Camp Lick Project Preliminary Environmental Assessment (PEA)

Appendix C – Project Design Criteria

Blue Mountain Ranger District
Malheur National Forest
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## Project Design Criteria

Project design criteria (PDCs) are an integral part of each action alternative and serve to mitigate impacts of activities on resource areas. In addition to best management practices and legal requirements, these measures would be applied during implementation (Table C-1).

### Table C-1. Project design criteria to be applied during implementation

#### Botany

<table>
<thead>
<tr>
<th>Criteria Number</th>
<th>Objective</th>
<th>Design criteria</th>
<th>Management areas, units, or activity type</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botany–1</td>
<td>Protect rare plants</td>
<td>All rare and sensitive plant populations shall be avoided and buffered 100 feet from all operational activities. Sensitive plant sites and associated buffers shall be identified as areas to protect (ATPs). Operational activities include, but are not limited to, vehicle and heavy equipment operation, road construction, staging areas, stockpile areas, landings, piling of slash, recreation developments, prescribed fire, and fire line construction. A Forest Service botanist shall be consulted prior to implementation of activities within 200 feet of ATPs. The botanist may flag the site, and/or help lay out in the field the location of nearby skid trails, landings, and roads.</td>
<td>Vehicle and heavy equipment operation, road construction, staging areas, stockpile areas, landings, piling of slash, recreation developments, prescribed fire, and fire line construction.</td>
<td>Botanist, sale administrator, contracting officer’s representative (COR)</td>
</tr>
<tr>
<td>Botany–2</td>
<td>Protect rare plants</td>
<td>If any new rare or sensitive plant populations are located before or during project implementation, the population will be evaluated and a mitigation plan shall be developed in consultation with the botanist.</td>
<td>All units</td>
<td>Botanist</td>
</tr>
<tr>
<td>Botany–3</td>
<td>Protect unique and sensitive plant and animal habitats; protect undocumented rare plants</td>
<td>The integrity of unique habitats shall be maintained. Unique habitats may include meadows, lithosols (scablands), rimrock, talus slopes, cliffs, wallows, bogs, fans, seeps and springs. Operational activities (see Botany–1) shall avoid these areas (with the exception of prescribed fire). This shall be accomplished by incorporating cover buffers of approximately 100 feet from unit boundaries and landings.</td>
<td>Meadows, lithosols (scablands), rimrock, talus slopes, cliffs, wallows, fans, seeps and springs.</td>
<td>Layout crew, sale administrator, COR</td>
</tr>
</tbody>
</table>

#### Non-native invasive plants

<table>
<thead>
<tr>
<th>Criteria Number</th>
<th>Objective</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Invasive-1</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>Prevention Standard 1: Prevention of invasive plant introduction, establishment and spread will be addressed in watershed analysis; roads analysis; fire and fuels management plans; Burned Area Emergency Recovery Plans; emergency wildland fire situation analysis; wildland fire implementation plans; grazing allotment management plans, recreation management plans; vegetation management plans; and other land management assessments.</td>
<td>All treatment units</td>
<td>Non-native invasive plants specialist</td>
</tr>
<tr>
<td>Invasive-2</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>Prevention Standard 2: Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands.</td>
<td>All units authorizing heavy equipment outside the limits of the road prism</td>
<td>Sale administrator, COR</td>
</tr>
<tr>
<td>Criteria Number</td>
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<tr>
<td>Invasive-3</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td><strong>Prevention Standard 3:</strong> Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands. If state certified straw and/or mulch is not available, individual Forests should require sources certified to be weed free using the North American Weed Free Forage Program standards, or a similar certification process.</td>
<td>Units proposed for mulching activities</td>
<td>Botanist, sale administrator, COR</td>
</tr>
<tr>
<td>Invasive-4</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td><strong>Prevention Standard 4:</strong> Use only pelletized or certified weed-free feed on all National Forest System lands. If state certified weed-free feed is not available, individual Forests should require feed certified to be weed-free using North American Weed Free Forage Program standards or a similar certification process. Choose weed-free project staging areas, livestock and packhorse corrals, and trailheads.</td>
<td>All staging areas, livestock and packhorse corrals, and trailheads, or elsewhere in Forest where feed might be used</td>
<td>Non-native invasive plants specialist</td>
</tr>
<tr>
<td>Invasive-5</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td><strong>Prevention Standard 6:</strong> Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include (but are not limited to) revising permits and grazing allotment management plans, providing annual operating instructions, and using adaptive management. Plan and implement practices in cooperation with the grazing permit holder.</td>
<td>All rangeland management areas</td>
<td>Non-native invasive plants specialist</td>
</tr>
<tr>
<td>Invasive-6</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td><strong>Prevention Standard 7:</strong> Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed-free by District or Forest weed specialists.</td>
<td>Gravel pits, fill, sand stockpiles, quarry sites, and borrow material sites</td>
<td>Botanist, engineer</td>
</tr>
<tr>
<td>Invasive-7</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td><strong>Prevention Standard 8:</strong> Conduct road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists, incorporate invasive plant prevention practices as appropriate.</td>
<td>Road maintenance, road construction, temporary road construction, and road decommissioning activities</td>
<td>Engineer, botanist</td>
</tr>
<tr>
<td>Invasive-8</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>When it is deemed necessary to help reestablish native vegetation, and to prevent non-native invasive species infestations, seeding and/or planting of native plants shall be implemented after ground disturbing activities. Areas that may need treatment include log decks, staging areas, landing zones, temporary roads, slash piles, skid trails, decommissioned roads, and any other disturbed site. A Forest Service botanist, or revegetation specialist, shall be consulted to prescribe appropriate seed mixes, sowing guidelines, and provide assistance with application, protection, and cultivation of seeds and plants.</td>
<td>Revegetation with native plants</td>
<td>Botanist or revegetation specialist</td>
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<tr>
<td>Invasive-9</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>Conduct road blading, brushing, and ditch cleaning in areas with high concentrations of targeted non-native invasive plants in consultation with invasive plant specialist, and incorporate non-native invasive plant species prevention practices as appropriate.</td>
<td>Road maintenance, road construction, temporary road construction, &amp; road decommissioning activities</td>
<td>Non-native invasive plants specialist, road engineer or crew</td>
</tr>
<tr>
<td>Invasive-10</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>Ensure all equipment and vehicles used on National Forest lands are cleaned and free of targeted non-native invasive plant material and seeds. Notify the Forest Service prior to moving each piece of equipment onto National Forest Lands or when moving between units by identifying the location of the most recent operations. Upon request of the Forest Service, arrangements would be made for inspection of each piece of equipment. Contractor and Forest Service shall agree on locations of cleaning and control of off-site impacts, if any.</td>
<td>All equipment and vehicles used on NFS lands</td>
<td>Contract overseer, non-native invasive plants specialist</td>
</tr>
<tr>
<td>Invasive-11</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>Targeted non-native invasive plants that are known to spread due to burning should be appropriately treated prior to prescribed burning. Direct burning through these areas would be avoided. Avoid ignition and burning in areas at high risk for targeted non-native invasive plant establishment or spread due to fire effects.</td>
<td>Prescribed burning</td>
<td>Fuels specialist, burn boss, botanist</td>
</tr>
<tr>
<td>Invasive-12</td>
<td>Prevent the introduction and spread of invasive plants</td>
<td>Minimize soil disturbance to no more than needed to meet vegetation management objectives.</td>
<td>All project activities</td>
<td>Non-native invasive plants specialist</td>
</tr>
</tbody>
</table>

**Range Criteria**

<table>
<thead>
<tr>
<th>Criteria number</th>
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</thead>
<tbody>
<tr>
<td>Range-1</td>
<td>Minimize impacts to allotment management</td>
<td>All existing structural range improvements (fences, gates, spring developments, etc.) and permanent ecological plots will be contractually protected. If these structural improvements are damaged during project operations they will be repaired to Forest Service standards prior to livestock scheduled use by the party responsible for causing the damage.</td>
<td>Silviculture treatments and prescribed burning</td>
<td>Sale administrator, burn boss</td>
</tr>
<tr>
<td>Range-2</td>
<td>Minimize impacts to allotment management</td>
<td>Fence right of ways (6 feet either side of fence), trails, other developments, and access to them will be cleared of slash produced by logging or post-sale activities.</td>
<td>Harvest activities</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Range-3</td>
<td>Minimize impacts to allotment management</td>
<td>Actions that result in roads being closed for any period of time (temporary, activity implementation related, closures), even if detours are present, need to be coordinated with the Blue Mountain Ranger District (BMRD) range program to ensure adequate passage for the purpose of livestock management and activities associated with FS-2200-10: term grazing permit.</td>
<td>Roads accessing rangeland management areas</td>
<td>Sale administrator, transportation planner</td>
</tr>
<tr>
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<tr>
<td>Range-4</td>
<td>Minimize impacts to allotment management</td>
<td>Construction of fencing for the purpose of protection of a resource will be coordinated with the BMRD range program and will not result in loss of grazing land in such a manner that the contractual obligations between the Forest Service and a term grazing permit holder require modification or are no longer achievable.</td>
<td>Fence construction</td>
<td>Resource specialist responsible for installing the fencing</td>
</tr>
<tr>
<td>Range-5</td>
<td>Minimize impacts to allotment management</td>
<td>All structural improvements will be constructed in accordance with guidance from General Technical Report PNW-GTR-250 (Sanderson et al. 1990) and the expertise of a Rangeland Management Specialist.</td>
<td>Rangeland structural improvements</td>
<td>Resource specialist installing the structural improvements</td>
</tr>
<tr>
<td>Range-6</td>
<td>Minimize impacts to allotment management</td>
<td>Range, fire specialist, and permittees should coordinate activities, including the scheduling of burning activities in grazing units for prescribed fire.</td>
<td>Prescribed burning</td>
<td>Rangeland specialist, burn boss</td>
</tr>
<tr>
<td>Range-7</td>
<td>Minimize impacts to allotment management</td>
<td>Use the Malheur National Forest Post-Fire Interim Grazing Guidelines to aid in determining resumption of grazing after prescribed burning is complete.</td>
<td>Prescribed burning</td>
<td>Rangeland specialist</td>
</tr>
<tr>
<td>Range-8</td>
<td>Minimize impacts to allotment management</td>
<td>Whenever possible, burn units within pastures would be burned in the spring of the year the pasture is rested, or in the fall prior to the rest year.</td>
<td>Prescribed burning</td>
<td>Rangeland specialist, burn boss</td>
</tr>
<tr>
<td>Range-9</td>
<td>Minimize impacts to allotment management</td>
<td>The permittee has the option to exclude cattle grazing from portions of a pasture that were burned (through the use of fencing) and could continue to graze unburned areas of a pasture.</td>
<td>Prescribed burning</td>
<td>Rangeland specialist, burn boss</td>
</tr>
</tbody>
</table>

**Visuals**

<table>
<thead>
<tr>
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</table>
| Visuals-1      | Blend treatment units and create free-form vegetation patterns that mimic natural patterns, | Unit design and layout – general requirements applicable to all foreground and middleground areas:  
- In order to blend treatment units and create free-form vegetation patterns that mimic natural patterns, straight lines and geometric shapes for unit boundaries should be avoided or minimized.  
- Tree or shrub islands of various shapes and sizes would be retained in a random distribution pattern where possible, to provide a characteristic vegetation appearance while meeting objectives for fuel reduction and bark-beetle risk reduction. | All foreground and middleground areas | Sale administrator, layout crew                                                      |
<table>
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<tbody>
<tr>
<td>Visuals-2</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>If necessary, unburned slash in the foreground area should be scattered to reduce the color contrast of any exposed soil at burn-pile sites.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator, layout crew</td>
</tr>
<tr>
<td>Visuals-3</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>On slopes facing the road, campground, or trail, slash piles would be placed 50 feet or more away from the road, campground, or trail where practicable to reduce visual impacts. Slash within 150 feet of the road should be removed, grapple-piled, and burned, or hand-piled and burned.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator, burn boss, layout crew</td>
</tr>
<tr>
<td>Visuals-4</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>If after one year pile-burned sites are visible from the road/campground/trail, re-burning, scattering, covering with natural duff, or masticating burned piles should be accomplished in order to minimize visual impact of management activities.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Visuals-5</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Where marking paint can be seen, it is to be applied to the side of the tree facing away from the road/campground/trail. Flagging and signs that are visible from the road/river/trail should be removed upon completion of the harvest unit activities.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator, layout crews</td>
</tr>
<tr>
<td>Visuals-6</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Stumps should be cut flush or close to the ground where practicable and always within 6 inches of the ground on the uphill side.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Visuals-7</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>The number of landings along National Forest System (NFS) roads 3618, 3620, and County Road 18 should be kept to a minimum. Landing size should be minimized and landings should be shaped to blend with the contours of the landscape to maintain visual standards. Use established openings or old landings where possible. Natural vegetation should be retained between the landing and the road to serve as vegetative screening where practical and not in conflict with Wildland Urban Interface objectives.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Criteria number</td>
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<tr>
<td>Visuals-8</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Prior to harvest, the locations and clearing for all temporary roads and landings within 150 feet of NFS roads 36, 3660, 3620, and County Road 20 will be reviewed by a landscape architect or recreation specialist. Harvest activities in this zone must maintain a partial retention (slightly altered) visual objective. The ground disturbance must be minimal and the size and number of landings in the zone must be minimized. If the burning of the landing piles in this zone would cause more than 20 percent tree mortality surrounding the piles, consider either chipping or hauling the slash to a disposal area.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Landscape architect or recreation specialist, burn boss</td>
</tr>
<tr>
<td>Visuals-9</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Landings and skid trails should be returned to their original/natural profile, with no continuous berms or soil piles left behind. This does not preclude the use of water bars to reduce erosion on skid trails. Landings and skid trails should be re-vegetated with native grasses and forbs to protect soils and watershed processes.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Visuals-10</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Avoid placing skid trails within 100 feet of the road, campground, or trail where practical. Harvest units within the immediate foreground shall have a mosaic of stocking levels and tree sizes will be retained. Where practical minimize skid trails and roads located perpendicular to the road in order to minimize the forest visitor's direct views into landings.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Visuals-11</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Abrupt transitions between thinned and unthinned stands should be avoided in the foreground.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Visuals-12</td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Burning prescriptions in visual foreground areas should be developed to produce low intensity fire, minimizing damage to the larger-diameter overstory trees.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Burn boss</td>
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</tbody>
</table>
### Visuals

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<tr>
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</thead>
<tbody>
<tr>
<td><strong>Visuals-13</strong></td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Trees greater than 21 inches DBH within 200 feet of the road, campground, or trail would be protected from high intensity flames that could cause mortality. This protection could include activities such as raking needles away from the base of trees or wetting down the area around the tree prior to ignition.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Burn boss</td>
</tr>
<tr>
<td><strong>Visuals-14</strong></td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>Burning intensities will be controlled by ignition methods and techniques to retain a minimum of 80 percent of the live crowns. Isolated small trees within a stand of larger trees may end up having less than 80 percent of the live crown remaining.</td>
<td>Immediate foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Burn boss</td>
</tr>
<tr>
<td><strong>Visuals-15</strong></td>
<td>Management Area 14 immediate foreground design and layout--specific requirement</td>
<td>No marking paint should be applied within the Lower Camp Creek Campground if applicable, if required, apply marking paint to the backside of the tree out of view from the campground and NFS roads 36, 3660, 3620, and County Road 20. Signage should be minimal and low key, avoiding shiny or metallic materials and bright or white colors.</td>
<td>Immediately foreground areas – 150 feet from scenic/visual corridor center point (road, campground, or trail) into the project activity area.</td>
<td>Sale administrator, layout crew</td>
</tr>
</tbody>
</table>

### Recreation

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<tr>
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</thead>
<tbody>
<tr>
<td><strong>Recreation-1</strong></td>
<td>Preserve integrity of established dispersed campsites</td>
<td>The integrity of established dispersed campsites shall be preserved. Placement of landings should only occur at established dispersed campsites when no other allowable option exists.</td>
<td>Dispersed campsites</td>
<td>Sale administrator</td>
</tr>
<tr>
<td><strong>Recreation-2</strong></td>
<td>Preserve integrity of established trails and campgrounds</td>
<td>The integrity of established trails and campgrounds shall be preserved. Placement of landings in established campgrounds and trails will be avoided.</td>
<td>Established trails and campgrounds</td>
<td>Sale administrator, burn boss</td>
</tr>
</tbody>
</table>

### Soils

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<tr>
<th>Criterion number</th>
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<tbody>
<tr>
<td><strong>Soil-1</strong></td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>Keep soil impacts, especially long-lasting impacts, as small as practicable (as determined by the line officer) and keep cumulative detrimental soil impacts to less than 20 percent of the area of each unit.</td>
<td>All project activities</td>
<td>District Ranger</td>
</tr>
<tr>
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<tr>
<td>Soil-2</td>
<td>Minimize impacts and erosion and meet Malheur Forest Plan standard</td>
<td>Avoid downhill skidding or forwarding on slopes steeper than 35 percent, where feasible, using directional felling and tractor winching. There shall be no downhill skidding or forwarding on slopes steeper than 44 percent for more than 40 feet.</td>
<td>Units that appear to contain an acre or more of slopes steeper than 45 percent, including units 0, 12, 20, 22, 24, 36, 38, 40, 60, 68, 78, 90, 94, 104, 114, 120, 152, 154, 166, 168, 184, 188, 196, 200, 204, 212, 214, 238, 240, 246, 252, 254, 262, 264, 266, 268, 270, 278, 284, 286, 296, 300, 304, 306, 308, 309, 316, 318, 326, 330, 332, 338, 342, 344, 346, 370, 374, 376, 378, 384, 410, 414, 416, 418, 421, 434, 460, 502, 602, 606, 608, 618.</td>
<td>Sale layout and sale administrator</td>
</tr>
<tr>
<td>Soil-3</td>
<td>Minimize impacts and erosion and meet Malheur Forest Plan standard</td>
<td>Avoid uphill skidding or forwarding for more than 40 feet on slopes steeper than 35 percent.</td>
<td>Units with slopes steeper than 35 percent</td>
<td>Sale layout and sale administrator</td>
</tr>
<tr>
<td>Soil-4</td>
<td>Control erosion</td>
<td>Draw bottoms are not appropriate for skidding or forwarding. If the only way to log a particular part of a unit is to skid in the draw bottom, that part of the unit shall be excluded from harvest.</td>
<td>Units that appear to contain narrow draw bottoms include: 96, 116, 144, 152, 156, 188, 190, 200, 204, 238, 242, 246, 259, 262, 264, 270, 278, 304, 308, 330, 334, 346, 350, 398, 418, 460, 502</td>
<td>Sale layout and sale administrator</td>
</tr>
<tr>
<td>Soil-5</td>
<td>Control erosion</td>
<td>No heavy equipment shall be allowed on inclusions of highly erodible soil. “Inclusions of highly erodible soil” generally means areas larger than 50 feet diameter, and either 1) steeper than 30 percent, with less than 75 percent ground cover, 2) 20-30 percent slope with less than 50 percent ground cover, or 3) 10-19 percent slope with less than 25 percent ground cover. A Forest Service soils specialist can approve exceptions.</td>
<td>Inclusions of highly erodible soil, probably including parts of units 40, 140, 200, 264, 286, 308, 398, 412, and others</td>
<td>Sale layout and sale administrator</td>
</tr>
<tr>
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<tr>
<td>Soil-6</td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>Re-use existing landings where feasible and where they are away from shallow soil areas and ephemeral draws unless approved by a hydrologist, soil scientist, or fisheries biologist.</td>
<td>All treatment units</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-7</td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>On areas where existing skid trails spaced 100-140 feet apart can be reused, reuse the old skid trails. Otherwise, space skid trails about 120 feet apart where practical, using existing skid trails where possible and appropriate. Skid trails should average less than 14 feet wide.</td>
<td>All treatment units utilizing heavy equipment</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-8</td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>Skidders or forwarders shall not be allowed off trails unless the soil is snow-covered or frozen, or under other conditions approved by a soil scientist. Directional felling and/or winching shall be used when necessary. Low ground-pressure equipment (&lt;8.5 pounds per square inch [psi]) can be allowed off trails on dry, snow covered, or frozen soil. For soil design criteria, “dry” means July–September, or obviously dry in the top 6 inches in other months; “snow covered” means sufficient snow strength and depth to prevent compaction; and “frozen” means the soil is frozen in the top 4 inches.</td>
<td>All treatment units utilizing heavy equipment</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-9</td>
<td>Minimize impacts and erosion and meet Malheur Forest Plan standard</td>
<td>Skidding shall not be done on any unit under wet soil conditions, when ruts 6 inches or deeper would form on a continuous 50 feet or more of skid trails. This includes units with inclusions of moist soil.</td>
<td>All treatment units utilizing skidding. Units with inclusions of moist soil probably include parts of units 148, 184, 188, 190, 200, 212, 354, 384, 412, 414, 458, and others.</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-10</td>
<td>Control erosion</td>
<td>Runoff and erosion from skid trails, skyline corridors, and tractor-winch furrows shall be controlled by the use of waterbars or comparable measures. Outfalls of the waterbars shall be clear and located on soil where water will infiltrate, not on shallow or impermeable soil. Waterbars should be spaced appropriately for the terrain.</td>
<td>All treatment units utilizing heavy machinery</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-11</td>
<td>Minimize impacts and erosion and meet Malheur Forest Plan standard</td>
<td>For harvesting with low ground pressure harvesters and forwarders, the following design elements apply: - Forwarders shall have a maximum of 12.0 pounds/square inch ground pressure. - Forwarders should ride on top of a mat slash where feasible. - Forwarder trails shall be spaced a minimum of 50 feet apart, center to center. - The machinery shall not be operated when the soil is wet. (For forwarders “wet” means when ruts would be 3 inches or deeper on a continuous 50 feet or more of forwarder trails.) - The machinery shall not be operated on slopes steeper than 35 percent, except for distances less than 40 feet.</td>
<td>All treatment units utilizing ground pressure harvesters and forwarders</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-12</td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>Slash shall not be dozer piled (except on landings), unless a soil scientist determines that Forest Plan soil quality standards would be met.</td>
<td>All treatment units</td>
<td>Sale administrator, soil scientist</td>
</tr>
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<tr>
<td>Soil-13</td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>Grapple piling and mastication shall be done with low ground pressure (&lt; 8.5 psi) machinery on dry, frozen, or snow covered soil, and machinery shall stay on existing skid trails where feasible.</td>
<td>Piling or mastication activities</td>
<td>Sale administrator, fuels COR</td>
</tr>
<tr>
<td>Soil-14</td>
<td>Minimize impacts and meet Malheur Forest Plan standard</td>
<td>Slash piles shall not cover more than 5 percent of any unit, not including piles on landings.</td>
<td>All treatment units</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-15</td>
<td>Control erosion, meet Malheur Forest Plan standard</td>
<td>Malheur Forest Plan ground cover standard shall be met when prescribed burning is completed.</td>
<td>All prescribed burning units</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Soil-16</td>
<td>Meet Malheur Forest Plan standard</td>
<td>The following unit shall be logged either a) on dry soil, or b) design criterion Soil-17.</td>
<td>166</td>
<td>Contracting and sale administrator</td>
</tr>
<tr>
<td>Soil-17</td>
<td>Meet Malheur Forest Plan standard</td>
<td>For the following units and also units listed in design criteria soil–18, soil–19, and soil-20, no heavy equipment shall be allowed for biomass harvest unless it is done within 1-year of the logging, and it is done with the same type of equipment (skidders or forwarders).</td>
<td>148.3*, 242.2*, 286, 348.2*, 396, 400</td>
<td>Contracting and sale administrator</td>
</tr>
<tr>
<td>Soil-18</td>
<td>Meet Malheur Forest Plan standard</td>
<td>In the following units, apply either a) logging on dry soil and design criterion soil-17, or b) design criterion Soil-19 (where appropriate).</td>
<td>94, 95, 264.2*, 386</td>
<td>Contracting and sale administrator</td>
</tr>
<tr>
<td>Soil-19</td>
<td>Meet Malheur Forest Plan standard</td>
<td>In the following units, either a) the purchaser shall subsoil skid trails and landings and apply design criterion Soil-17, or b) apply design criterion Soil-20 (where appropriate).</td>
<td>148.2*, 414</td>
<td>Contracting and sale administrator</td>
</tr>
<tr>
<td>Soil-20</td>
<td>Meet Malheur Forest Plan standard</td>
<td>In the following unit, apply design criterion soil-17 and either a) yard on dry soil with low ground-pressure equipment riding on top of as much slash as feasible, or b) yard on frozen or snow covered soil (if compatible with winter range).</td>
<td>254</td>
<td>Contracting and sale administrator</td>
</tr>
<tr>
<td>Soil-21</td>
<td>Control erosion</td>
<td>For subsoiling, erosion shall be controlled by subsoiling in a &quot;J&quot; pattern, or installation of water bars, or comparable measures. If runoff cannot be diverted out of the furrows, such as in draw bottoms, subsoiling shall not occur. Skid trails on slopes steeper than 35 percent should not be subsoiled. Do not subsoil sections of skid trails where excessive rock would be pulled to the surface. Do not subsoil skid trails in RHCAs.</td>
<td>Subsoiling activities</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Soil-22</td>
<td>Control erosion</td>
<td>During juniper encroachment treatments, heavy equipment shall not be used more than 10 feet off roads, except in stands with a commercial thinning prescription.</td>
<td>Juniper encroachment treatment units on scabs</td>
<td>Non-commercial thinning COR</td>
</tr>
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<td>Criterion number</td>
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<tr>
<td>Soil-23</td>
<td>Control erosion</td>
<td>Temporary roads in scabs shall not be steeper than 6 percent. They shall be constructed and used only when the soil is obviously dry to a depth of 10 inches or throughout the profile (whichever is less), or frozen, or protected by snow. After use, 4 inches of slash shall be placed at outfall of waterbars, and slash shall be scattered on the surface of the road. Exceptions can be approved in advance by a soil scientist or hydrologist.</td>
<td>Scabs</td>
<td>Engineer, sale administrator</td>
</tr>
</tbody>
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Silviculture

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<thead>
<tr>
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<tbody>
<tr>
<td>Silviculture -1</td>
<td>Reduce the risk of spreading annosus root disease.</td>
<td>All ponderosa pine stumps greater than 14” diameter on low-to-moderate productivity sites (site productivity classes 6 and 7) would be treated with Sporax or Cellu-treat within 24 hours of cutting, preferably as soon as possible.</td>
<td>44, 124, 148, 152, 154, 156, 158, 168, 170, 172, 180, 181, 182, 188, 194, 202, 210, 218, 220, 223, 224, 225, 227, 234, 237, 238, 256, 259, 260, 266, 268, 282, 302, 310, 316, 326, 334, 344, 411, 416, 602, 618</td>
<td>Sale administrator</td>
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Heritage

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<tbody>
<tr>
<td>Heritage-1</td>
<td>Protect heritage resources</td>
<td>The archaeological sites within the Camp Lick project area that are eligible or potentially eligible for listing on the National Register of Historic Places will have minimal (or insignificant) direct or indirect effects caused by harvest activities, road activities, and other proposed actions. Other management actions that may have potential to impact archaeological sites will be assessed on a case by case basis.</td>
<td>All project activities</td>
<td>Heritage specialist, affected resource specialists, COR, sale administrator</td>
</tr>
<tr>
<td>Heritage-2</td>
<td>Protect heritage resources</td>
<td>If during project activities cultural material is encountered, all work will cease immediately and a Forest Service Archaeologist will be contacted to evaluate the inadvertent discovery. A mitigation plan, if needed, will be developed in consultation with the Oregon SHPO.</td>
<td>All project activities</td>
<td>Heritage specialist, affected resource specialists, COR, sale administrator</td>
</tr>
<tr>
<td>Heritage-3</td>
<td>Protect heritage resources in harvest areas</td>
<td>A “no effect” determination will apply in areas where archaeological sites and commercial logging activities coincide, as long as the sites are avoided completely or over-snow logging protocols are implemented (refer to Attachment 1, Section D for over-snow logging protocols).</td>
<td>Timber harvest units</td>
<td>Sale administrator, heritage specialist</td>
</tr>
<tr>
<td>Heritage-4</td>
<td>Protect historic properties in harvest and prescribed burning areas</td>
<td>There will be no slash piling, either by hand or ground-based machines, within archaeological site boundaries. Burning of slash is preferred to be conducted outside site boundaries. If burning of slash is necessary, however, the project lead must check with the Heritage specialist for concurrence regarding historic sites, rare isolates, and/or features.</td>
<td>Slash piling and burning</td>
<td>Sale administrator, heritage specialist, burn boss</td>
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### Heritage

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<tr>
<td>Heritage-5</td>
<td>Protect historic properties in harvest and prescribed burning areas</td>
<td>All eligible and potentially eligible (unevaluated) historic properties with structural remains or other combustible feature types will be avoided or protected during all burning activities. Eligible historic remains will be identified on the ground and proper protection measures will be conducted during the burning activities.</td>
<td>All project activities</td>
<td>Fuels specialist, heritage specialist</td>
</tr>
<tr>
<td>Heritage-6</td>
<td>Protect historic properties in prescribed burning areas</td>
<td>Low intensity burning that will have little to no effect on pre-contact lithic assemblages is permitted under the terms of the Management Strategy for the Treatment of Lithic Scatter Sites (Keyser et al. 1988).</td>
<td>Prescribed burning</td>
<td>Fuels project lead, heritage specialist</td>
</tr>
<tr>
<td>Heritage-7</td>
<td>Landings</td>
<td>Landings will not be located within 100 feet of known cultural resource sites.</td>
<td>Timber harvest units</td>
<td>Sale administrator, heritage specialist</td>
</tr>
<tr>
<td>Heritage-8</td>
<td>Protect historic properties proximate to proposed tree tipping areas</td>
<td>Potential tree-tipping locations will be inspected by a Heritage specialist prior to implementation to determine the presence of historic properties. If historic properties are present and ground disturbance by tipping will cause an adverse effect, no action will occur. Heritage implementation monitoring is required during ground disturbing activities.</td>
<td>Timber harvest or restoration thinning units</td>
<td>Aquatics specialist, heritage specialist</td>
</tr>
<tr>
<td>Heritage-9</td>
<td>Protect historic properties from mechanical impacts in harvest areas</td>
<td>Locations where equipment would cross railroad grades and other linear cultural resources will be coordinated with a Heritage specialist, prior to implementation. Linear cultural resources, if crossed, are to be crossed perpendicularly (at a 90-degree angle) to reduce impacts. Any linear cultural resource crossed will be rehabilitated following implementation (refer to attached Attachment 1, Section H-1 for best management practices regarding historic mining linear cultural resources).</td>
<td>Project activities utilizing heavy equipment</td>
<td>Sales administrator, heritage specialist</td>
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### Wildlife

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<tr>
<td>Wildlife-1</td>
<td>To reduce impacts to bats and their habitat</td>
<td><strong>Bats:</strong> During layout, look for snags and trees that have cavities or sloughing bark that could be used as natal or roost sites by bats. If found, retain where possible by incorporating into skip areas or as leave trees. If necessary to fell for safety reasons leave as high a stump as possible to maintain potential for future use. In the event a significant bat roost is located within the project area, the District and Forest wildlife biologists should be contacted to inspect the site, assess any project activities for their potential to impact bats, and formulate site specific management guidelines to ensure protection of the site.</td>
<td>All project activities</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-2</td>
<td>Prevent harassment in calving areas (LRMP 36, IV-29)</td>
<td><strong>Big game:</strong> A known elk calving/rearing area exists in the project area between Cougar and Trail creeks. No activities are permitted within known elk calving/rearing areas from May 1 to July 1. T11S R32E Sections 14, 15, 22, 23.</td>
<td>All project activities between Cougar and Trail creeks, or other known elk calving/rearing areas. Units 270, 264 266, 268</td>
<td>Sale administrator / COR, wildlife biologist, burn boss</td>
</tr>
<tr>
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<tr>
<td>Wildlife-4</td>
<td>Provide for elk hiding cover along road corridors (Malheur Forest Plan Glossary, page VI-9)</td>
<td><strong>Big game</strong>: Where possible, provide for vegetation capable of hiding 90% of a standing adult deer or elk from human view at 200 feet from existing road corridors.</td>
<td>422,507,508,600,602</td>
<td>Sale administrator / COR, silviculturist, wildlife biologist, burn boss</td>
</tr>
<tr>
<td>Wildlife-5</td>
<td>Protect occupied Northern goshawk nest sites</td>
<td><strong>Raptors</strong>: Activities are prohibited from April 01 – Aug 15 within ½ mile radius of nest site. Activities may occur from October 1- March 31; however, there must be no habitat removal within 30-acre designated nest stands.</td>
<td></td>
<td>Silviculturist, wildlife biologist, burn boss, sale administrator / COR</td>
</tr>
<tr>
<td>Wildlife-6</td>
<td>Protect occupied (non-goshawk) raptor nest sites (excluding eagles)</td>
<td><strong>Raptors</strong>: Activities are prohibited from March 01-July 31 within ¼ mile radius of nest site. Activities may occur from August 1- February 28; however, there will be no management activities (i.e., thinning) within 100 feet of nest tree.</td>
<td>All project activities Units 336, 502</td>
<td>Silviculturist, wildlife biologist, burn boss, sale administrator / COR</td>
</tr>
<tr>
<td>Wildlife-7</td>
<td>To maintain Johnson’s hairstreak (butterfly) habitat.</td>
<td><strong>Johnson’s hairstreak</strong>: Leave patches of dwarf mistletoe infected pines across the landscape. Please see ‘Wildlife Habitat Requirements’ in Silviculture Prescription Section for additional information.</td>
<td>All project activities Unit 264. Unit 242 at - 118.852509 44.643525</td>
<td>Sale administrator / COR, silviculturist, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-8</td>
<td>Protect special status raptor habitats</td>
<td><strong>Raptors</strong>: If an occupied bald or golden eagle nest is found within the project planning area, management activities would be prohibited within ½ mile radius of the nest from March 15th – July 15th. In addition, a nest stand would be delineated to protect nest site structure, and no management activities would take place in or within 500 feet of designated nest stands.</td>
<td>All project activities</td>
<td>Sale administrator / COR, wildlife biologist, engineering</td>
</tr>
<tr>
<td>Wildlife-9</td>
<td>Protect special status raptor habitats</td>
<td><strong>Raptors</strong>: If an occupied Peregrine falcon nest is found within the project planning area, management activities within ¼ mile radius of the nest would be prohibited from April 1st – August 31st.</td>
<td>All project activities</td>
<td>Sale administrator / COR, wildlife biologist, engineering</td>
</tr>
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<tr>
<td>Wildlife-10</td>
<td>Protect active raptor habitats</td>
<td><strong>Raptors:</strong> The district wildlife biologist will be consulted if any raptor nest is discovered prior to or during project implementation. Nests will be flagged and a ¼ mile radius disturbance buffer will be designated until species determination is validated. In addition, a nest stand will be delineated to protect nest site structure. Determination of restrictive periods and activity buffers will be species-specific and based upon current Forest and Regional guidance.</td>
<td>All project activities</td>
<td>Sale administrator / COR, wildlife biologist, engineering</td>
</tr>
<tr>
<td>Wildlife-11</td>
<td>Protect Northern goshawk habitats</td>
<td><strong>Raptors:</strong> There are two known northern goshawk nest trees and associated designated northern goshawk post-fledging areas (PFAs) within the project planning area. No activities are allowed within northern goshawk PFAs (~400 acres encompassing nest tree) or within ½ mile radius of occupied goshawk nest sites from April 1st - Aug 15. No timing restrictions apply to unoccupied nest sites. Treatment timeframe for units within goshawk PFAs may be adjusted after occupancy site visits by a wildlife biologist, on a site-by-site basis.</td>
<td>All project activities within PFA</td>
<td>Sale administrator / COR, wildlife biologist, engineering</td>
</tr>
<tr>
<td>Wildlife-12</td>
<td>Comply with Cooperative Travel Management</td>
<td><strong>Roads:</strong> The Camp Creek Cooperative Travel Management Area falls wholly within the project area. During periods of travel restriction, generally October/November, travel is prohibited on all roads not marked with a Green Dot.</td>
<td>Project activities utilizing green dot roads</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-13</td>
<td>Preserve snags and large downed wood, providing wildlife habitat and long-term productivity.</td>
<td><strong>Snags and downed wood / old growth:</strong> Snags will not be targeted for removal unless identified as a safety hazard via the regional hazard tree guidelines. Hazard snags felled will be left on site and stumped as high as possible to provide maximum benefit to wildlife.</td>
<td>All project activities</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-14</td>
<td>Protect upland big game forage</td>
<td><strong>Juniper encroachment treatments:</strong> Locate mountain mahogany and antelope bitterbrush shrubs in treatment area and avoid trampling during cutting operations. If not piling juniper to burn, position some limbs over browsed shrubs (12” or less in height) so as to deter browsing while allowing sufficient light and room to grow.</td>
<td>Units: 70, 76, 82, 100, 108, 122, 192, 198, 219, 221, 232, 233, 250, 258, 290, 294, 340, 341, 349, 422, 440, 500, 501, 503</td>
<td>Sale administrator / COR, silviculturist</td>
</tr>
<tr>
<td>Wildlife-15</td>
<td>Silver-bordered frillitary</td>
<td><strong>Meadow Restoration treatments:</strong> No heavy equipment in existing meadow areas, only around periphery unless required for restoration activities (such as wood placement in stream that bisects meadow).</td>
<td>Meadow restoration treatment areas</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Criteria Number</td>
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<tr>
<td>Wildlife-16</td>
<td>Ensure that livestock fencing is friendly to wildlife</td>
<td><strong>Big game:</strong> Any, non-exclosure fence construction or replacement will incorporate protective design modifications for wildlife following BMRD wildlife fencing guidelines (i.e., smooth bottom wire, total height &lt;42 inches). Review “A Landowner’s Guide to Wildlife Friendly Fences”. <a href="http://fwp.mt.gov/fwpDoc.html?id=34461">http://fwp.mt.gov/fwpDoc.html?id=34461</a></td>
<td>Fence construction</td>
<td>Wildlife biologist, COR, range specialist</td>
</tr>
<tr>
<td>Wildlife-17</td>
<td>Protect mountain mahogany which is an important forage species for deer and elk.</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Avoid ignition in mahogany stands and piling fuels in and near mahogany, to the extent possible. Consider placing a fireline or otherwise protecting mahogany stands from burning if they are small inclusions in a larger vegetation type. Avoid prescribed fire in identifiable patches of mountain mahogany (e.g. 10+ plants within ¼ acre). Avoid direct fire ignitions in mountain mahogany.</td>
<td>Prescribed burning in or near mountain mahogany stands</td>
<td>COR, wildlife biologist, silviculturist, burn boss</td>
</tr>
<tr>
<td>Wildlife-18</td>
<td>Protect dead wood habitats for dependent wildlife species.</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Avoid ignition within 50 feet of standing dead trees (12 inch DBH or greater) and 100 feet of designated wildlife trees.</td>
<td>Prescribed burning</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Wildlife-19</td>
<td>Enhance ecosystem health in connectivity corridors while preserving appropriate overstory.</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Burning prescriptions in designated connectivity corridors will be designed to produce low intensity fire, minimizing damage to large diameter overstory trees.</td>
<td>Prescribed burning in designated connectivity corridors</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Wildlife-20</td>
<td>Protect young big game during calving season.</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> During the May 1 to July 1 window, burning crews will watch for lone elk or deer and if sighted will search the immediate area for calves and fawns and avoid igniting fire where young animals are discovered.</td>
<td>Prescribed burning</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Wildlife-21</td>
<td>Analyze riparian areas at time of proposed burning to identify and mitigate any wildlife concerns.</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Individual burn blocks, encompassing more than 500 contiguous acres of riparian habitat will require a wildlife biologist’s input to ensure that wildlife objectives such as big game forage for winter range and neo-tropical migratory bird objectives are being met. Minimum 2-week notice must be given to the biologist to allow time for inspection and designation of any necessary mitigation measures.</td>
<td>Prescribed burning within RHCA</td>
<td>Wildlife biologist, burn boss</td>
</tr>
<tr>
<td>Wildlife-22</td>
<td>Reduce impacts to spring nesting species</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Prescribed burning will be ‘fall only’ in riparian zones, except for site-specific riparian restoration treatment areas. Where spring burning is necessary in order to meet restoration objectives, a minimum of 40%-50% of the shrub layer will be maintained.</td>
<td>Prescribed burning within RHCA</td>
<td>Wildlife biologist, burn boss</td>
</tr>
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<tr>
<td>Wildlife-23</td>
<td>Enhance aspen stands</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Prescribed burning within aspen stands will be site-specific, but may include the following to protect wildlife habitat: Burning within aspen stands will be avoided if extensive aspen suckering is already present. Direct ignition in aspen stands on a case-by-case basis or for pile burning only. If direct ignition occurs with underburning, the stand must be fenced and wildlife breeding season restrictions will be established. To improve stand health and productivity, competing conifers will be removed and the stand will be fenced whenever possible (preferably fall burning).</td>
<td>Prescribed burning within aspen stands</td>
<td>Wildlife biologist, burn boss</td>
</tr>
<tr>
<td>Wildlife-24</td>
<td>Enhance Old Growth areas to improve vigor, reduce mortality and facilitate improvement in old growth characteristics LRMP 7, 13, IV-106</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Recommended burn plan objectives for old growth stands include: maintain large diameter ponderosa pine and Douglas-fir (use DBH classes from Hamilton 1993); maintain decadent component of existing stands; maintain log debris and snags; maintain shrub understory; include treatments such as ladder and tree-well fuel reduction for each old growth unit only if needed prior to prescribed burning so that the risk of an old growth stand being consumed by fire in its entirety is reduced. Pile burning is acceptable in a mosaic in stands adjacent to designated old growth. Some piles (maximum of 6 feet by 6 feet) will be kept intact and left unburned to increase wildlife habitat (for pine marten, small mammals, etc.) inside designated old growth or elsewhere. Please see ‘Wildlife Habitat Requirements’ in Silviculture Prescription Section.</td>
<td>Prescribed burning in designated old growth (DOG) stands</td>
<td>Wildlife biologist, burn boss</td>
</tr>
<tr>
<td>Wildlife-25</td>
<td>Enhance riparian habitat while maintaining wildlife habitat</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> To protect riparian wildlife habitat, direct ignition in riparian corridors would take place only when needed for prescribed burning control and containment and in relation to site-specific riparian restoration treatments. Fire may be allowed to back into riparian areas with the objective of maintaining a minimum of 40-50% of the shrub layer to meet migratory bird objectives.</td>
<td>Prescribed burning in RHCA</td>
<td>Wildlife biologist, burn boss</td>
</tr>
<tr>
<td>Wildlife-26</td>
<td>Rejuvenate ground vegetation while maximizing control of the burn.</td>
<td><strong>Prescribed burning (underburning and pile burning):</strong> Underburn units will be designed to include areas of similar fuels conditions using trails and roads as boundaries, wherever possible, to reduce resource damage from fireline construction.</td>
<td>Prescribed burning</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Wildlife-27</td>
<td>Maintain road crossings for big game while allowing for fuels reduction along road corridors</td>
<td><strong>Big game:</strong> In big game road crossings identified by ODFW, manage burning and thinning to provide for adequate vegetative cover. Please see ‘Wildlife Habitat Requirements’ in Silviculture Prescription Section.</td>
<td>Timber harvest, restoration thinning, and prescribed burning activities</td>
<td>Wildlife biologist, burn boss</td>
</tr>
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<tr>
<td>Wildlife-28</td>
<td>Protect grouse winter roosts (LRMP 50, IV-30)</td>
<td><strong>Blue (Dusky) Grouse</strong>: To provide blue grouse winter roosts, retain large mistletoe infected or “wolfy” Douglas-fir trees along ridge tops and large scab openings, where available. Please see ‘Wildlife Habitat Requirements’ in Silviculture Prescription Section for additional information.</td>
<td>Ridge tops and large scab openings</td>
<td>Sale administrator / COR, wildlife biologist, silviculturist</td>
</tr>
<tr>
<td>Wildlife-29</td>
<td>Maintain areas of hiding cover for big game.</td>
<td><strong>Mechanical treatments (small and large diameter restoration thinning)</strong>: Horizontal hiding cover (vegetation capable of hiding 90% of a standing adult deer or elk from human view at 200') will be provided by retaining non-thinned patches of forest trees as necessary throughout the project planning area and on relatively flat topography. Leave 5-25% of the area untreated in patches of 1-10 acres. Patches in larger units may be greater than 10 acres in size. These patches should not be near the boundary of private land or roads. Wherever possible, align cover patches with designated connectivity corridors, particularly in larger treatment units. Leave patches must contain satisfactory to marginal cover to be considered effective leave patches.</td>
<td>Mechanical treatments</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-30</td>
<td>Maintain potential nesting and foraging habitat</td>
<td><strong>Mechanical treatments (small and large diameter restoration thinning)</strong>: Where possible and not in conflict with visual requirements, leave stumps as high as practicable for subsequent wildlife use.</td>
<td>Mechanical treatments</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-31</td>
<td>Maintain potential nesting and foraging habitat</td>
<td><strong>Snags and downed wood / old growth</strong>: Where possible and not in conflict with visual requirements, leave stumps as high as practicable for subsequent wildlife use.</td>
<td>All project activities</td>
<td>Sale administrator / COR, wildlife biologist</td>
</tr>
<tr>
<td>Wildlife-32</td>
<td>Prevent harassment and protect elk calving and rearing habitat.</td>
<td><strong>Roads</strong>: Ensure previously closed roads and new road closure proposals become effectively closed in elk calving and rearing area between Cougar and Trail creeks.</td>
<td>Roads between Cougar and Trail creeks.</td>
<td>Sale administrator / COR, wildlife biologist, engineering</td>
</tr>
<tr>
<td>Wildlife-33</td>
<td>Wildlife refugia preservation</td>
<td><strong>Roads</strong>: Effectively close all temporary roads created for project entry.</td>
<td>Temporary roads</td>
<td>Sale administrator / COR, wildlife biologist, engineering</td>
</tr>
<tr>
<td>Wildlife-34</td>
<td>Allow for dynamic evaluation as conditions change</td>
<td><strong>Waivers</strong>: If a waiver is requested to operate outside of the timelines and restrictions as described in the above measures, the District Wildlife Biologist and District Ranger will be consulted prior to approval.</td>
<td>All project activities</td>
<td>Wildlife biologist</td>
</tr>
</tbody>
</table>
### Aquatic and Watershed Resources

<table>
<thead>
<tr>
<th>Criteria number</th>
<th>Objective</th>
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</thead>
<tbody>
<tr>
<td>Aquatic and watershed -1</td>
<td>Protect aquatic resources, and follow all applicable laws, regulations, and standards</td>
<td>See Attachment 1 for A. General Water Drafting Guidance for Road Maintenance and Non-emergency Fire Use for Watersheds with Anadromous Fish in the Blue Mountain Tri-Forest Area. B National Marine Fisheries Service Juvenile Fish Screen Criteria for Pump Intakes C. Relevant Project Implementation Criteria for Road Maintenance Activities D. Log Haul Project Design Criteria E includes aquatic and riparian restoration programmatic consultation – Project Design Criteria for Aquatic Restoration Activities F. Key Best Management Practices.</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator, engineering</td>
</tr>
<tr>
<td>Aquatic and Watershed -2</td>
<td>Minimize water quality threats.</td>
<td>Follow the General Water Quality Best Management Practices, Pacific Northwest Region, November 1988 (USDA Forest Service 1988) and the National Best Management Practices for Water Quality Management on National Forest System Lands, Vol. 1: National Core BMP Technical Guide (USDA Forest Service 2012). Specific BMPs for aquatics specialists applicable to this project include: T1-T22, R1-R15, R17-R23, F2-F3, VM1-VM4, RM1, and W5. Apply all applicable BMPs listed in USDA Forest Service (1988). Full descriptions of each BMP may be found in the Attachment 1, Section E.</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator, aquatics specialists</td>
</tr>
<tr>
<td>Aquatic and Watershed -3</td>
<td>Minimize equipment disturbance of duff and soil</td>
<td>Ephemeral stream channels should have protections to minimize equipment disturbance of duff and soil, and should not be used as skid trails, landing sites, or as road locations. Ephemeral draws (not within RHCAs) are to meet the following down wood requirements to reduce risk of upward migration and channel initiation: retain all wood embedded in the soil; retain sufficient wood for the forest type in the draw bottom for existing and future down wood. Ephemeral draws with a gradient of 5% or more will need to be visited by the hydrologist to determine if any additional site specific mitigation is required. No timber harvest within ephemeral draw buffer (10 to 50 feet on each side).</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -4</td>
<td>Meet PACFISH standards</td>
<td>Riparian habitat conservation area (RHCA) buffer widths for category 1, 2, and 4 streams (300, 150, and 100 feet on each side of the stream, respectively) and for category 3 wetlands (150feet) shall be consistent with PACFISH.</td>
<td>All project activities</td>
<td>Contracting &amp; layout</td>
</tr>
<tr>
<td>Aquatic and Watershed -5</td>
<td>Protect from hazardous materials</td>
<td>The Forest Service will require a Hazardous Substances Plan and Prevention of Oil Spill Plan from contractor which will be reviewed and approved prior to implementation activities. Fuels and other toxicants shall not be stored within RHCAs, and other provisions of PACFISH standard RA-4 shall be implemented.</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -6</td>
<td>Protect from hazardous materials</td>
<td>Inspect all heavy equipment and machinery for hydraulic or other leaks before working near RHCAs. Leaking or faulty equipment will not be used. Equipment with accumulations of oil, grease, or other toxic materials will be cleaned in pre-approved sites outside RHCAs.</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -7</td>
<td>Protect aquatic resources</td>
<td>Industrial camping permits will be required. Locations within RHCA will be coordinated with a Malheur National Forest aquatics specialist before permits are issued.</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
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<tr>
<td>Aquatic and Watershed -8</td>
<td>Meet PACFISH standards</td>
<td>Because streams in the aquatics analysis area are deficient in LWD in accordance with PACFISH Standard RA-2, all trees felled within or into RHCAs (including danger trees, those felled for road construction/maintenance, aspen restoration, and aquatic restoration) will either be felled into streams where feasible to provide LWD, or left within the RHCA. Felled trees may be transported off-site for use in aquatic restoration projects as determined by a Malheur National Forest aquatics specialist. Trees felled shall be pushed over with rootwad intact where feasible, rather than cutting (unless felled as part of riparian thinning treatments). This does not apply to riparian enhancement treatments, LWD could be removed in commercial units after riparian management objectives and desired conditions have been met.</td>
<td>All project activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -9</td>
<td>Protect RHCA resources</td>
<td>During implementation of upland silviculture treatments do not use heavy equipment in RHCAs and do not use off road vehicles within 100 feet of streams, springs, or wetlands.</td>
<td>Upland silviculture activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -10</td>
<td>Meet PACFISH standards</td>
<td>Follow PACFISH standards and guidelines. Timber management, roads management, and fire/fuels management standards and guides apply to this project.</td>
<td>All activities in RHCAs</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -11</td>
<td>Meet PACFISH standards</td>
<td>No yarding of logs will occur within existing meadow areas, only around the edge.</td>
<td>Meadow restoration areas</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -12</td>
<td>Protect aquatic resources</td>
<td>The work period for instream work, including culvert installations on fish-bearing streams, will be July 15 through August 15, as specified in the Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources, June 2008.</td>
<td>Culvert installation, road decommissioning</td>
<td>Engineer or contracting</td>
</tr>
<tr>
<td>Aquatic and Watershed -13</td>
<td>Prevent erosion and runoff</td>
<td>Conduct activities during dry-field conditions – low to moderate soil moisture levels.</td>
<td>Culvert installation, road decommissioning</td>
<td>Engineer, or contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -14</td>
<td>Meet all applicable standards</td>
<td>Culvert installation and road decommissioning would will be completed in accordance with the Regional General Permit issued by the U.S. Army Corps of Engineers. Minimization measures for fisheries, watershed function, water quality, and soil conditions include those identified in the NMFS and FWS 2013 ARBO II as well as PDCs developed by the Blue Mountain Ranger District interdisciplinary team. A complete listing of ARBO II PDCs specific to this project element is included in Attachment 1, Section D.</td>
<td>Culvert installation, road decommissioning</td>
<td>Engineer, or contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -15</td>
<td>Meet PACFISH standards</td>
<td>All quality pools (pools greater than 2 feet in depth or pools greater than 1.5 feet in depth with cover) will be noted and designed for retention within the planning area.</td>
<td>Culvert installation</td>
<td>Engineer or contracting</td>
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<tr>
<td>Aquatic and Watershed -16</td>
<td>Meet water quality standards</td>
<td>There should be no measureable loss in streamside shade within the project area from culvert replacement/installation on fishbearing streams. If a measurable reduction in stream shade cannot be avoided, the project will be designed to obtain recovery of streamside shade within an approximate five year period, including the use of riparian plantings.</td>
<td>Culvert installation</td>
<td>Engineer or contracting</td>
</tr>
<tr>
<td>Aquatic and Watershed -17</td>
<td>Prevent erosion</td>
<td>In RHCAs or ephemeral draws, conduct culvert installation, replacement or removal during dry conditions or with approval from the district hydrologist and fish biologist. Prevent erosion of soil into streams during installation using appropriate BMPs (Attachment 1, Section D). Cease work if a storm event increases stream flows.</td>
<td>Culvert installation</td>
<td>Engineer, or contracting, district hydrologist and fish biologist</td>
</tr>
<tr>
<td>Aquatic and Watershed -18</td>
<td>Protect watershed resources</td>
<td>Grapple/hand piling areas will not be located within RHCAs, except for aquatic restoration projects designed for RHCAs.</td>
<td>Prescribed burning</td>
<td>Burn boss, COR</td>
</tr>
<tr>
<td>Aquatic and Watershed -19</td>
<td>Restore forest resiliency</td>
<td>Ignition of underburning may occur in RHCAs, and may occur up to 25 feet from the edge of the stream channel (to prevent drip torch fuel from entering the stream). Fire will be allowed to back into the riparian areas.</td>
<td>Prescribed burning</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Aquatic and Watershed -20</td>
<td>Protect watershed resources</td>
<td>Firelines will not be constructed within RHCAs and will be waterbarred on slopes greater than 35%. Firelines will utilize existing constructed and natural barriers such as existing roads and streams, and will be rehabilitated to a natural state after use. Fireline construction will not occur down draw bottoms. Hand lines may be used to keep fire out of sensitive areas and private property.</td>
<td>Prescribed burning</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Aquatic and Watershed -21</td>
<td>Maintain water quality</td>
<td>There should be no measureable loss in streamside shade within the project area from fence construction on fishbearing streams. If a measurable reduction in stream shade cannot be avoided, the project will be designed to obtain recovery of streamside shade within an approximate five year period, including the use of riparian plantings.</td>
<td>Range activities</td>
<td>Rangeland manager</td>
</tr>
<tr>
<td>Aquatic and Watershed -22</td>
<td>Protect riparian hardwoods</td>
<td>Minimize disturbances to riparian hardwoods greater than 2 feet in height located within the floodplain or providing bank stabilization. Consider cutting hardwoods at their base where equipment crossings are needed. This will encourage re-sprouting at a faster rate.</td>
<td>Riparian restoration activities</td>
<td>Contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -23</td>
<td>Protect watershed resources</td>
<td>Obtain approval from district fisheries biologist and hydrologist on specific methods for removing culverts from streams.</td>
<td>Road decommissioning</td>
<td>Engineer, or contracting &amp; sale administrator</td>
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<tr>
<td>Aquatic and Watershed -24</td>
<td>Erosion control</td>
<td>Decommission roads by some combination of the following: recontouring slopes (removing cut and fill slopes); subsoiling (loosening) compacted soils in a “J” pattern to a depth of 16 inches (unless prevented by bedrock or rock content of soils); pulling berm; pulling slash (where available); planting or seeding disturbed areas with native species that naturally occur in the project planning area to achieve a minimum of 35% ground cover; restoring natural drainage patterns and waterbarring as needed; and/or disguising the first hundred yards of travel way with large pieces of organic material such as cull logs and tops of trees. Methods will be determined in consultation with a hydrologist, fisheries biologist, or soil scientist.</td>
<td>Road decommissioning</td>
<td>Engineer, or contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -25</td>
<td>Erosion control</td>
<td>Utilize erosion control measures (sediment filters or straw bales) and operate machinery only on road prism during road construction, maintenance and road decommissioning activities.</td>
<td>Road maintenance, decommissioning and new road construction</td>
<td>Engineer, or contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -26</td>
<td>Erosion control</td>
<td>Locate temporary roads outside sediment delivery zones (determined by soil type, ground vegetation, and slope), meet best management practices for controlling surface runoff and erosion, and keep machinery on approved roadway.</td>
<td>Temporary road and landing construction</td>
<td>Engineer, or contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -27</td>
<td>Erosion control and wildlife habitat preservation</td>
<td>Obliterate temporary roads by some combination of the following: recontouring slopes (removing cut and fill slopes); subsoiling (loosening) compacted soils in a “J” pattern to a depth of 16 inches (unless prevented by bedrock or rock content of soils); pulling berm; pulling slash (where available); planting or seeding disturbed areas with native species that naturally occur in the project planning area to achieve a minimum of 35% ground cover; restoring natural drainage patterns and waterbarring as needed; and/or disguising the first hundred yards of travel way with large pieces of organic material such as cull logs and tops of trees. Methods will be determined in consultation with a hydrologist, fisheries biologist, wildlife biologist, or soil scientist.</td>
<td>Temporary road and landing construction</td>
<td>Engineer, or contracting &amp; sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -28</td>
<td>Erosion control</td>
<td>Landings/staging areas will not be located within riparian habitat conservation areas (RHCAs) unless located on existing landings or utilizing an area approved by the Aquatics Staff.</td>
<td>Landings</td>
<td>Sale administrator, aquatics staff</td>
</tr>
<tr>
<td>Aquatic and Watershed -29</td>
<td>Erosion control</td>
<td>Minimize amount of blading on closed roads with good grass cover present, unless a gulley or safety is present.</td>
<td>Timber haul</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -30</td>
<td>Protection of watershed resources</td>
<td>Timber harvest will not occur within RHCAs, unless identified as an aquatic restoration unit.</td>
<td>Timber felling</td>
<td>Sale administrator, layout</td>
</tr>
<tr>
<td>Criteria number</td>
<td>Objective</td>
<td>Design criteria</td>
<td>Areas, units, or activity type</td>
<td>Responsible person</td>
</tr>
<tr>
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</tr>
<tr>
<td>Aquatic and Watershed -31</td>
<td>Forest restoration, protection of watershed resources</td>
<td>Skyline yarding corridors (sky roads) and tailholds are permitted across streams. Corridors must be less than 12 feet wide, spaced greater than 100 feet apart when crossing the stream, as close to perpendicular to the channel as possible, and can range from 350 to 1000 feet in length.</td>
<td>Timber yarding</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -32</td>
<td>Protection of watershed resources</td>
<td>Require one end suspension on &gt;90% of skyline logging corridors. Logs will be fully suspended over streams.</td>
<td>Timber yarding</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -33</td>
<td>Protection of watershed resources</td>
<td>Heavy equipment is permitted only at designated crossings within the ephemeral draws and stream channels, and approved by a hydrologist or fisheries biologist.</td>
<td>Timber yarding</td>
<td>Sale administrator, layout</td>
</tr>
<tr>
<td>Aquatic and Watershed -34</td>
<td>Protection of watershed resources</td>
<td>Skyline corridors shall be oriented perpendicular across ephemeral draws, not running lengthways along them.</td>
<td>Timber yarding</td>
<td>Sale administrator</td>
</tr>
<tr>
<td>Aquatic and Watershed -35</td>
<td>Protection of watershed resources</td>
<td>No skidding will occur across stream channels (categories 1-4), unless approved by aquatics staff. Logs and slash would be placed at all crossings within channel and floodplain to minimize soil compaction. Once skidding is complete, logs and slash will be spread out across channel and floodplain to minimize bare ground and maintain water quality.</td>
<td>Timber yarding</td>
<td>Sale administrator, aquatics staff</td>
</tr>
</tbody>
</table>

### Fuels

<table>
<thead>
<tr>
<th>Criteria number</th>
<th>Objective</th>
<th>Design criteria</th>
<th>Areas, units, or activity type</th>
<th>Responsible person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuels-1</td>
<td>Limit mortality of overstory trees and leave trees as designed by Silviculture Rx</td>
<td>Maintain fire behavior that best meets the overall objectives of Silviculture, and other forest resources.</td>
<td>All prescribed burn blocks</td>
<td>Burn boss</td>
</tr>
<tr>
<td>Fuels-2</td>
<td>Protect private property from prescribed fire</td>
<td>Separate fire next to private lands from areas to be treated. Prescribed fire could enter private property if an agreement with the local land owner is put into place.</td>
<td>Prescribed burn blocks adjacent to private land</td>
<td>Fire management specialist / burn boss</td>
</tr>
<tr>
<td>Fuels-3</td>
<td>Protect road ways from smoke impacts to protect public</td>
<td>Notify Oregon Department of Transportation of intent to burn next to highways, and place hazard signs along highway during prescribed burning operations.</td>
<td>Prescribed burn blocks adjacent to highways</td>
<td>Burn boss</td>
</tr>
</tbody>
</table>
Attachment 1: Aquatic and Watershed Design Features and Best Management Practices

Section A: This section provides guidance for water drafting activities mainly associated with road maintenance and non-emergency fire suppression activities in the Blue Mountain Tri-Forest area (Umatilla, Malheur, and Wallowa Whitman National Forests). The goal is to create an understandable and workable protocol that will allow water drafting to occur while avoiding or minimizing risks to Endangered Species Act-listed fish.

Section B: This section includes criteria that serve as an addendum to current National Marine Fisheries Service gravity intake juvenile fish screen criteria. These criteria apply to new pump intake screens and existing inadequate pump intake screens, as determined by fisheries agencies with project jurisdiction.

Section C: This section includes road maintenance activities and the relevant project implementation criteria described in the Malheur National Forest Road Maintenance Program Biological Assessment.

Section D: This section includes Log Haul Project Design Criteria.

Section E: This section includes aquatic and riparian restoration programmatic consultation – Project Design Criteria for Aquatic Restoration Activities.

Section F: This section describes key best management practices that have been selected.

Section A—General Water Drafting Guidance for Road Maintenance and Non-emergency Fire Use for Watersheds with Anadromous Fish in the Blue Mountain Tri-Forest Area

Within the Blue Mountain Tri-Forest area (Malheur National Forest, Umatilla National Forest, and Wallowa-Whitman National Forest), water drafting regularly occurs to accomplish road maintenance activities as well as control fires. Because of the wide distribution of Endangered Species Act (ESA)-listed anadromous salmonids within the Tri-Forest area, and frequency of drafting water for Federal activities, there is potential for water drafting activities interfering with ESA listed anadromous salmonids. This is particularly true in northeast Oregon where streams used for water are small and support ESA-listed anadromous salmonids.

Water drafting for road maintenance activities can happen at any time of the year, though the largest water withdrawals typically occur in spring. Water is used to soften soil for road shaping, grading, and rocking. These activities usually involve tanker trucks ranging from 500 gallons to 3,500 gallons which fill their tanks from local surface water sources and distribute water on roads as they drive. Most tankers used for this application are equipped with power take off (PTO) pumps which are powered by the vehicles engine. PTO pumps for these types of tankers typically range from about 150 gallons per minute (gpm) (approximately 0.3 cubic feet per second (cfs)) to about 550 gpm (approximately 1.2 cfs) and are often not capable of varying pump rates. Because these types of pumps are capable of removing large volumes of water at high rates, and streams available for water drafting are often small, it is important to avoid or minimize the potential to harm or harass ESA-listed anadromous salmonids.

Water drafting for prescribed fire use can vary from use of small pumps (less than 40 gpm/0.1 cfs) for direct use with hoses to larger pumps as described above for filling tanks or water tenders.
Regardless of pump rate, physical damage to redds, spawning adults, or juveniles can occur from incorrect placement of water drafting equipment. Proper equipment handling and placement in sensitive areas is important to reduce the likelihood of direct harm of ESA-listed anadromous salmonids.

This document provides guidance for water drafting activities mainly associated with road maintenance and non-emergency fire suppression activities in the Blue Mountain Tri-Forest area (Umatilla, Malheur, and Wallowa Whitman National Forests). The goal is to create an understandable and workable protocol that will allow water drafting to occur while avoiding or minimizing risks to ESA-listed fish.

The following guidance is intended to minimize or avoid adverse effects to listed fish in the Blue Mountain Tri-Forest area when engaging in water drafting activities. As with any activity, site specific or project specific information may require more stringent or relaxed criteria to avoid adverse effects. In addition, compliance with these criteria may not minimize adverse effects to avoid take of listed fish in all cases, and therefore does not preclude the need for consultation. Projects will be reviewed on a case by case basis to ensure that guidance is reasonable, prudent, and adequately avoids or minimizes adverse effects to listed species.

- Any intake used for drafting water will be screened according to National Marine Fisheries Service Juvenile Fish Screen Criteria for Pump Intakes for salmonid fry (see Section B).
- Non-stream water (i.e., ponds) sources will be used prior to the use of stream sources whenever feasible.
- When non-stream sources are unavailable, streams with the greatest flow will be used whenever feasible.
- Water withdrawal will not reduce stream flow by more than 1/10th. In order to accomplish the lowest reduction of flow from marginal water sources (sources in which water drafting will reduce flows by more than 5 percent), the lowest drafting rate on pumps that have adjustable draft rates, and the smallest volume tender appropriate for the project will be used. Whenever feasible, marginal water sources will be avoided.
- During drafting, streams will be monitored for reduced flows. If a flow concern is identified, operators will reduce pumping rates to ensure that flow reduction is not more than 1/10th of the existing stream flow is being removed or discontinue drafting.
- If marginal water sources are used, withdrawal from single marginal sites will be limited to 18,000 gallons per day.
- No more than one high-volume pump per site will be used, except sites in which the use of multiple pumps will not measurably decrease stream flows.
- To avoid disturbing fish that may be spawning, No drafting will occur from any pools which contain adult salmonids.
- Operators will avoid direct effects to redds or pre-emergence alevins by placing the intake hose in the deepest part of a drafting pool (where redds are unlikely to be present) and will avoid placing equipment on areas that redds are known or suspected to be. Operators will also ensure that tailout areas of pools that are known or suspected to have redds will not be dewatered.
- Blading, shaping, aggregate placement, and dust control should be performed in spring and early summer when flows are high, to take advantage of available road soil moisture content to minimize the need for water drafting. Exceptions during the low-flow period will be limited to roads receiving heavy summer through fall traffic creating hazardous road surface conditions that require maintenance for human safety reasons. Essential maintenance during low-flow conditions will be deferred, when possible, until fall precipitation reduces the need for water drafting. Spring and fall blading and shaping will minimize demands for water usage, will minimize dust production, and will reduce sediment generated from surface erosion.
• National Marine Fisheries Service may periodically review drafting activities to ensure that these measures are adequate for the protection of listed fish.

Section B—National Marine Fisheries Service Juvenile Fish Screen Criteria for Pump Intakes

The following criteria serve as an addendum to current National Marine Fisheries Service gravity intake juvenile fish screen criteria. These criteria apply to new pump intake screens and existing inadequate pump intake screens, as determined by fisheries agencies with project jurisdiction.

Developed by:

National Marine Fisheries Service
Environmental & Technical Services Division
Portland, Oregon
May 9, 1996

Definitions Used in Pump Intake Screen Criteria

Pump intake screens are defined as screening devices attached directly to a pressurized diversion intake pipe. Effective screen area is calculated by subtracting screen area occluded by structural members from the total screen area. Screen mesh opening is the narrowest opening in screen mesh. Approach velocity is the calculated velocity component perpendicular to the screen face. Sweeping velocity is the flow velocity component parallel to the screen face with the pump turned off.

Active pump intake screens are equipped with a cleaning system with proven cleaning capability, and are cleaned as frequently as necessary to keep the screens clean. Passive pump intake screens have no cleaning system and should only be used when the debris load is expected to be low, and:

• If a small screen (less than 1 cfs pump) is over-sized to eliminate debris impingement, and
• Where sufficient sweeping velocity exists to eliminate debris build-up on the screen surface, and
• If the maximum diverted flow is less than 0.01 percent of the total minimum streamflow, or
• The intake is deep in a reservoir, away from the shoreline.

Pump Intake Screen Flow Criteria

The minimum effective screen area in square feet for an active pump intake screen is calculated by dividing the maximum flow rate in cubic feet per second (cfs) by an approach velocity of 0.4 feet per second (fps). The minimum effective screen area in square feet for a passive pump intake screen is calculated by dividing the maximum flow rate in cfs by an approach velocity of 0.2 fps. Certain site conditions may allow for a waiver of the 0.2 fps approach velocity criteria and allow a passive screen to be installed using 0.4 fps as implementation criteria. These cases will be considered on a site-by-site basis by the fisheries agencies.

If fry-sized salmonids (i.e., less than 60 millimeter fork length) are not ever present at the site and larger juvenile salmonids are present (as determined by agency biologists), approach velocity shall not exceed 0.8 fps for active pump intake screens, or 0.4 fps for passive pump intake screens. The allowable flow should be distributed to achieve uniform approach velocity (plus or minus 10 percent) over the entire screen area. Additional screen area or flow baffling may be required to account for designs with non-uniform approach velocity.
**Pump Intake Screen Mesh Material**

Screen mesh openings shall not exceed 3/32 inch (2.38 millimeters) for woven wire or perforated plate screens, or 0.0689 inches (1.75 millimeters) for profile wire screens, with a minimum 27 percent open area. If fry-sized salmonids are never present at the site (by determination of agency biologists) screen mesh openings shall not exceed 1/4 inch (6.35 millimeters) for woven wire, perforated plate screens, or profile wire screens, with a minimum of 40 percent open area.

Screen mesh material and support structure shall work in tandem to be sufficiently durable to withstand the rigors of the installation site. No gaps greater than 3/32 inch shall exist in any type screen mesh or at points of mesh attachment. Special mesh materials that inhibit aquatic growth may be required at some sites.

**Pump Intake Screen Location**

When possible, pump intake screens shall be placed in locations with sufficient sweeping velocity to sweep away debris removed from the screen face. Pump intake screens shall be submerged to a depth of at least one screen radius below the minimum water surface, with a minimum of one screen radius clearance between screen surfaces and adjacent natural or constructed features. A clear escape route should exist for fish that approach the intake volitionally or otherwise. For example, if a pump intake is located off of the river (such as in an intake lagoon), a conventional open channel screen should be considered, placed in the channel or at the edge of the river. Intakes in reservoirs should be as deep as practical, to reduce the numbers of juvenile salmonids that approach the intake. Adverse alterations to riverine habitat shall be minimized.

**Pump Intake Screen Protection**

Pump intake screens shall be protected from heavy debris, icing and other conditions that may compromise screen integrity. Protection can be provided by using log booms, trash racks or mechanisms for removing the intake from the river during adverse conditions. An inspection and maintenance plan for the pump intake screen is required, to ensure that the screen is operating as designed per these criteria.

**Section C—Relevant Project Implementation Criteria for Road Maintenance Activities**

**Road Reshaping and Blading**

Forest roads can be hydrologically connected to fish bearing waters. Precipitation and snow melt can create runoff that, in turn, can create sediment depositions and delivery to those hydrologically connected roads and streams. Maintenance of the road prisms and the water flow controls incorporated in the roadways are vital to minimizing the deterioration of the ability of the water controls to keep sediment from entering stream systems. Reshaping road surfacing is intended to remove irregularities from the road surface, which can cause the concentration of runoff in amounts, which result in soil and aggregate displacement through rills, ruts, and pot holes. Maintenance Level III and IV roads open to travel on an annual basis and possessing crushed aggregate in the base or surface are shaped at least once a year if funding is available.

Road maintenance activities occur primarily from April 15 to November 1 depending on the actual condition of the road and the moisture level. If rutting will occur, the standard practice is to delay maintenance until the road is dry enough to allow equipment to the site without damaging the road. These activities within riparian habitat conservation areas (RHCAs) including bull trout and steelhead waters
will be completed during the appropriate instream work window. Proposals to work outside this window will be reviewed by Malheur National Forest fisheries biologist and or hydrologist prior to taking action.

Design Criteria

- Side casting of materials will not occur where these materials could be directly or indirectly introduced into a stream, or where the placement of these materials will contribute to destabilization of the slope.
- Before working in a RHCA, all heavy equipment or other machinery will be inspected for hydraulic or other leaks. Leaking or faulty equipment will not be used. Equipment with accumulations of oil, grease, or other toxic materials will be cleaned in pre-approved sites outside RHCA.
- Undercutting of cut slopes will be avoided during ditch maintenance activities.
- Fuel storage and fueling of equipment will not occur within RHCA.
- Disposal materials will be deposited in approved disposal areas.
- Grader operators will backslope away from areas adjacent to streams where there is a potential for sediment delivery into streams. Sediment control devices will be placed to trap sediment in hot spots where sediment could reach a stream.
- Grassy areas are maintained around culverts to minimize the potential for sediment delivery to streams from road grading. Sediment control devices will be placed to trap sediment in hot spots where sediment could reach a stream.
- Sloughing material is deposited in a disposal site away from any stream and left to vegetate naturally. If the annual amount of slough is substantial and the road has become narrowed by loss of material from cut banks or by machine removal of the slough, the slough material is hauled to an approved stable waste site where it is deposited and seeded.

Drainage Structure Maintenance

Drainage maintenance is one of, if not, the most important item of maintenance. Drainage maintenance is performed in order to disperse runoff and minimize road-generated sediment and delivery to surface waters. Drainage maintenance includes the maintenance of drainage structures including culverts, water bars, drain dips, and ditches. Actions include removal of coarse and fine materials and brush from catch basins, inlets, outlets, outlet channels, leadoff ditches, trash racks, drop inlets, water bars, open-top culverts, and rolling dips.

Drainage structure work accomplished under maintenance includes opening plugged culverts, adding water bars to road surfaces, maintaining and forming drivable drainage dips into road surface, adding ditch relief culverts, replacing plugged or damaged ditch relief culverts, and cleaning drainage ditches. These proposed actions will be reviewed by fisheries biologist and or hydrologist prior to taking action if they occur within Category 1 or in Category 2 streams where sediment could enter fish habitat.

Plugged culverts are opened using hand shovels or power equipment. The material removed by hand is spread away from drainage so it will not fall or wash back into the drainage channel or structure. When cleaned with backhoe, the material is hauled to a disposal area by dump truck away from areas subject to erosion or discharge into streams. These proposed actions will be reviewed by fisheries biologist and or hydrologist prior to taking action if they occur within PACFISH/INFISH Category 1 or in Category 2 streams where sediment could enter fish habitat unless they are emergency situations and are consulted on under emergency consultation procedures.
Roadside ditches and lead off ditches shall be cleaned of any material, which would obstruct the flow of water. When possible, grassed ditches are not disturbed, except where necessary to re-establish functional drainage.

Water bars are used on roads to disperse water at variable intervals to slow the velocity and decrease the volume of water traveling on the road prism, thus decreasing the risk of sedimentation due to erosion. These water bars are cut into the road surface at spacing intervals, which control the accumulation of water volumes and velocities. Backhoes and excavators are generally used to perform drainage repair or replacement.

Design Criteria
- Waste materials removed during maintenance activities and cleaned materials from culverts and open tops will be deposited in approved disposal areas outside flood plains in pre-approved disposal sites.
- Before working in a riparian habitat conservation area (RHCA), all heavy equipment or other machinery will be inspected for hydraulic or other leaks. Leaking or faulty equipment will not be used. Equipment with accumulations of oil, grease, or other toxic materials will be cleaned in pre-approved sites outside RHCAs.
- Berms, sediment basins, or sediment traps will be constructed where required to contain sediment from the damage/repair site.

Ditch Relief Culvert Replacement, Installation, or Removal
Ditch relief culverts remove water from roadside ditches, decreasing sedimentation to streams by reducing the concentration of water exiting roadside ditches. Replacement, removal, or installation of ditch relief culverts can occur outside riparian habitat conservation areas (RHCAs) or in RHCAs, although culverts located in RHCAs are not located in a streambed. Backhoes and excavators are generally used to perform ditch relief culvert construction activities. Ditch relief culvert construction activities outside of RHCAs would occur as part of this consultation but would be limited to dry conditions and would use appropriate sediment control measures to ensure sediment does not reach streams. Ditch relief culverts construction activities occurring inside RHCAs will occur only during dry conditions. Sediment controls will ensure that sediment will not enter streams. The proposed activities will be reviewed by Malheur National Forest fisheries biologist and/or hydrologist before being carried out. Culvert removal, replacement, or installation in perennial or intermittent streams will be consulted on separately as a separate project.

Design Criteria
- Work would be done only during dry conditions.
- During installation, efforts are taken to prevent the escapement of soil into streams.
- Sediment filters, certified weed free hay bales, or other devices will be installed at the culvert outlet if natural filters are not present.
- Culvert work inside RHCAs will be reviewed with engineering and hydrology or fisheries staff and designed to conform the project design criteria, standards, guides, and best management practices.

Sign Maintenance and Construction
When selecting sign locations, sites adjacent to fish bearing streams will be avoided if at all possible to avoid disturbance and potential for sediment delivery to the stream and to prevent the need for brushing for visibility.
Sign maintenance includes: straightening rock basket and sign post, cleaning the sign face, brushing for sign visibility, installing hazard markers that denote road hazards, and replacing missing lag screws. When a sign degenerates to an unacceptable degree it will be replaced. When not applicable to the public, signs will be removed, covered, hinged, turned, or supplemented with another sign that indicates periods of time that signing is applicable. When signs are installed in rock baskets, the rock basket shall be no less than 113 inches circumference and 32 inches high. For posts 12 feet or higher, baskets shall be no less than 151 inches in circumference and 52 inches high. All posts shall be placed to the proper height and be thoroughly tamped in. They shall in no case be less than 2 feet or a quarter of the post height in the ground, or which is greater. Multiple post installation shall be used on signs 40 inches or more in width. The elevation of the lowest marker (an arrow symbol) will be 4 feet from near edge of road surface to bottom of sign. Reassurance markers or other single route markers will also be 4 feet. Destination and warning (any signs other than route markers) should be a minimum of 5 feet.

**Road Snag or Danger Tree Felling**

An interagency field guild for Danger Tree identification and response was developed in 2005 and then amended in 2008. The Forest is currently following this direction to comply with Occupational Safety and Health Administration (OSHA) regulations and to maintain safe driving conditions.

Danger trees within a riparian habitat conservation area (RHCA) will be felled and left onsite. Danger trees will not be directionally felled into Category 1 streams as part of this consultation.

**Logging Out**

Logging out is the bucking, removal, and disposal of downed trees, logs, and debris, which have fallen on or across the road bed or lie within the traveled way, thus presenting safety and access concerns. Logging out is performed to provide safe travel for the road users and provide adequate room to achieve road maintenance activities with maintenance equipment. All roads except Maintenance Level I roads require logging out as part of the road maintenance program, unless funding or priorities determine differently. It is intended for all arterial and main collectors to be logged out as early in the year as possible.

Logging out removes fallen trees, snags, or protruding trees that extend into the travel way. Additional width shall be cleared if needed for maintenance. Any wood, slash or debris over four inches in diameter and 2 feet long either existing or created from logging out operations, will be removed from ditches, drainage channels, traveled way, shoulders, and turnouts and scattered on the downhill slope away from drainage. Trees within the travel way shall be cut, limbed, and placed outside the travel way and turnouts and out of drainages and ditches. Trees standing outside travel way but having branches extending into the area shall be limbed to a height of 14 feet. Trees that are blocking ditches or drainage structures may be cut. Some slash will be used as sediment filters at outlets for cross road drainage. Some of the slash will be chipped and placed on cut or fill slopes or disturbed areas. The chipped material provides sediment control, holds in moisture improving sprouting of native seed, and is incorporated more rapidly into the duff layer.

Any portion of a tree, which has fallen into a riparian habitat conservation area (RHCA) will be left in place outside of the roadway. Merchantable logs outside the RHCA shall be cut and removed from the traveled way to facilitate safe passage and proper maintenance. Non-merchantable logs may be cut any length to facilitate safe removal. If these logs are decked to provide designated firewood to the forest users, the deck will not be adjacent to live streams in order to prevent fuel contamination.

When removing downed logs in the road, which extend into a stream, any material on the fill slope and in the stream will be retained to provide for instream woody debris recruitment. If the woody debris is
endangering nearby culverts, bridges, or road fill, the debris will be relocated in its original condition to the fill slope or stream channel downstream of the structure.

**Design Criteria**

- When removing down logs, which extend into a stream, from a road, any material on the fill slope and in the stream will remain (not be removed) to provide for woody debris recruitment, except in cases where the retention of this material would result in a safety concern (i.e. downstream facilities). Any felled hazard trees or blow down in RHCAs will be left in the RHCA and off the roadway.

**Roadside Brushing**

Roadside brushing is performed to provide visibility, safe stopping distance, clearance for maintenance equipment, unimpeded travel and unobstructed flow of water by the removal of standing vegetation in ditches which may divert water out of the intended course of flow within the clearing limits. Safety and drainage issues will be the primary need for brushing.

On designated open roads, maintenance Level II, brush is removed when it reaches a damage threshold described below.

The threshold for roadside vegetation is exceeded when:

- Growth blocks the view of oncoming traffic to the degree that a driver could not determine the speed or existence of an oncoming vehicle thus affecting adequate stopping distance.
- Growth interferes with the steady flow of water in ditches or through drainage structures.

Roadside brushing on Level II roads will consist of cutting and disposing of vegetative growth to provide at least 12 feet of continuous traveled way and 8 feet of turnout width where they exist plus any additional width needed for maintenance. All vegetation shall be cut within 2 inches of the traveled way. Limbing may be done with a chainsaw or hand tools. Limbs are cut flush to the tree trunk. Debris from cutting operations shall be removed from the brushed area and scattered or chipped. Some slash from cutting operations will be used as sediment filters at outlets for cross road drainage. Some of the slash will be scattered or chipped and placed on cut or fill slopes or disturbed areas. The chipped material provides sediment control, holds in moisture improving sprouting of native seed, and is incorporated more rapidly into the duff layer.

Roadside brushing along main access roads consists of cutting and disposing of vegetative growth including trees less than 6 inches in diameter. The area to be brushed includes cut slopes, fill slopes, ditches, roadbed, turnouts, and vertical clearance. Additional area shall be brushed on the inside of curves as necessary to achieve adequate sight distance. Trees outside the roadbed or ditch, but within the brushing limits, which are over 6 inches in diameter will be limbed in lieu of cutting. Trimming or limbing may be done with a chainsaw or hand tools. Limbs are cut flush to the tree trunk. Debris from cutting operations shall be removed from the brushed area and scattered or chipped. Some slash from cutting operations will be used as sediment filters at outlets for cross road drainage. Some of the slash will be scattered or chipped and placed on cut or fill slopes or disturbed areas. The chipped material provides sediment control, holds in moisture improving sprouting of native seed, and is incorporated more rapidly into the duff layer.
Design Criteria

- In road segments that parallel stream courses, brushing operations will maintain stream shade along with safety considerations. This may necessitate hand brushing, partial brushing, or limbing, with consideration for providing growth for future shade.

- Brush removal will occur within riparian habitat conservation areas (RHCAs) where safety is an issue. Options other than complete "removal" will be considered in order to leave ground cover to help control water and sediment flow off the road surface into the RHCA and stream channels on sites where brush removal would cause sediment to be delivered to a stream.

- When brush cutting is necessary at stream crossings, it will be cut only to a minimum height of 6 inches above the ground to prevent sediment delivery to a live stream and will be left in ditches. Brush and other standing vegetation provide shade and filtering of dust delivery to streams and will be maintained except where public safety is an issue.

- Roadside brushing that involves more than minimal removal of vegetation (i.e., limbing of trees or removal of brush) in RHCAs will be reviewed by a Malheur National Forest fish biologist or hydrologist.

Dust Abatement

During the summer months some roads will receive dust abatement treatment. Dust abatement is the application of a product, which either bonds dust particles and fines to larger matter or makes them heavier so they tend not to rise with the passage of vehicles. The purpose of dust abatement is to prevent loss of surface fines, enhance vehicle safety, and in some cases, prevent pollution and provide vehicle occupant comfort. **Water is the only agent that will be used for dust abatement within RHCAs.**

Water source development is not part of the action alternatives. Where water can be drafted from designated water sources, it can occur only as long as supply is adequate to provide for both fish and withdrawal. Screens are attached to intake hoses to prevent pulling fish and other small matter. **NOAA FISHERIES developed criteria for pump intake screens will be used on all water pump intakes as described in the attached "Appendix B, Juvenile Fish Screen Criteria For Pump Intakes" (NMFS, May 9, 1996).** Screen mesh openings shall not exceed 3/32 inch for woven wire or perforated plate screens, or 0.0689 inch for profile wire screens, with a minimum 27 percent open area. Trucks will be maintained to prevent oil leaks. Loading is done in a manner to minimize overflowing and discharge of wash into stream.

Storage water will be pumped or gravity fed into a holding tank or pond, using less than ten percent of the stream volume. All systems will have screened intake pipes and return systems will be designed that prevents sediment from entering the stream. The maximum withdrawal from one site in an 8-hour period will be 18,000 gallons of water.

**Water drafting guidelines prepared by NOAA Fisheries are included in Attachment 1, Section A.**

Snow Removal

Removal of snow from roads is needed to facilitate logging operations and access for project work (e.g., reforestation). As snow plowing is done in connection or association with timber harvest and/or reforestation, it will be included as an activity with those projects for consultation.

Snow removal is also done to ensure safe and efficient transportation and to prevent unacceptable erosion damage to roads, streams, and adjacent lands. Removal includes the entire road width and turnouts. Snow slides, minor earth slides, fallen timber, and boulders that obstruct normal road surface width, including
turnouts, are also removed. If culverts and ditches are restricted by snow or ice, they will be opened to allow proper drainage.

Design Criteria

- Any type of equipment may be used to remove snow, providing:
- Type or use of equipment is not restricted in contract or permit clauses or Forest Road Rules document.
- Equipment is of the size and type commonly used to remove snow and will not cause damage to the road.
- The use of dozers to remove snow requires written Forest Service approval. All equipment shall be equipped with shoes or runners, unless agreed otherwise, that are designed to leave 4 to 6 inches of snow on roadway. Snow will not be completely removed.
- Berms shall be opened (surface trenches or drainage holes) to prevent the accumulation of runoff during melt off. Drainage holes will be spaced as required to obtain satisfactory surface drainage without discharge on erodible fills and will be placed above vegetation filters.
- Side casting of snow will be avoided in areas adjacent to streams where there is potential to cause snow or ice damming.
- Side cast material will not include dirt and gravel.
- Damage from, or as a result of snow removal, will be restored in a timely manner.

Road Closures

Road closure actions will include the installation of a physical device to restrict vehicle traffic. A closed road is an operating facility on which motorized traffic has been removed (yearlong or seasonally). These roads remain on the Forest Road Transportation System. Closed roads may not be drivable because they are usually not logged out or brushed out. They are closed to vehicles except for emergency or permitted use. One objective of road closures is to limit motorized vehicle traffic on native surface roads to reduce erosion. The roads are left in a stable condition and are maintained on an “as needed” basis. Inspections are made following a storm event or at least every 5 years.

Roads are most commonly closed with pole gates, steel gates, closure signs, slash, or earth berms as applicable for effective closure. These roads will be treated to provide self-maintenance prior to closure. Self-maintenance includes a variety of actions.

Water bars will be installed with appropriate skew, outlet, and spacing. Sediment barriers of available woody material such as slash, brush, etc., will be placed at water bar outlets. Side ditches will be bladed where needed; culverts will be cleaned to drain; catch basins will be functional and free of debris. Drain dips, grade sags, and cross ditches will be reshaped/rocked as necessary to assure proper functioning. All actions will be considered on a site-specific basis with each road or road segment actions suited to the needs and condition of the road and related resources.

Roads to be stored using berm closures will be evaluated prior to closing by qualified Forest Service representatives from engineering and aquatics (fisheries and hydrology) to insure that closures are consistent with Best Management Practices (BMPs) and maintain high aquatic habitat (negligible fine sediment inputs over time). Evaluations will be conducted using the appropriate portion of BMP R-6 from National Best Management Practices for Water Quality Management on National Forest System Lands (FS-990a 2012) which states the following for road storage, and the guidance for applying this BMP on the MNF which also follows:
A. BMP R-6 Excerpt:

- Evaluate all stream and waterbody crossings for potential for failure or diversion of flow if left without treatment.
  - Use suitable measures to reduce the risk of flow diversion onto the road surface.
  - Consider leaving existing crossings in low-risk situations where the culvert is not undersized, does not present an undesired passage barrier to aquatic organisms, and is relatively stable.
  - Remove culverts, fill material, and other structures that present an unacceptable risk of failure or diversion.
  - Reshape the channel and streambanks at the crossing-site to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site.
  - Use suitable measures to avoid or minimize scour and downcutting.
- Use suitable measures to ensure that the road surface drainage system will intercept, collect, and remove water from the road surface and surrounding slopes in a manner that reduces concentrated flow in ditches, culverts, and over fill slopes and road surfaces without frequent maintenance.
- Use suitable measures to stabilize unstable road segments, seeps, slumps, or cut or fill slopes where evidence of potential failure exists.

B. Guidance for application of the road storage portion of BMP R-6 on the MNF:

1. When the evaluation of stream crossings shows any of the following, removal of culvert and adequate re-shaping of stream valley area are strongly recommended to minimize chronic fine sediment impacts and adverse effect to listed and sensitive species:
   - Aggradation of sediment upstream of culvert or evidence of overtopping, indicating undersized or improperly installed culverts or substantial impacts to bedload transport. Alternatively consider increasing culvert size to address water and sediment routing until upstream conditions are investigated, evaluated, and rehabilitated if appropriate.
   - Culvert is clearly undersized (below the 100-year peak flow or \(Q_{100}\)). Consider rust lines, drainage size and condition of watershed upstream (through USGS StreamStats, NetMap, field/map evaluation, or other tools), etc.
   - If removal is not recommended, adequate documentation shall be completed, communicated to aquatics specialists, and tracked in appropriate engineering files.
   - Alternatively an evaluation of the condition of the watershed above the culvert shall be conducted and used to inform and document the decision to leave the culvert if rehabilitating upslope/stream conditions would alleviate aggradation of sediment or allow greater infiltration reducing expected \(Q_{100}\) at the culvert.
   - Ditch relief culverts will also be reviewed for the need of removal using these criteria.

2. Other conditions requiring a thorough field evaluation and risk/hazard evaluation and appropriate documentation of recommendation:
   - Steep drainage gradient above culvert.
   - Deep road fill large drainage area above culvert; evaluate conditions in watershed above and at fill location.
   - Native surface or improved native surface roads with roadbeds consisting of a high proportion of fine substrate.
• Length of time the road would be in long-term storage before being opened for future management.
• Remoteness or road or frequency of expected inspection.
• If the road accesses sites or features that are necessary for administrative duties.
• Landform shows evidence of debris flows/dissection or culvert located on active landslide or other instability, for instance, Balance Creek landslide, or if soil conditions such as serpentine are present in the drainage above the culvert.
• Condition of drainage above is contributing or likely to contribute to substantial or channelized overland flow (for instance, hydrologic soil group D, soil type or condition, road density, veg cover/condition, presence of eroding hillslopes or ephemeral draws; presence of past activities implemented without application of BMPs)
• Crossing is in proximity to listed or sensitive aquatic species habitat or other high values in the event of sediment mobilization.
• Low likelihood of long term persistence and effectiveness of water bars or other relief drainage, especially if installed just downslope of culverts to mitigate potential failure (for instance, if heavy life stock trailing is occurring on the road or if road closure effectiveness is low, i.e. would be driven, then likelihood of persistence is lower).
• When other local conditions, often unique to the MNF, are present that alert aquatic specialists or engineering personnel to concerns.

3. When a culvert is removed, the requirement for re-shaping the channel and valley in the BMP R-6 shall be enhanced to promote removal of fill within the floodplain and expected, active meander belt, to allow the stream channel to adjust to local valley; consider use of temporary crossing structure at future entries.

4. When a decision is made to leave a culvert, adequate relief drainage (i.e. rolling dips, oversized waterbars, etc.) for the Q\textsubscript{100} shall be installed.

Road closure actions, whether the initial closure or re-closing a breached road will occur only during sufficiently dry conditions to prevent damage and runoff. Road closure are also confined to time periods such that key fish or spawning areas are not impacted and soil movement is not likely to occur. All road closure activities will be reviewed by a fisheries biologist and who will inspect the site for adequate design criteria. The Forest will consult separately on road decommissioning projects of any type and on self-maintenance closures, which contribute sediment delivery to water. This would entail removing the road from the transportation system, contouring when needed, and rehabilitation of the area to as natural a condition as possible.

**Material Sources**

The Forest maintains an inventory of all active rock material (quarry) sources and many closed, inactive, and unopened sources. Over 28 years ago, the Forest began locating centralized sources to provide rock material needs, especially for those projects that required large quantities of material. A primary goal of centralized sources is to limit the magnitude of surface disturbances while extracting quality materials to meet demand. Most roads which access developed sources have aggregate surfaces.

Some of the larger sites have been designed to impound water. These sites provide storage for rain and runoff, which may be used as water sources for road construction and maintenance activities, dust abatement, and fire suppression. An associated benefit of these ponds is use by wildlife and grazing animals.
Most sources are located in rocky terrain and are at a sufficient distance from any drainages or riparian habitat conservation areas (RHCAs) so as to have no impact on sediment contribution. A few sources have been developed in the past, which are located within RHCA buffers. The portions of sources within RHCAs will not be expanded into the RHCAs.

U.S. Forest Service engineers are responsible for following all Malheur Forest Plan Standards and Guidelines, PACFISH Standards and Guidelines, and PACFISH Riparian Management Objectives. Dust abatement will be used as needed, and safety guidelines will be used.

Section D – Log Haul Project Design Criteria

Log Haul

Project Design Criteria crafted to support a “May effect, Not likely to Adversely affect” (NLAA) effects determination call for Aquatic TES species and meet Clean Water Act obligations (01/19/2017).

Log haul will occur on designated haul routes with the following design criteria. If additional haul routes are needed and were not identified during the NEPA process then additional NEPA and consultation may be required. These PDC’s are only applicable to culverted stream crossings and do not cover creek or river fords.

- Product haul will occur during the Commercial Use Period (June 1 – January 15), unless otherwise authorized by the Forest Engineer. The Commercial Use Period is intended to prevent weather-related road damage, but actual field conditions may necessitate suspending haul to prevent road damage at any time. Product haul is also limited to conditions that will not result in Resource Damage, as described in the June 2009 Malheur National Forest Commercial Road Use Rules (CRUR).
- During product haul, weather conditions are monitored daily for the chance of precipitation by the Timber Sale Administrator, Hydrologist or Fish Biologist.
- During product haul, road conditions shall be monitored by the Timber Sale Administrator daily for indications of Road Distress, defined in the CRUR as visible road conditions that occur as a result of road use, or a combination of road use and weather, which indicate that damage to a road or the adjacent resources, may occur under existing conditions. Examples of indicators include, but are not limited to, excessive dust, compromised or improper functioning road drainage, muddy ditch water, mud tracked onto asphalt or aggregate surfaced roads, and significant distortions of the road surface such as tracks, ruts, potholes, washboarding, asphalt cracking or settling.
- Timber haul on gravel and native surface roads will be limited to dry or frozen conditions. Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditch lines, regardless of time of year. Ditch lines are the normal sediment delivery mechanism to steam channels and or Critical Habitat.
- Haul will cease under periods of thawing conditions, as this is the most critical period for sediment delivery. Heavy truck traffic during thaw periods can cause failure of the entire road prism and can deliver sediment to streams. The forest service will attempt to provide a warning of impending thaw conditions 3 to 4 days before possible shutdown and also attempt to notify purchasers 48 hours before operational shutdown.
- When the Timber Sale Administrator observes indications of Road Distress during haul (haul should be halted prior to road distress in RHCAs due to the mechanism for sediment delivery), one or more of the following actions would be taken: 1) perform maintenance work (including installation of additional erosion control materials); 2) change method of operations; 3) strengthen road surface to avoid damage; or 4) suspend operations until conditions change.
Examples of ‘change method of operations’ include lowering tire pressure, hauling fewer logs per truck, or restricting haul to certain times of the day.

- During product haul on native-surface roads, the road surface will be rocked for a distance of up to 100 feet on either side of approaches to culverts on perennial stream crossings (RHCA Category 1 & 2). To prevent sediment delivery to streams from haul, the distance of rocking on either side of approaches and/or installation of rolling dips shall be made on a site-specific basis by aquatic specialists in coordination with Engineering. Rocking will maintain as close to an 8-inch lift as the travelway width allows (minimum 6-inch lift). All rocked crossings shall have a well graded rock material placed with no material larger than 6 inches.

- Native-surfaced road crossings with culverts on Category 4 streams (Non-Critical Habitat) will be rocked (as described in above bullet) and/or have coarse slash dams placed below the crossings unless crossings are identified to be exempt by aquatic specialists. Exceptions to rocking crossings on category 4 streams can be made on a site specific basis, based on professional judgment and consensus of both the hydrologist and fisheries biologist in relation to sediment delivery and resource effects. This will ensure that the NLAA effects determination to TES species will be consistent with the Endangered Species Act and also ensure that the Forest is meeting its obligations under the Clean Water Act.

- Prior to annual haul, actions will be implemented to minimize or avoid sediment delivery to Critical Habitat for MCR Steelhead and Columbia River Bull Trout where needed as identified by an aquatics specialist. Examples of protective measures will include but are not limited to; Sediment fences or straw bales in ditch lines, mulching.


Roads exempt from haul restrictions include (due to no mechanism for sediment delivery):
- Paved roads
- Surfaced ridge top roads
- Surfaced outsloped roads with no ditch or stream crossings
- Hauling over snow, frozen conditions (as defined above).

Section D—Aquatic & Riparian Restoration Programmatic Consultation – Project Design Criteria for Aquatic Restoration Activities

Aquatic restoration activities described below would be consistent with Region 6 fish passage guidance and in accordance with the Regional General Permit issued by the U.S. Army Corps of Engineers. Minimization measures for fisheries, watershed function, water quality, and soil conditions include those identified in the NMFS and FWS 2013 ARBO as well as design criteria developed by the Blue Mountain Ranger District interdisciplinary team. ARBO measures specific to this proposed project are identified below.

Project Categories
1. Fish Passage Restoration (Stream Simulation Culvert and Bridge Projects; Headcut and Grade Stabilization; Fish Ladders; Irrigation Diversion Replacement/Relocation and Screen Installation/Replacement).
2. Large Wood (LW), Boulder, and Gravel Placement (LW and Boulder Projects; Engineered Logjams; Porous Boulder Weirs and Vanes, Gravel Augmentation; Tree Removal for LW Projects).
5. Off- and Side-Channel Habitat Restoration.
7. Set-back or Removal of Existing Berms, Dikes, and Levees.
9. Road and Trail Erosion Control
10. Riparian Vegetation Treatment (controlled burning).

Program Administration

1. Integration of Project Design Criteria (PDC) and Conservation Measures and Terms and Conditions into Project Design and Contract Language

The Action Agencies shall incorporate appropriate aquatic and terrestrial conservation measures along with Project Design Criteria listed in the aquatic restoration BA along with any terms and conditions included in the subsequent Aquatic Restoration Biological Opinion (ARBO II, 2013) into contract language or force-account implementation plans.

2. Project Notification

Streamlining Level 1 teams will review and discuss aquatic restoration projects planned for implementation during an upcoming work season through their team-specific processes. The Action Agencies shall provide a project Notification Form to ARBO.nwr@noaa.gov and the NMFS Level 1 Aquatics members 30 days prior to implementation and will include the following information:

a. Action identifier – The same unique identification number is necessary for each project’s Action Notification and Project Completion reports.
b. Project name – Use the same project name from notification to completion (e.g., Jones Creek, Tillamook Co., Oregon, culvert replacement).
c. Location – 6th field HUC (hydraulic unit code), stream name, and latitude and longitude (decimal degrees)
d. Agency contact – Agency and project lead name
e. Timing – Project start and end dates
f. Activity category – As listed above in section 1.3.
g. Project description – Brief narrative of the project and objectives
h. Extent – Number of stream miles or acres to be treated
i. Species affected – Listed Fish and or Wildlife species, Critical Habitat, and or EFH affected by project
j. Date of submittal
k. For any action requiring a site assessment for contaminants, include a copy of the report explaining the likelihood that contaminants are present at the site.
l. For any action requiring NMFS fish passage and RRT reviews, attach a copy of the approval correspondence.
m. Verification – Check box that verifies that all appropriate General Aquatic Conservation Measures, Wildlife Conservation Measures, Project Design Criteria for Aquatic Restoration Activity Categories, and Project Design Criteria for Terrestrial Species and Habitats have been
thoroughly reviewed and will be incorporated into project design, implementation, and monitoring.

n. SOD project notification requirements (see PDC 39h-i) as an attachment to notification form

3. Minor Variance Process

Because of the wide range of proposed activities and the natural variability within and between stream systems, some projects may be appropriate for minor variations from criteria specified herein. NMFS branch chiefs will authorize variances when there is a clear conservation benefit or there are no additional adverse effects (especially incidental take) beyond that covered by the ARBO II. Minor variances may be requested as part of the above notification process and must:

a. Cite ARBO II identifying number.
b. Cite the relevant criterion by page number.
c. Define the requested variance.
d. Explain why the variance is necessary.
e. Provide a rationale why the variance will either provide a conservation benefit or,
f. at a minimum, not cause additional adverse effects.
g. Include as attachments any necessary approvals by state agencies.

4. NMFS Fish Passage Review and Approve

The NMFS Level 1 team member will coordinate NMFS fish passage review and approval for the following types of project:

a. Dewatering construction sites by pumping at a rate that exceeds 3 cubic feet per second (cfs) will require fish screen review.
b. Fish passage culverts and bridges that do not meet width standards.
c. Headcut stabilization and channel spanning non-porous rock structures that create discrete longitudinal drops > 6 inches.
d. Fish ladders.
e. Engineered log jams (ELJs) that occupy greater than 25 percent of the bankfull area.
f. Irrigation diversion replacement/relocation & screen installation/replacement.
g. Dam removal.
h. Channel reconstruction/relocation projects.
i. Off- and side-channel reconstruction when the proposed side channel will contain >20% of the bankfull flow.

5. Restoration Review Team (RRT)

The following types of project require RRT review:

a. Dam removal.
b. Channel reconstruction/relocation projects.
c. Precedent or policy setting actions, such as the application of new technology.

The RRT will be comprised of highly skilled interagency (BLM, Forest Service, BIA, NMFS, USFWS) fisheries biologists, hydrologists, geomorphologists, soil scientists, or engineers to review and help select project designs. The RRT will have a four member core group—one individual from each of the following agencies: Forest Service, BLM, NMFS, and USFWS. The designated Forest Service and BLM ARBO II contacts will serve as core group members. Additional technical experts from these agencies will be recruited depending on the project to be reviewed.

The RRT reviews will help ensure that projects: (1) Meet the obligations set forth in the BA and subsequent ARBO II; (2) maximize ecological benefits of restoration and recovery projects; (3) maximize
efficient and effective use of limited financial resources; and (4) ensure consistent use and implementation throughout the geographic area covered by this opinion. Any RRT concerns must be described in detail, referencing underlying scientific (based on peer-reviewed science) or policy rationale, and include recommended changes to the proposed project to address the specific concerns. When requested, RRT will provide an estimate of the time necessary to complete the review based on the complexity of the proposed action and work load considerations at the time of the request. Approval may be delayed if a substandard design is submitted for review during the post-design or action implementation stage and significant revision is necessary.

The RRT will keep a record of each review, including any recommended clarifications, changes, or interpretations. The RRT does not replace any existing review process, nor shall it slow down project implementation unless significant technical, policy, or program concerns with a particular restoration approach are identified.

6. Project Completion Report

Level 1 teams will discuss and review aquatic restoration projects completed during a previous season. Each BLM, Forest Service, or BIA field office that completes a project will submit a Project Completion Report to ARBO.nwr@noaa.gov and their USFWS and NMFS Level 1 Team counterparts. Reports are due 60 days after project completion. Reports will include the following information:

   a. Action identifier (same number as in notification).
   b. Action name (same name as in notification).
   c. Location – 6th field HUC, stream name, latitude and longitude.
   d. Agency contact – Agency and project lead name.
   e. Date of submittal.
   f. Timing – Actual project start and end dates.
   g. Activity category – As listed above in section 1.3.
   h. Project description – Brief narrative of the completed project and objectives.
   i. Extent – Number of stream miles or acres treated.
   j. Species affected – Fish and or wildlife species, critical habitat, or EFH affected by the project.
   k. Fish pursuit and capture – If fish are pursued or captured during salvage operations, the project biologist will describe removal methods, stream conditions, and the number of fish handled, injured, or killed, and reasons for the fish mortality. This report will likely be limited to fish passage, dam removal, and channel restoration/relocation projects.
   l. State-specific Clean Water Act section 401 certification monitoring results. If protocol conditions were not met, describe effects and any remedial actions.
   m. Post Project Assessment – Remedial actions taken, including any dates work ceased due to high flows.
   n. SOD project completion requirements (see PDC 39h-ii; Table 6) as an attachment to project completion form.

7. Annual Program Report

The Action Agencies will provide an annual program report to NMFS and USFWS by February 15 of each year that describes projects funded or carried out under ARBO II. The report will include the following information:

   a. An assessment of overall program activity.
   b. A map showing the location and category of each project carried out under ARBOII.
   c. A list of any projects that were funded or carried out by the Action Agencies using the ARBO II, including the name of the Action Agency designated as the lead agency for each project for ESA purposes.
d. Data or analyses that the Action Agencies deem necessary or helpful to assess habitat trends as a result of actions carried out under the ARBO II.

e. Totals for amount of incidental take and for each extent of take indicator by recovery domain.

f. Requests for variance and their disposition and a description of RRT activity.

g. SOD project annual report requirements (see PDC 39h-iii).

**General Aquatic Conservation Measures**

**8. Technical Skill and Planning Requirements**

a. Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by this opinion. The experience should be commensurate with technical requirements of a project.

b. Planning and design includes field evaluations and site-specific surveys, which may include reference-reach evaluations that describe the appropriate geomorphic context in which to implement the project. Planning and design involves appropriate expertise from staff or experienced technicians (e.g., fisheries biologist, hydrologist, geomorphologist, wildlife biologist, botanist, engineer, silviculturist, fire/fuels specialists).

c. The project fisheries biologist/hydrologist will ensure that project design criteria are incorporated into implementation contracts. If a biologist or hydrologist is not the Contracting Officer Representative, then the biologist or hydrologist must regularly coordinate with the project Contracting Officer Representative to ensure the project design criteria and conservation measures are being followed.

**9. Climate Change**

Consider climate change information, such as predictive hydrographs for a given watershed or region, when designing projects covered by this opinion.

**10. In-water Work Period**

Follow the appropriate state (ODFW 2008; WDFW 2010) or most recent guidelines for timing of in-water work. If work occurs in occupied Oregon chub habitat, in-water work will not occur between June 1 and August 15. In those few instances when projects will be implemented in California, Idaho, or Nevada, follow appropriate state guidelines. The Action Agencies will request exceptions to in-water work windows through Level 1 NMFS or USFWS representatives as well as essential state agencies. For National Forests in the state of Washington, the Forest Service will work with Washington Department of Fish and Wildlife (WDFW) to determine in-water work periods, using the process contained in the 2012 Memorandum of Understanding between the WDFW and USDA-Forest Service, Pacific Northwest Region regarding hydraulic projects conducted by the Forest Service (WDFW and USDA-Forest Service 2012).

**11. Fish Passage**

Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction, unless passage did not exist before construction, stream isolation and dewatering is required during project implementation, or where the stream reach is naturally impassible at the time of construction. After construction, adult and juvenile passage that meets NMFS’s fish passage criteria (NMFS 2011e) will be provided for the life of the structure.
12. Site Assessment for Contaminants

In developed or previously developed sites, such as areas with past dredge mines, or sites with known or suspected contamination, a site assessment for contaminants will be conducted on projects that involve excavation of greater than 20 cubic yards of material. The action agencies will complete a site assessment to identify the type, quantity, and extent of any potential contamination. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. The assessment may include the following:

i. Review of readily available records, such as former site use, building plans, records of any prior contamination events.
ii. Site visit to observe the areas used for various industrial processes and the condition of the property.
iii. Interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, local government officials, etc.
iv. Report that includes an assessment of the likelihood that contaminants are present at the site.

13. Pollution and Erosion Control Measures

Implement the following pollution and erosion control measures:

i. Project Contact: Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.
ii. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.
iii. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.
iv. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.
v. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).
vi. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.
vii. No uncured concrete or form materials will be allowed to enter the active stream channel.
viii. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.

14. Site Preparation

a. Flagging sensitive areas – Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
b. Staging area – Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
   i. No Topographical Restrictions – place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.
   ii. Topographical Restrictions – place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
c. **Temporary erosion controls** – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.

d. **Stockpile materials** – Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any LW, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., LW, boulders, fencing material) may be staged within the 100-year floodplain.

e. **Hazard trees** – Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse LW objectives.

15. **Heavy Equipment Use**

i. **Choice of equipment** – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).

ii. **Fueling and cleaning and inspection for petroleum products and invasive weeds**

   a. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five gallons.

   b. Store and fuel equipment in staging areas after daily use.

   c. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.

   d. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

iii. **Temporary access roads** – Existing roadways will be used whenever possible. Minimize the number of temporary access roads and travel paths to lessen soil disturbance and compaction and impacts to vegetation. Temporary access roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads will be obliterated or revegetated. Temporary roads in wet or flooded areas will be restored by the end of the applicable in-water work period. Construction of new permanent roads is not permitted.

iv. **Stream crossings** – Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored.

v. **Work from top of bank** – To the extent feasible, heavy equipment will work from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem.

vi. **Timely completion** – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.
16. Site Restoration

i. **Initiate rehabilitation** – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, spreading of stockpiled materials (soil, LW, trees, etc.) seeding, or planting with local native seed mixes or plants.

ii. **Short-term stabilization** – Measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

iii. **Revegetation** – Replant each area requiring revegetation prior to or at the beginning of the first growing season following construction. Achieve reestablishment of vegetation in disturbed areas to at least 70% of pre-project levels within three years. Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Barriers will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

iv. **Planting manuals** – All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.

v. **Decompress soils** – Decompress soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.

18. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release

Isolate the construction area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. This condition will typically apply to the following aquatic restoration categories: Fish Passage Restoration; Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation.

i. Isolate capture area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.

ii. Capture and release – Fish trapped within the isolated work area will be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.
iii. Electrofishing – Use electrofishing only where other means of fish capture may not be feasible or effective. If electrofishing will be used to capture fish for salvage, NMFS’s electrofishing guidelines will be followed (NMFS 2000).

- Reasonable effort should be made to avoid handling fish in warm water temperatures, such as conducting fish evacuation first thing in the morning, when the water temperature would likely be coolest. No electrofishing should occur when water temperatures are above 18ºC or are expected to rise above this temperature prior to concluding the fish capture.
- If fish are observed spawning during the in-water work period, electrofishing shall not be conducted in the vicinity of spawning fish or active redds.
- Only Direct Current (DC) or Pulsed Direct Current shall be used.
- Conductivity <100, use voltage ranges from 900 to 1100. Conductivity from 100 to 300, use voltage ranges from 500 to 800. Conductivity greater than 300, use voltage to 400.
- Begin electrofishing with minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized and captured. Turn off current once fish are immobilized.
- Do not allow fish to come into contact with anode. Do not electrofish an area for an extended period of time. Remove fish immediately from water and handle as described above (PDC 20b). Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.
- If mortality is occurring during salvage, immediately discontinue salvage operations (unless this would result in additional fish mortality), reevaluate the current procedures, and adjust or postpone procedures to reduce mortality.

iv. Dewater construction site – When dewatering is necessary to protect species or critical habitat, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow and fish downstream with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If ESA listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

v. Surface water withdrawals

- Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10% of the available flow and fish screen(s) will be installed, operated, and maintained according to NMFS’s fish screen criteria (NMFS 2011e).
- For the dewatering of a work site to remove or install culverts, bridge abutments etc., if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the Action Agencies will ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cfs. NMFS approved fish screens have the following specifications: a) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps), or no automated cleaning device, a minimum effective surface area
of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and b) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.

vi. Stream re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

17. Monitoring

Monitoring will be conducted by Action Agency staff, as appropriate for that project, during and after a project to track effects and compliance with this opinion.

i. **Implementation**
   
i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.
   
ii. Fix any problems that arise during project implementation.
   
iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.

ii. **401 Certification** – To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards described by the following: Oregon Department of Environmental Quality (Oregon BLM, Forest Service, and BIA); Washington Department of Ecology (Washington BLM); and the Memorandum of Understanding between the Washington Department of Fish and Wildlife and Forest Service regarding Hydraulic Projects Conducted by Forest Service, Pacific Northwest Region (WDFW and USDA-Forest Service 2012); California, Idaho, or Nevada 401 Certification protocols (BLM and Forest Service).

iii. **Post project** – A post-project review shall be conducted after winter and spring high flows.
   
a. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation. For fish passage and revegetation projects, monitor in the following manner:
   
   b. Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.
   
   c. Revegetation – For all plant treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.
   
   d. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDC and aquatic conservation measures and the effects of the action categories are not exceeded.

20. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release

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vii. Isolate capture area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.

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the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.

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x. Dewater construction site – When dewatering is necessary to protect species or critical habitat, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow and fish downstream with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If ESA listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

xi. Surface water withdrawals
• Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10% of the available flow and fish screen(s) will be installed, operated, and maintained according to NMFS’s fish screen criteria (NMFS 2011e).
• For the dewatering of a work site to remove or install culverts, bridge abutments etc., if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the Action Agencies will ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cfs. NMFS approved fish screens have the following specifications: a) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps), or no automated cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and b) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.

xii. Stream re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

Project Design Criteria for Aquatic Restoration Activity Categories

The 11 aquatic restoration activity categories will be designed and implemented to help restore watershed processes. These projects will improve channel dimensions and stability, sediment transport and deposition, and riparian, wetland, floodplain and hydrologic functions, as well as water quality. As such, these improvements will help address limiting factors—related to spawning, rearing, migration, and more—for ESA-listed and other native fish species. Aquatic habitat restoration and enhancement projects are conducted within stream channels, adjacent riparian/floodplain areas, wetlands, and uplands. Work may be accomplished using manual labor, hand tools (chainsaws, tree planting tools, augers, shovels, and more), all-terrain vehicles, flat-bed trucks, and heavy equipment (backhoes, excavators, bulldozers, front-end loaders, dump trucks, winch machinery, cable yarding, etc.).

1. **Fish Passage Restoration** includes the following: total removal of culverts or bridges, or replacing culverts or bridges with properly sized culverts and bridges, replacing a damaged culvert or bridge, and resetting an existing culvert that was improperly installed or damaged; stabilizing and providing passage over headcuts; removing, constructing (including relocations), repairing, or maintaining fish ladders; and constructing or replacing fish screens for irrigation diversions. Such projects will take place where fish passage has been partially or completely eliminated through road construction, stream degradation, creation of small dams and weirs, and irrigation diversions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.
   a. **Stream Simulation Culvert and Bridge Projects** – All road-stream crossing structures shall simulate stream channel conditions per Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008), located at: http://stream.fs.fed.us/fishxing/aop_pdfs.html
      1. **Culvert criteria** – Within the considerations of stream simulation, the structure shall, at a minimum, accommodate a bankfull wide channel plus constructed banks to provide for passage of all life stages of native fish species (for more information, reference Chapter 6, page 35 of the USFS Stream Simulation
The following crossing-width guidance applies to specific ranges of entrenchment ratios as defined by Rosgen (1996):

1. **Non-entrenched Streams**: If a stream is not fully entrenched (entrenchment ratio of greater than 1.4), the minimum culvert width shall be at least 1.3 times the bankfull channel width. This is consistent with Anadromous Salmonid Passage Facility Design (section 7.4.2 “Stream Simulation Design”) (NMFS 2011e). However, if the appropriate structure width is determined to be less than 1.3 times the bankfull channel width, processes for variances are listed in “iv” and “v” below.

2. **Entrenched Streams**: If a stream is entrenched (entrenchment ratio of less than 1.4), the culvert width must be greater than bankfull channel width, allow sufficient vertical clearance to allow ease of construction and maintenance activities, and provide adequate room for the construction of natural channel banks. Consideration should be given to accommodate the floodprone width. Floodprone width is the width measured at twice the maximum bankfull depth (Rosgen 1996).

### Bridge Design

1. Bridges with vertical abutments, including concrete box culverts, which are constructed as bridges, shall have channel widths that are designed using the culvert criteria (PDC 21a-i above). This opinion does not cover bridges that require pile driving within a wetted stream channels.

2. Primary structural elements must be concrete, metal, fiberglass, or untreated timber. Concrete must be sufficiently cured or dried before coming into contact with stream flow.

3. Riprap must not be placed within the bankfull width of the stream. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings. However, the amount and placement of riprap should not constrict the bankfull flow.

### Crossing Design

1. Crossings shall be designed using an interdisciplinary design team consisting of an experienced Engineer, Fisheries Biologist, and Hydrologist/Geomorphologist.

2. Forest Service crossing structures wider than 20 feet or with costs that exceed $100,000 shall be reviewed by the USDA-Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.

3. At least one member of the design team shall be trained in a weeklong Aquatic Organism Passage course based Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008).

4. Bankfull width shall be based on the upper end of the distribution of bankfull width measurements as measured in the reference reach to account for channel variability and dynamics.

5. **NMFS fish passage review and approve** – If the structure width is determined to be less than the established width criteria as defined above, a variance must be requested from NMFS for consistency with criteria in NMFS (2011e).

6. **Opportunity for individual consultation** – The Action Agencies have a legal duty under the ESA to consult with NMFS and USFWS on a project specific basis if they prefer to operate outside the conditions in this opinion. The standards provided in this document are conservative for the purpose of this programmatic and may or may not be applicable to projects that undergo
individual Level 1 Consultation. The standards in ARBO II are not new defaults to be used universally outside the programmatic arena.

6. **Headcut and grade stabilization** – Headcuts often occur in meadow areas, typically on Rosgen “C” and “E” channel types. Headcuts develop and migrate during bankfull and larger floods, when the sinuous path of Rosgen E type streams may become unstable in erosive, alluvial sediments, causing avulsions, meander cut-offs, bank failure, and development of an entrenched Rosgen G gully channel (Rosgen 1994).

1. **Stabilize Headcuts**
   1. In streams with current or historic fish presence, provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels as described in part ii below.
   2. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.
   3. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.
   4. Minimize lateral migration of channel around headcut (“flanking”) by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.
   5. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.
   6. In streams without current or historic fish presence, it is recommended to construct a series of downstream log or rock structures as described in part ii below to expedite channel aggradation.

7. **Grade stabilization to promote fish passage associated with headcut stabilization**
   1. NMFS fish passage review and approve – If a grade stabilization structure spans the channel and creates one or more discrete longitudinal drops > 6 inches, the Action Agencies will ensure that the action is individually reviewed and approved by the NMFS for consistency with criteria in Anadromous Salmonid Passage Facility Design (NMFS 2011e).
   2. Provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels. If LW and boulder placement will be used for headcut stabilization, refer to Large Wood, Boulder, and Gravel Placement (PDC 22) below.
   3. Construct structures in a ‘V’ or ‘U’ shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of channel.
4. Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The structures should also be keyed into both banks—if feasible greater than 8 feet.

5. If several structures will be used in series, space them at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate NMFS fish passage criteria (jump height, pool depth, etc.) in the design of step structures. Recommended spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high step structure in a stream with a two-percent gradient will have a minimum spacing of 50-feet [1/0.02]).

6. Include gradated (cobble to fine) material in the rock structure material mix to help seal the structure/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction if natural flows are sufficient.

7. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.

2. Large Wood, Boulder, and Gravel Placement includes LW and boulder placement, ELJs, porous boulder structures and vanes, gravel placement, and tree removal for LW projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (LW removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

- Large Wood and Boulder Projects
  i. Place LW and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low gradient meadow streams.
  ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, and tree breakage.
  iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.
  iv. Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.
  v. The partial burial of LW and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.
  vi. LW includes whole conifer and hardwood trees, logs, and rootwads. LW size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0x bankfull width.
vii. Structures may partially or completely span stream channels or be positioned along stream banks.

viii. Stabilizing or key pieces of LW must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the LW increases stability.

ix. Anchoring LW – Anchoring alternatives may be used in preferential order:
   1. Use of adequate sized wood sufficient for stability
   2. Orient and place wood in such a way that movement is limited
   3. Ballast (gravel or rock) to increase the mass of the structure to resist movement
   4. Use of large boulders as anchor points for the LW
   5. Pin LW with rebar to large rock to increase its weight. For streams that are entrenched (Rosgen F, G, A, and potentially B) or for other streams with very low width to depth ratios (<12) an additional 60% ballast weight may be necessary due to greater flow depths and higher velocities.

• **Engineered Logjams (ELJs)** are structures designed to redirect flow and change scour and deposition patterns. To the extent practical, they are patterned after stable natural log jams and can be either unanchored or anchored in place using rebar, rock, or piles (driven into a dewatered area or the streambank, but not in water). Engineered log jams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the log jam. While providing valuable fish and wildlife habitat they also redirect flow and can provide stability to a streambank or downstream gravel bar.

   i. **NMFS fish passage review and approve** – For ELJs that occupy >25% of the bankfull area, the Action Agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in Anadromous Salmonid Passage Facility Design (NMFS 2011e).

   ii. ELJs will be patterned, to the greatest degree possible, after stable natural log jams.

   iii. Grade control ELJs are designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.

   iv. Stabilizing or key pieces of LW that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire LW with untrimmed rootwads to provide functional refugia habitat for fish.

   v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.

   vi. The partial burial of LW and boulders may constitute the dominant means of placement, and key boulders (footings) or LW can be buried into the stream bank or channel.

   vii. Angle and Offset – The LW portions of engineered log jam structures should be oriented such that the force of water upon the LW increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.
viii. If LW anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the LW.

- Tree Removal for LW Projects
  i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995; USDA and USDI 1994b) riparian habitat conservation areas (RHCA), and upland areas (e.g., late successional reserves or adaptive management areas for northern spotted owl and marbled murrelet critical habitat) for in-channel LW placement only when conifers and trees are fully stocked. Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.
  ii. Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.
  iii. Trees may be removed by cable, ground-based equipment, horses or helicopters.
  iv. Trees may be felled or pushed/pulled directly into a stream or floodplain.
  v. Trees may be stock piled for future instream restoration projects.
  vi. The project manager for an aquatic restoration action will coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

8. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Facilities projects will be implemented by constructing fences to exclude riparian grazing, providing controlled access for walkways that livestock use to transit across streams and through riparian areas, and reducing livestock use in riparian areas and stream channels by providing upslope water facilities. Such projects promote a balanced approach to livestock use in riparian areas, reducing livestock impacts to riparian soils and vegetation, streambanks, channel substrates, and water quality. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

1. Livestock Fencing
   i. Fence placement must allow for lateral movement of a stream and to allow establishment of riparian plant species. To the extent possible, fences will be placed outside the channel migration zone.
   ii. Minimize vegetation removal, especially potential LW recruitment sources, when constructing fence lines.
   iii. Where appropriate, construct fences at water gaps in a manner that allows passage of LW and other debris.

2. Livestock Stream Crossings
   i. The number of crossings will be minimized.
   ii. Locate crossings or water gaps where streambanks are naturally low. Livestock crossings or water gaps must not be located in areas where compaction or other damage can occur to sensitive soils and vegetation (e.g., wetlands) due to congregating livestock.
   iii. To the extent possible, crossings will not be placed in areas where ESA listed species spawn or are suspected of spawning (e.g., pool tailouts where spawning may occur), or within 300-feet upstream of such areas.
iv. Existing access roads and stream crossings will be used whenever possible, unless new construction would result in less habitat disturbance and the old trail or crossing is retired.

v. Access roads or trails will be provided with a vegetative buffer that is adequate to avoid or minimize runoff of sediment and other pollutants to surface waters.

vi. Essential crossings will be designed and constructed or improved to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.

vii. If necessary, the streambank and approach lanes can be stabilized with native vegetation or angular rock to reduce chronic sedimentation. The stream crossing or water gap should be armored with sufficient sized rock (e.g., cobble-size rock) and use angular rock if natural substrate is not of adequate size.

viii. Livestock crossings will not create barriers to the passage of adult and juvenile fish. Whenever a culvert or bridge—including bridges constructed from flatbed railroad cars, boxcars, or truck flatbeds—is used to create the crossing, the structure width will tier to project design criteria listed for Stream Simulation Culvert and Bridge Projects under Fish Passage Restoration (PDC 21).

ix. Stream crossings and water gaps will be designed and constructed to a width of 10 to 15 feet in the upstream-downstream direction to minimize the time livestock will spend in the crossing or riparian area.

x. When using pressure treated lumber for fence posts, complete all cutting/drilling offsite (to the extent possible) so that treated wood chips and debris do not enter water or flood prone areas.

xi. Riparian fencing is not to be used to create livestock handling facilities or riparian pastures.

3. Off-channel Livestock Watering Facilities

i. The development of a spring is not allowed if the spring is occupied by ESA-listed species.

ii. Water withdrawals must not dewater habitats or cause low stream flow conditions that could affect ESA-listed fish. Withdrawals may not exceed 10% of the available flow.

iii. Troughs or tanks fed from a stream or river must have an existing valid water right. Surface water intakes must be screened to meet the most recent version of NMFS fish screen criteria (NMFS 2011e), be self-cleaning, or regularly maintained by removing debris buildup. A responsible party will be designated to conduct regular inspection and as-needed maintenance to ensure pumps and screens are properly functioning.

iv. Place troughs far enough from a stream or surround with a protective surface to prevent mud and sediment delivery to the stream. Avoid steep slopes and areas where compaction or damage could occur to sensitive soils, slopes, or vegetation due to congregating livestock.

v. Ensure that each livestock water development has a float valve or similar device, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion.

vi. Minimize removal of vegetation around springs, wet areas.

vii. When necessary, construct a fence around the spring development to prevent livestock damage.
9. Road and Trail Erosion Control includes hydrologically closing or decommissioning roads and trails, including culvert removal in perennial and intermittent streams; removing, installing or upgrading cross-drainage culverts; upgrading culverts on non-fish-bearing streams; constructing water bars and dips; reshaping road prisms; vegetating fill and cut slopes; removing and stabilizing of sidecast materials; grading or resurfacing roads that have been improved for aquatic restoration with gravel, bark chips, or other permeable materials; contour shaping of the road or trail base; removing road fill to native soils; soil stabilization and tilling compacted surfaces to reestablish native vegetation. Roads closed under Forest Service and BLM/BIA-equivalent Travel and Access Management Plans will be subject to these PDC and may be addressed under this opinion. However, such “plans” for road management will require separate consultations. Such actions will target priority roads that contribute sediment to streams, block fish passage, or disrupt floodplain and riparian functions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

2. Road Decommissioning and Stormproofing
   1. For road decommissioning and hydrologic closure projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the extent possible.
   2. When obliterating or removing road segments adjacent to a stream, use sediment control barriers between the road and stream if space is available.
   3. Dispose of slide and waste material in stable sites out of the flood-prone area. Native material may be used to restore natural or near-natural contours.
   4. Drainage features used for stormproofing and treatment projects should be spaced as to hydrologically disconnect road surface runoff from stream channels. If grading and resurfacing is required, use gravel, bark, or other permeable materials for resurfacing.
   5. Minimize disturbance of existing vegetation in ditches and at stream crossings.
   6. Conduct activities during dry-field conditions (generally May 15 to October 15) when the soil is more resistant to compaction and soil moisture is low.
   7. When removing a culvert from a first or second order, non-fishing bearing stream, project specialists shall determine if culvert removal should include stream isolation and rerouting in project design. Culvert removal on fish bearing streams shall adhere to the measures described in Fish Passage Restoration (PDC 21).
   8. For culvert removal projects, restore natural drainage patterns and channel morphology. Evaluate channel incision risk and construct in-channel grade control structures when necessary.

3. Road Relocation
   1. When a road is decommissioned in a floodplain and future vehicle access through the area is still required, relocate the road as far as practical away from the stream.
   2. The relocation will not increase the drainage network and will be constructed to hydrologically disconnect it from the stream network to the extent practical. New cross drains shall discharge to stable areas where the outflow will quickly infiltrate the soil and not develop a channel to a stream.
   3. This consultation does not cover new road construction (not associated with road relocation) or routine maintenance within riparian areas.

10. Riparian Vegetation Treatment (controlled burning) includes reintroduction of low and moderate-severity fire into riparian areas to help restore plant species composition and structure that would occur under natural fire regimes in dry forest types east of the Cascade mountains and in
southwestern Oregon. Additionally, controlled burns may be implemented in localized lowland areas in western Oregon, i.e., oak woodlands. Conifer thinning may be required to adjust fuel loads for moderate-severity burns to regenerate deciduous trees and shrubs. Equipment would include drip torches and chainsaws, along with fire suppression vehicles and equipment.

1. Low and Moderate Severity Burns

4. Experienced fuels specialists, silviculturists, fisheries biologist, and hydrologists shall be involved in designing prescribed burn treatments.

5. Prescriptions will focus on restoring the plant species composition and structure that would occur under natural fire regimes.

6. Burn plans are required for each action and shall include, but not be limited to the following: a description of existing and desired future fire classifications, existing and target stand structure and species composition (including basis for target conditions); other ecological objectives, type, severity, area, and timing of proposed burn; and measures to prevent destruction of vegetation providing shade and other ecological functions important to fish habitat.

7. Low-severity burns will be used except where the objective is to restore deciduous trees, as describe below under part “v.”, with a goal of creating a mosaic pattern of burned and unburned landscape. Low severity burns are characterized by the following: Low soil heating or light ground char occurs where litter is scorched, charred, or consumed, but the duff is left largely intact. LW accumulation is partially consumed or charred. Mineral soil is not changed. Minimal numbers of trees, typically pole/saplings, will be killed.

8. Moderate-severity burns are permitted only where needed to invigorate decadent aspen stands, willows, and other native deciduous species and may be targeted in no more than 20% of the area within RHCAs or Riparian Reserves/6th field HUC/year. Such burns shall be contained within the observable historical boundaries of the aspen stand, willow site, other deciduous species, and associated meadows; additional area outside of the “historical boundaries” may be added to create controllable burn boundaries. Moderate severity are characterized by the following: Moderate soil heating or moderate ground char occurs where the litter on forest sites is consumed and the duff is deeply charred or consumed, but the underlying mineral soil surface is not visibly altered. Light colored ash is present. LW is mostly consumed, except for logs, which are deeply charred.

9. Fire lines will be limited to five feet in width, constructed with erosion control structures, such as water bars, and restored to pre-project conditions before the winter following the controlled fire. To the extent possible, do not remove vegetation providing stream shade or other ecological functions that are important to streams.

10. Ignition can occur anywhere within the Riparian Reserve and RHCAs area as long as project design criteria are met.

11. Avoid water withdrawals from fish bearing streams whenever possible. Water drafting must take no more than 10% of the stream flow and must not dewater the channel to the point of isolating fish. Pump intakes shall have fish screens consistent with NMFS fish screening criteria (NMFS 2011e).

2. Non-commercial Thinning associated with Moderate-severity Burns

12. Non-commercial tree thinning and slash removal is allowed only as required to adjust fuel loads to implement a moderate-severity burn to promote growth of deciduous trees and shrubs, such as aspen, cottonwood, willow, other deciduous species, and associated meadows.
13. Thinning is allowed only in dry forest types, i.e., east of the Cascade mountains and southwestern Oregon, and in localized lowland areas in western Oregon, i.e., oak woodlands.

14. To protect legacy trees, thinning from below is allowed. If conifers are even-aged pole, sapling, or mid-seral with no legacy trees, thin existing trees to the degree necessary to promote a moderate-severity burn.

15. No slash burning is allowed within 30-feet of any stream. To the extent possible, avoid creating hydrophobic soils when burning slash. Slash piles should be far enough away from the stream channel so any sediment resulting from this action will be unlikely to reach any stream.


17. Only hand equipment—chain saws, axes, Pulaski’s, etc.—may be used for felling.

18. Where livestock or wildlife grazing could be a threat to restoration of aspen, cottonwood, willow, alder, and other deciduous vegetation and an immediate moderate-severity burn would consume large amounts of felled trees, consider delaying the burn and leaving felled trees in place to create grazing barriers to help assure plant growth.

19. If in an existing grazing allotment, projects in this category shall be accompanied by livestock grazing practices that promote the attainment of moderate-severity burn objectives.

Section E—Key BMPs Best Management Practices

Best management practices (BMPs) are the primary mechanism for achievement of water quality standards. This appendix describes key BMPs that have been selected in addition to those listed in Table E-3, Project Implementation Criteria and in PACFISH Standards and Guidelines for implementation with the action alternatives.

BMPs include but are not limited to structural and non-structural controls, operations, and maintenance procedures. BMPs would be applied before, during, or after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving water-bodies.

BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. Blue Mountain Ranger District monitors some applications of BMPs to evaluate implementation and effectiveness and to determine if changes are needed.

The Memorandum of Understanding, between the USDA Forest Service and the Oregon Department of Environmental Quality, To Meet State and Federal Water Quality Rules and Regulations, specifically identifies the implementation of site specific BMPs as one of the Forest Service responsibilities to satisfy State and Federal point and nonpoint source pollution control requirements on National Forest Service lands.

Below are applicable BMPs, listed in the General Water Quality Best Management Practices (USDA Forest Service 1988) document that will be used with the Camp Lick Project, along with information as to who will be responsible for implementing them, when they will be done, and a determination of ability to implement, and effectiveness:
T-1 – Timber Sale Planning Process
Estimates have been made on the potential changes to water quality and instream beneficial uses, and are disclosed in the environmental assessment.

- Responsibility: Project soil scientist and fisheries biologists
- Timing: Prior to activity
- Ability to Implement: High
- Effectiveness: High

T-4 – Use of Sale Area Maps for Designating Water Quality Protection Needs
The sale area map will include locations of streams to be protected and the required harvest method.

- Responsibility: Presale technician
- Timing: Prior to activity
- Ability to Implement: High
- Effectiveness: High

T-7 – Streamside Management Unit Designations
The interdisciplinary team designated PACFISH riparian habitat conservation areas (RHCAs) as streamside management units. RHCAs will prevent potential adverse effects of nearby logging and prescribed burning.

- Responsibility: Presale technician
- Timing: Prior to activity
- Ability to Implement: High
- Effectiveness: High

T-10 – Log Landing Location
Harvest plans will be developed for riparian treatments and will include proposed landing locations. Landing locations and size will be approved in advance by Aquatics Staff.

- Responsibility: Presale technician and sale administrator
- Timing: Prior to and during activity
- Ability to Implement: High
- Effectiveness: High

T-11 – Tractor Skid Trail Location and Design
Harvest plans will be developed for riparian treatments and will include proposed yarding patterns. Skid trails will be approved in advance by Aquatics Staff.

- Responsibility: Presale technician and sale administrator
- Timing: Prior to and during activity
- Ability to Implement: High
- Effectiveness: High

T-13 – Erosion Prevention Measures during Timber Sale Operations
Erosion control work will be kept current.
- Responsibility: Sale administrator
- Timing: During activity
- Ability to Implement: High
- Effectiveness: High

**T-18 – Erosion Control Structure Maintenance**

The purchaser will provide maintenance of soil erosion control structures as required in the timber sale contract.

- Responsibility: Sale administrator
- Timing: During activity
- Ability to Implement: Moderate
- Effectiveness: High

**T-19 – Acceptance of Timber Sale Erosion Control Measures before Sale Closure**

The effectiveness of erosion control measures will be evaluated periodically during the life of the timber sale contract.

- Responsibility: Sale administrator and hydrologist
- Timing: During activity
- Ability to Implement: High
- Effectiveness: High

**R-1 – General Guidelines for the Location and Design of Roads**

Temporary road construction and system road maintenance design creates minimal resource damage.

- Responsibility: Engineering representative and sale administrator
- Timing: Prior to activity
- Ability to Implement: High
- Effectiveness: High

**R-2 – Erosion Control Plan**

Limit erosion and sedimentation through effective planning and contract administration.

- Responsibility: Engineering representative and sale administrator
- Timing: Prior to and during activity
- Ability to Implement: High
- Effectiveness: Moderate

**R-3 – Timing of Construction Activities**

Road construction and temporary road construction will occur during minimal runoff periods to minimize erosion.

- Responsibility: Sale administrator and engineering representative
- Timing: During activity
- Ability to Implement: High
- Effectiveness: Moderate
R-6 and R-7 – Dispersion of Subsurface and Surface Drainage Associated with Roads
Ditch relief and cross drainage design will assure intercepted ground water and surface water is moved from road prism before it develops enough energy to undermine cut slopes or erode fill slopes.

- Responsibility: Sale administrator and engineering representative
- Timing: During activity
- Ability to Implement: High
- Effectiveness: Moderate

R-12 – Control of Construction in Streamside Management Units
No road construction is planned within riparian habitat conservation areas.

- Responsibility: Sale administrator and engineering representative
- Timing: During activity
- Ability to Implement: High
- Effectiveness: High

R-18 – Maintenance of Roads
Ditches and culverts will be kept open and ruts repaired

- Responsibility: Sale administrator and engineering representative
- Timing: During activity
- Ability to Implement: High
- Effectiveness: High

R-19 – Road Surface Treatment to Prevent Loss of Material
Watering and grading will be kept on schedule to assure surface material is not lost.

- Responsibility: Sale administrator and engineering representative
- Timing: During activity
- Ability to Implement: High
- Effectiveness: High

R-21 – Snow Removal Controls to Avoid Resource Damage
Snow removal will assure water can drain from road prism before it develops enough energy to erode road surface or fill slopes.

- Responsibility: Sale administrator, engineering representative, and silvicultural representative
- Timing: During activity
- Ability to Implement: High
- Effectiveness: High

R-22 – Restoration of Borrow Pits and Quarries
Borrow pits will be stabilized such that banks are stable and access road provides necessary drainage.

- Responsibility: Engineering representative or sale administrator
- Timing: During activity
• Ability to Implement: High
• Effectiveness: High

R-23 – Obliteration of Temporary Roads
Temporary roads will be decommissioned as described in the biological assessment. Future use of the road would be eliminated, and hydrological function would be restored using subsoiling and seeding as necessary.

• Responsibility: Sale administrator and engineering representative
• Timing: At the end of activity
• Ability to Implement: High
• Effectiveness: High

F-3 – Protection of Water Quality during Prescribed Fire Operations
The prescribed fire will follow the burn plan. Adjustments will be made during firing operations if objectives are not being met.

• Responsibility: Fire management officer, district ranger
• Timing: Prior to and during activity
• Ability to Implement: High
• Effectiveness: High

W-5 – Cumulative Watershed Effects
The interdisciplinary team analyzed and disclosed in the environmental assessment the effects of the proposed management activities, when added to the existing conditions to ensure cumulative effects do not exceed thresholds of concern or result in adverse (degraded) water quality or channel/fish habitat conditions.

• Responsibility: Project soil scientist and fish biologists
• Timing: Prior to activity
• Ability to Implement: High
• Effectiveness: High

H-1 – Best Management Practices for Protection of Historic Mining Features During Forest Restoration Projects

Project Design Criteria
Site avoidance is the preferred method of protecting the integrity of sites eligible for listing on the National Register of Historic Places (NRHP) and those with undetermined NRHP eligibility. Because of the areal extent of historic mining sites with extensive feature systems they can be difficult to avoid during landscape scale restoration projects. These projects can include pre-commercial and commercial thinning, commercial timber harvest and prescribed burning. Most historic mining features within sites are relatively small with discrete boundaries. These are easily identified on the ground and will be avoided. Some historic mining features are quite extensive and avoidance is impractical if restoration treatments are going to occur. These feature types include ditches, extensive tailings, waste rock dumps, fines flats, placer cuts, wash pits, trails, railroad grades, and roads. These types of features are quite durable and project activities can occur on and around them so long as some basic project design criteria are used to preserve the integrity of features.
The design criteria described below are based on criteria developed for other feature and site types within the State of Oregon. The use of these agreement documents is solely to provide examples, the design criteria may not be implemented until concurred with by the Oregon State Historic Preservation Office in individual Section 106 inventory reports for specific undertakings. The following documents and agreements were consulted:


Implementation of these design criteria will require close coordination between the Heritage program and the Timber and Fuels programs. Any project activities within site boundaries, including avoidance of all features, will require monitoring by the Heritage program. Heritage program personnel managed by the District, Zone or Forest Archaeologist will be designated as inspectors for project work occurring within site boundaries. Designation of skid trails, equipment entrance and egress routes, slash piles, landings, fire line, and temporary roads within site boundaries will be coordinated with Heritage program personnel. Monitoring and inspection of project activities occurring on or adjacent to known archaeological and historic sites will be documented in the Forest Service INFRA database.

Design criteria are described below by feature class. They are presented in order of preference with feature avoidance being the first preference, use of existing areas of disturbance as the second preference, and designation of specific potential impact areas as the third choice. If significant impacts to features cannot be avoided, then a specific mitigation plan will need to be developed in consultation with the Oregon State Historic Preservation Office before the project is implemented.