IM-2008-029), unless the wildfire is deemed a threat to human safety or private property. Apply aerial retardant adjacent to Riparian Reserve by making parallel passes.	USDI BLM 2008, Appendix I – Water, F 15, p. 295	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
Emergency Stabilization or Rehabilitation			
F 18	Implement emergency fire stabilization or rehabilitation treatments to accomplish erosion control as quickly as possible and before the wet season. Soil and water conservation practices may include, but are not restricted to: – Seeding or planting native vegetation for short-term cover development and long-term recovery, unless not available in quantities necessary for the emergency response. – Mulching with straw, wood chips, or other suitable material. To avoid introducing noxious weeds when mulching, use certified weed-free straw mulch or rice straw where available. – Placing straw wattles on the contour at adequate spacing between each row to capture eroded material without overflowing. Embed to the surface of the soil in slight trench to prevent undermining. – Placing and anchoring log erosion barriers similarly to straw wattles. – Spreading available cut vegetation or slash on bare soils. – Placing channel sediment retention or stabilization structures. – Placing trash racks for debris above road drainage structures. – Installing drainage structures, such as waterbars or drainage dips, on fire lines, fire roads, and other cleared areas according to guidelines in **Table J-6** (Waterbar spacing by gradient and erosion class). – Repairing damaged road drainage facilities, such as flattened or ripped culvert ends, or burned out plastic pipes, or cleaning ditch lines of materials that impede natural flow. – Blocking or decommissioning roads and trails.	USDI BLM 2008, Appendix I – Water, F 16, p. 296 Interagency Burned Area Emergency Response Guidebook; Interpretation of Department of the Interior 620 DM 3 and USDA Forest Service Manual 2523 For the Emergency Stabilization of Federal and Tribal Trust Lands Version 4.0 February 2006	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Post-Fire Road Repair			
F 19	Implement emergency fire rehabilitation treatments to accomplish erosion control as quickly as possible and before the wet season. Soil and water conservation practices may include, but are not restricted to: – Reducing road system hydrologic conductivity though proper grading, culvert spacing, and installing drivable dips. – Replacing culverts to increase peak flow capacity of stream crossing culverts to accommodate the 100-year design flood. – Preventing culvert plugging. – Correcting stream diversions.	USDI BLM 2008, Appendix I – Water, F 17, p. 297 Interagency Burned Area Emergency Response Guidebook; Interpretation of Department of the Interior 620 DM 3 (USDI BLM 2006) and USDA Forest Service Manual 2523 For the Emergency Stabilization of Federal and Tribal Trust Lands Version 4.0 (USDA FS *et al.* 2006)	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Fuel/Retardant Transport			
F 20	If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances would be transported to a project site, implement the following precautions: 1. Plan a safe route and transfer sites that could contain the transported volume. 2. Plan an active dispatch system that can relay the information to appropriate resources. 3. Ensure a spill containment kit that can absorb and contain 55 gallons of petroleum product and chemical substances is readily available. 4. Provide for immediate notification in the event of a spill. Have a radio equipped vehicle lead the chemical or fuel truck to the project site. 5. Assemble a spill notification list that includes the district hazardous materials coordinator, DEQ, and spill clean-up contractors. 6. Construct a water user contact list with address and phone numbers. 7. When operating within Source Water Watersheds, pre-estimate travel times through the watershed to predict downstream arrival times. 8. Be prepared to sample water and carry sample containers.	USDI BLM 2008, Appendix I – Water, F 18, p. 297	[40 CFR 112] - Oil Pollution Prevention. Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved. ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) and (13) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033

Table J-6. Water bar spacing by gradient and erosion class

Gradient (Percent)	Water Bar Spacing* Per Erosion Class†		
	High (Feet)	Moderate (Feet)	Low (Feet)
2–5%	200	300	400
6–10%	150	200	300
11–15%	100	150	200
16–20%	75	100	150
21–35%	50	75	100
36+%	50	50	50

* Spacing is determined by slope distance and is the maximum allowed for the grade.

† The erosion classes include the following rock types:

High: Granite, sandstone, andesite porphyry, glacial or alluvial deposits, soft matrix conglomerate, volcanic ash, and pyroclastics

Moderate: Basalt, andesite, quartzite, hard matrix conglomerate, and rhyolite

Low: Metasediments, metavolcanics, and hard shale

Surface Source Water for Drinking Water

Table J-7. Best management practices for surface source water for drinking water protection

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
SW 01	Plan, locate, design, construct, operate, inspect, and maintain sanitary facilities to minimize water contamination.	USDI BLM 2008, Appendix I – Water, SW 1, p. 299	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 02	Locate contractor camps outside DEQ sensitive zones in drinking water source areas for public water systems. If this is not possible, require self-contained sanitary facilities.	USDI BLM 2008, Appendix I – Water, SW 2, p. 299 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 03	Require self-contained sanitary facilities in surface source water watersheds, when long-term camping (greater than 14 days) is involved with contract implementation.	USDI BLM 2008, Appendix I – Water, SW 3, p. 299	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 04	Provide self-contained sanitary facilities when there is high recreational use (almost continuous occupancy) inside DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone.	USDI BLM 2008, Appendix I – Water, SW 4, p. 299 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
SW 05	Locate pack and riding, facilities outside DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone.	USDI BLM 2008, Appendix I – Water, SW 5, p. 299 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 06	Do not allow surface occupancy within 200 feet of a known domestic water source or within DEQ sensitive zones in drinking water source areas for public water systems.	USDI BLM 2008, Appendix I – Water, SW 6, p. 299 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 07	Do not apply sewage sludge as a soil amendment within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve.	USDI BLM 2008, Appendix I – Water, SW 7, p. 300 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 08	Avoid loading, or storing chemical, fuel, or fertilizer in DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone.	USDI BLM 2008, Appendix I – Water, SW 8, p. 300 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 09	Conduct equipment maintenance outside DEQ sensitive zones within drinking water source areas for public water systems, known domestic source water watersheds, or Riparian Reserve inner zone.	USDI BLM 2008, Appendix I – Water, SW 9, p. 300 ODEQ Drinking Water Protection Program http://www.deq.state.or.us/wq/dwp/swcountymap.htm	ODEQ–Water Pollution: Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 10	Use non-oil-based dust suppressants within surface source water watersheds.	USDI BLM 2008, Appendix I – Water, SW 10, p. 300	ODEQ–Water Pollution: Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)
SW 11	Use fire retardant and surfactants as a last resort in fire suppression activities within surface source water watersheds.	USDI BLM 2008, Appendix I – Water, SW 11, p. 300	ODEQ–Water Pollution: Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)

Recreation

Table J-8. Best management practices for recreation management

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
All Recreation Facilities			
REC 01	Implement erosion control measures at recreation sites to stabilize exposed soils where water flows or sediment, may reach waterbodies.	USDI BLM 2008, Appendix I – Water, REC 1, p. 301	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 02	Minimize development of recreation facilities that are not water-dependent (e.g., boat ramps and docks) in the Riparian Reserve.	USDI BLM 2008, Appendix I – Water, REC 2, p. 301	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
Developed Recreation Sites			
REC 03	Use self-contained sanitary facilities at all developed recreational facilities, unless a sewage system and drain field is approved by ODEQ.	USDI BLM 2008, Appendix I – Water, REC 3, p. 301	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009
REC 04	When conducting recreation site maintenance, do not cut portions of logs or coarse woody debris that fall across the active stream channel. Keep adequate lengths of material on the banks to anchor it in place. If not possible to make the log stable, it may be removed.	USDI BLM 2008, Appendix I – Water, REC 5, p. 301	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Water Dependent Facilities			
REC 05	Construct boat ramps and approaches with hardened surfaces. Minimize riprap to a 4-foot width to protect concrete ramps. Docks must not be wider than 6', and not include any treated wood.	USDI BLM 2008, Appendix I – Water, REC 6, p. 301	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
Off-highway Vehicle (OHV) Trails			
REC 06	Locate new OHV trails on stable locations (e.g., ridge tops, benches, and gentle-to-moderate side slopes). Minimize trail construction on steep slopes where runoff could channel to a waterbody.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 07	Design, construct, and maintain trail width, grades, curves, and switchbacks suitable to the terrain and designated use. Use and maintain surfacing materials suitable to the site and use, to withstand traffic and to minimize runoff and erosion.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 08	Suspend construction or maintenance of trails, where erosion and runoff into waterbodies would occur.	USDI BLM 2008, Appendix I – Water, REC 11, p. 302	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 09	Locate staging areas outside Riparian Reserve. Design or upgrade staging areas to prevent sediment/pollutant delivery to wetlands, floodplains, and waterbodies, (e.g., rocking or hardening and drainage through grading or shaping).	USDI BLM 2008, Appendix I – Water, REC 12, p. 302	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
REC 10	Designate class of vehicle suitable for the trail location, width, trail surfaces, and waterbody crossings, to prevent erosion and potential sediment delivery.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
REC 11	Designate season of use if the trail bed is prone to erosion, rutting, gullying, or compaction, due to high soil moisture, standing water or snowmelt.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
REC 12	Use existing road crossings of streams and floodplains on low-volume roads and partially decommissioned roads that tie with the trail system, where safety permits.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Toxic Substances OAR 340-041-0033
REC 13	Minimize low-water stream crossings for constructed or existing trails. Cross streams on stable substrate (e.g., bedrock, cobble) in areas of low streambanks. Block alternate stream-crossing routes where OHV wheel slippage (acceleration/ braking) would tear down banks or deliver sediment.	USDI BLM 2008, Appendix I – Water, REC 7, p. 301	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Toxic Substances OAR 340-041-0033
REC 14	Avoid public motorized vehicle use in ponds and wetlands, and navigating up or down streams and side-channels. Use suitable barriers where feasible.	USDI BLM 2008, Appendix I – Water, REC 7, pp. 302–303	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Toxic Substances OAR 340-041-0033
REC 15	Design improved stream crossings (culverts and bridges) for the 100-year flood event. Stream crossings with ESA-listed fish must meet ARBO II (NMFS 2013 and USFWS 2013) fish passage design criteria (See Roads and Landings section for stream crossing BMPs).	USDI BLM 2008, Appendix I – Water, REC 10, p. 302	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Toxic Substances OAR 340-041-0033
REC 16	In OHV bridge structures, avoid chemically treated materials at water level contact points where leachate or solids may enter waterbodies.	USDI BLM 2008, Appendix I – Water, REC 15, p. 302	ODEQ–Water Pollution: Toxic Substances OAR 340-041-0033 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (10) Toxic Substances OAR 340-041-0033
REC 17	Use a temporary flow diversion bypass to minimize downstream turbidity, when constructing in perennial stream crossings (See Roads and Landings section for Stream Crossing BMPs).	USDI BLM 2008, Appendix I – Water, REC 16, p. 302	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
REC 18	When constructing or maintaining trails within Riparian Reserve, do not cut the portion of logs or down woody material that extend into the active stream channel. Provide for adequate stabilization of the logs if not doing so would create a safety hazard.	USDI BLM 2008, Appendix I – Water, REC 8, p. 302	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
REC 19	Harden trail approaches to stream crossings using materials such as geotextile fabric and rock aggregate.	USDI BLM 2008, Appendix I – Water, REC 13, p. 302	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
REC 20	Hydrologically disconnect trails from waterbodies to the extent practicable. Install drainage features (e.g., drain dips and leadoff ditches), on approaches to stream crossings as needed to divert runoff and reinforce with rock for longevity.	USDI BLM 2008, Appendix I – Water, REC 14, p. 302. USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 21	Where trails intersect road ditches, provide erosion resistant crossings. Divert water from the trail to keep from reaching wetlands, floodplains, and waterbodies.	USDI BLM 2008, Appendix I – Water, REC 18, p. 303	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 22	If trail width is too wide for the designated use (such as old roads converted to trails), consider tilling one side of the trail, covering with brush, and seeding or planting.	USDI BLM 2008, Appendix I – Water, REC 19, p. 303	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 23	Repair rills and gullies to keep sediment from reaching wetlands, floodplains, and waterbodies.	USDI BLM 2008, Appendix I – Water, REC 20, p. 303	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 24	Construct and repair water bars, drain dips, and leadoff ditches as needed. These features may need rock reinforcement to promote longevity. Self-maintaining drain dips or leadoff features are the preferred design.	USDI BLM 2008, Appendix I – Water, REC 21, p. 303	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 25	Monitor trail condition to identify surface maintenance and drainage needs to prevent or minimize sediment delivery to waterbodies.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 26	Close and rehabilitate unauthorized trails, where needed, to protect sensitive areas and water quality.	USDA FS 2012, pp. 91–92	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Toxic Substances OAR 340-041-0033
Trails (Hiking)			
REC 27	When constructing or maintaining trails within Riparian Reserve, do not cut any portion of logs or coarse woody debris that extend into the active stream channel. Use alternative passage options, such as earthen ramps, small notch steps, or slight trail realignments, to facilitate maintenance of intact logs. Cut and stabilize if necessary for safe passage and safety.	USDI BLM 2008, Appendix I – Water, REC 23, p. 303	ODEQ–Water Pollution: Antidegradation OAR 340-041-004(1) Biocriteria OAR 340-041-0011 Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
Trail Closure			
REC 28	Remove existing stream crossings or bridges (See Road Decommissioning BMPs).	USDI BLM 2008, Appendix I – Water, REC 24, p. 303	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (8) Turbidity OAR 340-041-0036
REC 29	Position fill or waste material in a location that would avoid direct or indirect sediment discharge to streams or wetlands.	USDI BLM 2008, Appendix I – Water, REC 25, p. 304	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
REC 30	Plant restored stream banks with native vegetation, mulch, and then plant with water-tolerant species where appropriate.	USDI BLM 2008, Appendix I – Water, REC 26, p. 304	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
REC 31	Barricade and allow nearby vegetation to grow into closed trails.	USDI BLM 2008, Appendix I – Water, REC 27, p. 304	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
Dispersed Recreation			
REC 32	Site camps for permitted group overnight camping greater than 150 feet from surface water.	USDI BLM 2008, Appendix I – Water, REC 28, p. 304	ODEQ–Water Pollution: Bacteria OAR 340-041-0009 Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (13)

Range Management

Table J-9. Best management practices for livestock grazing

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
G 01	Fence water developments, including springs and seeps, unless other methods are available. Pipe overflow away from the developed source area.	USDI BLM 2008, Appendix I – Water, G 1, p. 305	ODEQ–Water Pollution: Antidegradation OAR 340-04l-0004 Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009 Biocriteria OAR 340-041-0011 Dissolved Oxygen OAR 340-041-0016 Temperature OAR 340-041-0028 Turbidity OAR 340-041-0036
G 02	Do not locate salting areas within 0.25 mile of permanent water sources or Riparian Reserve.	USDI BLM 2008, Appendix I – Water, G 2, p. 305	ODEQ–Water Pollution: Antidegradation OAR 340-04l-0004 Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009 Biocriteria OAR 340-041-0011 Dissolved Oxygen OAR 340-041-0016 Temperature OAR 340-041-0028 Turbidity OAR 340-041-0036
G 03	Locate new permanent livestock handling or management facilities (corrals, pens, or holding pastures) outside Riparian Reserve or 200 feet from waterbodies and on level ground where drainage would not enter surface waters. Make changes as necessary to existing facilities within Riparian Reserve to meet water quality standards and regulations.	USDI BLM 2008, Appendix I – Water, G 3, p. 305	ODEQ–Water Pollution: Antidegradation OAR 340-04l-0004 Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009 Biocriteria OAR 340-041-0011 Dissolved Oxygen OAR 340-041-0016 Temperature OAR 340-041-0028 Turbidity OAR 340-041-0036

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
G 04	Apply specific livestock grazing strategies for riparian wetland areas, including timing, intensity, or exclusion for maintenance of proper functioning condition. Use one or more of the following features: – Include the waterbodies, floodplains, and wetlands within a separate pasture. – Fence or herd livestock out of waterbodies, floodplains, and wetlands for as long as necessary to allow vegetation to recover. – Control the timing and intensity of grazing to keep livestock off stream banks when they are most vulnerable to damage and to coincide with the physiological needs of target plant species. – Add more rest to the grazing cycle to increase plant vigor, allow stream banks to re-vegetate, or encourage more desirable plant species composition. – Limit grazing intensity to a level that will maintain desired species composition and vigor. – Permanently exclude livestock from those waterbodies, floodplains, and wetlands areas that are at high risk and have poor recovery potential, and when there is no practical way to protect them while grazing adjacent uplands.	USDI BLM 2008, Appendix I – Water, G 4, p. 306	ODEQ–Water Pollution: Antidegradation OAR 340-041l-0004 Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009 Biocriteria OAR 340-041-0011 Dissolved Oxygen OAR 340-041-0016 Temperature OAR 340-041-0028 Turbidity OAR 340-041-0036
G 05	Recover degraded waterbodies through adjustments to forage utilization levels, improved livestock distribution, and management through fencing, vegetation treatments, water source developments, or changes in season of use or livestock numbers.	USDI BLM 2008, Appendix I – Water, G 5, p. 306	ODEQ–Water Pollution: Antidegradation OAR 340-041l-0004 Statewide Narrative OAR 340-041-0007(1) Bacteria OAR 340-041-0009 Biocriteria OAR 340-041-0011 Dissolved Oxygen OAR 340-041-0016 Temperature OAR 340-041-0028 Turbidity OAR 340-041-0036

Minerals (Salable) Development

Table J-10. Best management practices for minerals (salable)

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Salable Minerals			
M 01	Locate stockpile sites on stable ground where the material would not move into waterbodies, floodplains, and wetlands.	USDI BLM 2008, Appendix I – Water, M 18, p. 309	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
M 02	Locate, design, and construct salable mineral sites to control runoff and prevent or minimize sediment delivery to streams. Prevent overburden, solid wastes, drainage water, or petroleum products from entering wetlands, Riparian Reserve, flood plains, and waters of the State.	USDI BLM 2008, Appendix I – Water, M 18, p. 309 OAR 629-625-0500 1-5	OAR 629-625-0500-ODF, Rock Pits and Quarries ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
M 03	Locate, design, and maintain settling ponds to contain sediment discharges.	USDI BLM 2008, Appendix I – Water, M 1, p. 309	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
M 04	When a quarry or rock pit is depleted or vacated, stabilize cutbanks, headwalls, and other surfaces to prevent surface erosion and landslides. Close roads, excavations, and crusher pads in accordance with Roads and Landings section. Remove all potential pollutants to prevent their entry into wetlands, Riparian Reserve, floodplains, and waters of the State.	OAR 629-625-0500 ODEQ 2005 NS - 6	OAR 629-625-0500-ODF, Rock Pits and Quarries ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036
M 05	Use erosion-reduction practices, such as seeding, mulching, silt fences, and woody debris placement, to limit erosion and transport of sediment to streams from quarries. Provide drainage from stockpiles and mineral sites, dispersed over stable vegetated areas rather than directly into stream channels. Grade all material sites, where practicable to conform with the surrounding topography prior to closure. Utilized topsoil as a medium to for successful revegetation. Reseed and plant trees, where needed.	USDI BLM 2008, Appendix I – Water, M 22, p. 309	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Turbidity OAR 340-041-0036

Spill Prevention and Abatement

Table J-11. Best management practices for spill prevention and abatement

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Operations Near Waterbodies			
SP 01	Take precautions to prevent leaks or spills of petroleum products (e.g., fuel, motor oil, and hydraulic fluid) from entering the waters of the State.	[40 CFR 112] OAR 629-620-0100(2)	[40 CFR 112] – Oil Pollution Prevention Reportable quantity is a visible sheen where waterways are involved. OAR 629-620-0100-ODF, Chemical and Other Petroleum Product Rules ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) and (13) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
SP 02	Take immediate action to stop and contain leaks or spills of chemicals and other petroleum products. Notify the Oregon Emergency Response System, through the District Hazard Materials specialist, of any spill that enters the waters of the State.	[40 CFR 112] OAR 629-620-0100(3), (4)	[40 CFR 112] – Oil Pollution Prevention Reportable quantity is a visible sheen where waterways are involved. OAR 629-620-0100-ODF, Chemical and Other Petroleum Product Rules ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) and (13) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
SP 03	Inspect and clean heavy equipment as necessary prior to moving on to the project site, in order to remove oil and grease, noxious weeds, and excessive soil. Inspect hydraulic fluid and fuel lines on heavy-mechanized equipment for proper working condition. Where possible, maintain and refuel heavy equipment a minimum of 150 feet away from streams and other waterbodies. Refuel small equipment (e.g. chainsaws and water pumps) at least 100 feet from waterbodies (or as far as possible from the waterbody where local site conditions do not allow a 100-foot setback) to prevent direct delivery of contaminants into a waterbody. Refuel small equipment from no more than 5-gallon containers. Use absorbent material or a containment system to prevent spills when re-fueling small equipment within the stream margins or near the edge of waterbodies. In the event of a spill or release, take all reasonable and safe actions to contain the material. Specific actions are dependent on the nature of the material spilled. Use spill containment booms or as required by ODEQ. Have access to booms and other absorbent containment materials. Immediately remove waste or spilled hazardous materials (including but not limited to diesel, oil, hydraulic fluid) and contaminated soils near any stream or other waterbody, and dispose of it/them in accordance with the applicable regulatory standard. Notify Oregon Emergency Response System of any spill over the material reportable quantities, and any spill not totally cleaned up after 24 hours. Store equipment containing reportable quantities of toxic fluids outside of Riparian Reserve	USDI BLM 2008, Appendix I – Water, SP 1, p. 311	[40 CFR 112] – Oil Pollution Prevention Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved. ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) and (13) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
SP 04	If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances would be transported to a project site as project materials, implement the following precautions: 1. Plan a safe route and material transfer sites so that all spilled material will be contained easily at that designated location. 2. Plan an active dispatch system that can relay the information to appropriate resources. 3. Ensure a spill containment kit that can absorb and contain 55 gallons of petroleum product and chemical substances is readily available. 4. Provide for immediate notification to OERS in the event of a spill. Have a radio-equipped vehicle lead the chemical or fuel truck to the project site. 5. Assemble a spill notification list that includes the district hazardous materials coordinator, ODEQ, and spill clean-up contractors. 6. Construct a downstream water user contact list with addresses and phone numbers. 7. When operating within source water watersheds, pre-estimate water flow travel times through the watershed to predict downstream arrival times. 8. Be prepared to sample water and carry sample containers. 9. Be prepared to assist OSP and ODFW to assess wildlife impacts of any material spilled.	USDI BLM 2008, Appendix I – Water, SP 2, p. 312	[40 CFR 112] – Oil Pollution Prevention Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved. ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) and (13) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
Spill Abatement			
SP 05	Spill Prevention, Control, and Countermeasure Plan (SPCC): All operators shall develop a modified SPCC plan prior to initiating project work if there is a potential risk of chemical or petroleum spills near waterbodies. The SPCC plan will include the appropriate containers and design of the material transfer locations. No interim fuel depot or storage location other than a manned transport vehicle would be used.	USDI BLM 2008, Appendix I – Water, SP 3, p. 312	[40 CFR 112] – Oil Pollution Prevention Reportable quantity is forty-two U.S. Gallons not involving waterways, a visible sheen where waterways are involved. OAR-340-142-0030-DEQ, Oil and Hazardous Materials Emergency Response Requirements
SP 06	Spill Containment Kit (SCK): All operators shall have a SCK as described in the SPCC plan on-site during any operation with potential for run-off to adjacent waterbodies. The SCK will be appropriate in size and type for the oil or hazardous material carried by the operator.	USDI BLM 2008, Appendix I – Water, SP 4, p. 313	OAR-340-142-0030-DEQ, Oil and Hazardous Materials Emergency Response Requirements

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
SP 07	Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site.	USDI BLM 2008, Appendix I – Water, SP 5, p. 313	OAR-340-102-DEQ, Standards Applicable to Generators of Hazardous Waste OAR-340-122-DEQ, Hazardous Substance Remedial Action Rules

Restoration Activities

Table J-12. Best management practices for restoration activities

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
RST 01	Confine work in the stream channels to the ODFW in-water work period unless a waiver is obtained from permitting agencies.	USDI BLM 2008, Appendix I – Water, RST 1, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
RST 02	In stream channels that are sensitive to disturbance (e.g., meadow streams), do not drive heavy equipment in flowing channels and floodplains.	USDI BLM 2008, Appendix I – Water, RST 2, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
RST 03	In well-armored channels that are resistant to damage (e.g., bedrock, small boulder, and cobble-dominated), consider conducting the majority of heavy-equipment work from within the channel, during low streamflow, to minimize damage to sensitive riparian areas.	USDI BLM 2008, Appendix I – Water, RST 3, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
RST 04	Design access routes for individual work sites to reduce exposure of bare soil and extensive stream bank shaping.	USDI BLM 2008, Appendix I – Water, RST 4, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
RST 05	Limit the number and length of equipment access points through Riparian Reserve.	USDI BLM 2008, Appendix I – Water, RST 5, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
RST 06	Limit the amount of stream bank excavation to the minimum necessary to ensure stability of enhancement structures. Provide isolation from flowing water during excavation. Place excavated material above the flood-prone area and cover or place a berm to avoid its reentry into the stream during high-flow events.	USDI BLM 2008, Appendix I – Water, RST 6, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036 Temperature OAR 340-041-0028
RST 07	Inspect all mechanized equipment daily for leaks and clean as necessary to ensure that toxic materials, such as fuel and hydraulic fluid, do not enter the stream.	USDI BLM 2008, Appendix I – Water, RST 7, p. 314	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
RST 08	Locate equipment storage areas at least 100 feet from any water feature, including machinery used in stream channels for more than one day.	USDI BLM 2008, Appendix I – Water, RST 8, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
RST 09	When using heavy equipment in or adjacent to stream channels during restoration activities, develop and implement an approved spill containment plan that includes having a spill containment kit on-site and at previously identified containment locations.	USDI BLM 2008, Appendix I – Water, RST 9, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
RST 10	Refuel equipment, including chainsaws and other hand power tools, at least 100 feet from waterbodies (or as far as possible from the waterbody where local site conditions do not allow a 100-foot setback) to prevent direct delivery of contaminants into a waterbody.	USDI BLM 2008, Appendix I – Water, RST 10, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (12) Biocriteria OAR 340-041-0011 Toxic Substances OAR 340-041-0033
RST 11	Use waterbars, barricades, seeding, and mulching to stabilize bare soil areas along project access routes prior to the wet season.	USDI BLM 2008, Appendix I – Water, RST 11, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
RST 12	Prior to the wet season, stabilize disturbed areas where soil will support seed growth, with the potential for sediment delivery to wetlands, and waters of the State. Apply native seed and certified weed-free mulch or erosion control matting in steep or highly erosive areas. If needed to promote a rapid ground cover and prevent aggressive invasive plants, use interim erosion control non-native sterile annuals before attempting to restore native seed or plants.	USDI BLM 2008, Appendix I – Water, RST 12, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
RST 13	When replacing culverts design placement location, crossing type, and installation depth to avoid excessive scour through the site, consider using larger culverts and embedding the culvert to 30 percent bedload. Use bridges on high-gradient stream channels.	USDI BLM 2008, Appendix I – Water, RST 13, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036
RST 14	Rehabilitate headcuts and gullies. Use large wood in preference to rock weirs.	USDI BLM 2008, Appendix I – Water, RST 14, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
RST 15	Implement measures to control turbidity. Measures may include installation of turbidity control structures (e.g., isolation, diversion, and silt curtains) immediately downstream of in-stream restoration work areas. Remove these structures following completion of turbidity-generating activities.	USDI BLM 2008, Appendix I – Water, RST 15, p. 315	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1) Biocriteria OAR 340-041-0011 Turbidity OAR 340-041-0036

Dry Forest-specific BMPs

Soils of concern in the dry forest area include those with a high potential for severe surface erosion, soil creep, periodic slumping (even when not overly saturated), and low nutrient potential. These soils weathered from granite, schist, and pyroclastic materials. The Timber Production Capability Classification (TPCC) and Handbook (5251-1, USDI BLM 1986) involves mapping, with discrete mapping units and interpretations of timbered lands. The classification uses geology, landform, topographic position, climate (especially precipitation), soil properties, and vegetation. Lands with the capacity to erode excessively or prone to movement are denoted with either a fragile code of FM (surface erosion potential) or FP (mass movement potential) (**Table J-13**).

Table J-13. Timber Production Capability Classification soil categories of concern

Category	Description of Soil Categories
Surface Erosion FM	These sites have soil surface horizons that are highly erodible, easily detached and subject to bouncing or sliding downhill (dry ravel), even if partially vegetated. The soils overlay intrusive volcanic bedrock (e.g., granite, diorite, and schist). The Natural Resources Conservation Service (NRCS) provides a Revised Universal Soil Loss Equation soil loss tolerance factor, known as T factor, which ranges from a low of 1 (on shallow soils, 1–10" depth), to 5 (on soils deeper than 60"). This factor describes the maximum rate of annual soil loss in tons/acre that can be lost and still permit crop productivity to sustain economically and indefinitely. Disturbances from harvesting or burning create increased dry raveling of soil, losses of soil nutrients, and burying of newly planted seedlings. Classification coding may be FMR for suitable lands or FMNW for non-suitable lands.
Mass Movement FP	These sites range from gentle to moderately steep slopes, 10–60 percent, where the rate of sliding is slow enough to permit forest management, but with some loss in wood quality in certain areas. Sites may have an impervious clay pan overlaying pyroclastic bedrock (e.g., volcanic tuffs, breccia, and are subject to movement). Tree roots providing strength and certain landforms act as resisting forces, while gravity and soil moisture may initiate non-uniform spatial and temporal rates of movement. Slow deep seated, slump or earth flow types of mass movements may occur, forming an undulating topography. Classification coding may be FPR for suitable lands or FPNW for non-suitable lands.

Table J-14. Best management practices specific to the dry forest (refer to **Table J-13** for category type)

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Roads and Landings: General Construction, Maintenance Timber Harvest: Cable Yarding			
DF 01	Use full log suspension whenever possible on TPCC soils identified as prone to surface erosion, category FM in **Table J-13**. Use one-end suspension on these soils if full suspension is not practicable. Restrict yarding to the dry season, generally from June to end of September. Suspend the leading end over TPCC soils identified as prone to mass movement, category FP in **Table J-13**. Restrict yarding to the dry season.	USDI BLM 2008, Appendix I – Water, MFO 1, p. 317	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Timber Harvest: Ground-based			
DF 02	Limit non-specialized ground-based yarding equipment to slopes less than 20 percent on TPCC soils identified as category FM or FP in **Table J-13**, where soils average less than or equal to 20 percent clay in the top 6" of soil as determined by NRCS soil survey data. Otherwise, limit non-specialized ground-based yarding equipment to slopes less than 35 percent, on TPCC soils identified as category FM or FP in **Table J-13**, where soils average greater than 20 percent clay in the top 6". Avoid tilling on TPCC soils identified as category FM (when moisture is excessive) or FP in **Table J-13**, unless adequate ground cover is present to arrest potential erosion.	USDI BLM 2008, Appendix I – Water, MFO 2, p. 317	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Fire and Fuels Management			
DF 03	Avoid mechanical piling to limit severe surface disturbance and displacement on TPCC soils identified as category FM or FP in **Table J-13**	USDI BLM 2008, Appendix I – Water, MFO 3, p. 318	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
DF 04	Implement prescribed burning on FG and FM soils when fuel moisture contents result in 'cool burns.' Post-burn surface soil characteristics may include litter that is consumed and duff that is deeply charred or consumed or organic matter that is partially charred to a depth >1.0 cm, but mineral soil is not visibly altered.	USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 4 2005 Table 1.4 Part B	None

BMP Number	Best Management Practices	Source	Water Quality Standards and Regulations
Wildfire: Suppression			
DF 05	Limit the use of non-specialized ground-based fire line construction equipment and other major surface-disturbing activities (for example, safety zones or helispots) to slopes equal to 20 percent or less on TPCC soils identified as category FM or FP in **Table J-13**.	USDI BLM 2008, Appendix I – Water, MFO 5, p. 318	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036
Rights-of-Way			
DF 06	Avoid facility construction on soils identified on TPCC soils identified as the FM category in **Table J-13**, unless water quality would be maintained. Locate rights-of-ways to minimize surface disturbance on TPCC soils identified as category FM or FP in **Table J-13.**	USDI BLM 2008, Appendix I – Water, MFO 6, p. 318	ODEQ–Water Pollution: Antidegradation OAR 340-041-0004(1) Statewide Narrative OAR 340-041-0007(1), (7) Turbidity OAR 340-041-0036

References

Gesford, A. L., and J. A. Anderson. 2006. Environmentally sensitive maintenance for dirt and gravel roads. Pennsylvania Department of Transportation. http://water.epa.gov/polwaste/nps/upload/EnvironmentallySensitiveMaintenance_DirtGravelRoads.pdf.

Johansen, K., R. Copstead, and J. Moll. 1997. Relief culverts. Water/road interaction technology series. Research Report 9777 1812-SDTDC. USDA FS, San Dimas Technology and Development Program, Washington, D.C. 7 pp. http://www.stream.fs.fed.us/water-road/.

ODEQ. 2015. Oregon Administrative rules. Water Pollution, Division 41. Water quality standards, beneficial uses, policies and criteria for Oregon. http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_041.html.

ODEQ and USDI BLM. 2011. Memorandum of understanding between United States Dept. of the Interior, Bureau of Land Management, and State of Oregon Dept. of Environmental Quality to meet State and Federal water quality rules and regulations. Agreement Number BLM-OR932-1013 and DEQ Agreement # 040-11/I, Subject Function Code 1786, 7240 (P), April 2011. http://www.deq.state.or.us/wq/pubs/igas/DEQBLMMOU20110401.pdf.

---. 2005. Erosion and sediment control manual. Prepared by: Geosyntec Consultants, San Diego, CA. Project Number SW0106-01.

ODFW. 2008. Oregon guidelines for timing of in-water work to protect fish and wildlife resources. http://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf.

USACOE. 1972. Clean Water Act, Section 404. http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/materials/cwa_sec404doc.pdf.

USDA FS. 1998. U.S. Forest Service Manual 2500, Chap. 2520 Watershed Protection and Management, R-6 Supplement 2520.98-1. 6 pp. http://www.fs.fed.us/im/directives/field/r6pnw/fsm/2500/2520_2_3.doc.

---. 2002. Management and techniques for riparian restorations: roads field guide. Vol. I and II. Gen. Tech. Rep. RMRS-GTR-102 Vol. I and II. USDA Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 38 pp. http://www.fs.fed.us/rm/pubs/rmrs_gtr102.html.

---. 2012. National best management practices for water quality management on National Forest system lands. Volume 1: National core BMP technical guide. FS-990a. http://www.fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf.

USDA FS, USDI BIA, USDI BLM, USDI NPS, and USDI FWS. 2006. Interagency Burned Area Emergency Response Guidebook. Interpretation of Department of the Interior 620 DM 3 and USDA Forest Service Manual 2523. For the Emergency Stabilization of Federal and Tribal Trust Lands Version 4.0. http://www.fws.gov/fire/ifcc/esr/Policy/es_handbook_2-7-06.pdf.

USDC NMFS. 2013. Endangered Species Act - Section 7 Programmatic consultation conference and biological opinion and Magnuson-Stevens Fishery Conservation and Management Act essential fish habitat response for reinitiation of aquatic restoration activities in states of Oregon and Washington (ARBO II). NMFS consultation number NWR-2013-9664. http://www.blm.gov/or/districts/medford/plans/files/nmfs-arboii.pdf.

USDI BLM. 1986. Timber production capability classification. Handbook 5251-1. Available at district offices.

---. 2006. Interagency Burned Area Rehabilitation Guidebook. Interpretation of Department of the Interior 620 DM 3 for the burned area rehabilitation of Federal and Tribal Trust Lands. Version 1.3. Washington, D.C. 36 pp. http://www.fws.gov/fire/ifcc/Esr/Policy/BAR_Guidebook11-06.pdf.

---. 2008. Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts. Vol. I–IV. Portland, OR. http://www.blm.gov/or/plans/wopr/final_eis/index.php.

---. 2010. Vegetation treatments using herbicides on BLM lands in Oregon. Record of Decision. http://www.blm.gov/or/plans/vegtreatmentseis/files/Veg_Treatments_ROD_Oct2010.pdf.

---. 2011. BLM Road Design Handbook H9113-1. http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.5566.File.dat/H-9113-1.pdf.

U.S. Environmental Protection Agency (EPA). 2005. National management measures to control nonpoint source pollution from forestry. Nonpoint Source Control Branch, Office of Wetlands, Oceans, and Watersheds, Office of Water, U.S. Environmental Protection Agency. EPA-841-B-05-001. http://www2.epa.gov/polluted-runoff-nonpoint-source-pollution/national-management-measures-control-nonpoint-source.

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