CHAPTER II ALTERNATIVES CONSIDERED

INTRODUCTION

This section describes the alternatives that were developed by the Interdisciplinary (ID) Team in response to the issues identified. The team followed the alternative analysis procedure found under Section 104 of the Healthy Forest Restoration Act (HFRA). The team identified a reasonable range of alternatives and then evaluated potential environmental impacts of the various proposals (see Chapter III). The proposed action is within the Wildland Urban Interface (WUI) designated by the local fire protection district, and proposes activities to reduce fire hazard in the WUI that are supported by the fire districts. All alternatives are consistent with the Forest Plan as amended, including the Regional Forester's Forest Plan Amendment #2 and the Inland Native Fish Strategy Environmental Assessment (INFISH EA).

Table 1 on page 27 uses the comparison criteria for each purpose and need objective identified in chapter 1 on page 9 to compare alternatives. A detailed discussion of effects by alternative is contained in chapter III and the analysis file. Measures required to mitigate the effects of this project are also presented in this chapter.

Alternatives

1. Alternative A – No Action

The proposed action would not be implemented at this time under this alternative. However, existing previously approved management activities would continue.

Purpose and Need Objective #1 – Reduction of Hazardous Fuels

Since no vegetation manipulation would occur with this alternative, no stands that occur along the urban interface would be treated to reduce the risk of insect, disease, or wildfire. Under the Colville National Forest Land and Resource Management Plan this means that the Forest Service would continue to suppress fires, but would not reintroduce fire as a disturbance agent. There would be no fuels treatment, and no harvesting of trees to reduce crown connectivity. Fire disturbance processes would be kept from affecting the landscape. Stands would continue to increase the fuel loading on the surface. Crown mass may increase over time depending on insect and disease infestations. Ladder fuels would increase over time. Potential for a stand-replacing fire would increase as surface fuels, ladder fuels, and crown mass increase.

Figure 1. Dense understory within the Misery Lake analysis area

Purpose and Need Objective #2 – Forest Health

This alternative would result in no improvement in stand vigor and related forest health or moving the stands toward target condition on Forest Service administered lands. Stagnated stands within the proposed project area left untreated would lack adequate crown and diameter development. Structural development would be delayed due to the suppressed or non-existent understory. Development of desired habitat for big game would be delayed for a long time if the stands are left untreated. No treatment would also delay moving stands toward the historical range of variability[11] especially in stands that would be treated to move towards structural stage 6 or 7. In treatment areas that have the potential to be moved toward structural stage 6 or 7 encroachment of more shade-tolerant species have created a hazard due to the increased fuel loading and ladder fuels. Stands would continue to be a high risk to stand-replacing fires. If a fire was to occur many of the preferred early seral leave trees i.e., western white pine, western larch, and ponderosa pine may be killed by the fire and the site would be delayed in moving towards stage 6 or 7. Natural fires may or may not burn under conditions that would thin out the smaller trees and would have limited control over residual tree spacing and species selection. High intensity fires can reduce soil productivity drastically and cause major changes in the hydrological and erosion processes (Hessburg and others, 1999). Severe fires can also cause stand destruction and create potential brushfields that may last for many years.

> There are **seven structural stages** identified under the Regional Forester's Forest Plan Amendment #2: Revised Standards for Timber Sales on Eastside Forests (Lowe, 1995), also known as the "Eastside Screens". All structural stages are represented in varying proportions in the watershed. Structural stages 1, 2 and 3 are considered an early structural stage of stand development. Structural stages 4 and 5 are considered a middle structural stage. Structural stages 6 and 7 are considered late or old structural stages. Variations in structural stages are a result of fire, insects, diseases, harvest disturbances, weather (precipitation level, wind, etc.), and stand development.

There would be no silvicultural treatments to reduce stocking levels and improve stand vigor, or to plant early serals such as western white pine (WP), western larch (WL), and ponderosa pine (PP). Conversion of stands to shade-tolerant species would continue, increasing the future hazard to insects and diseases. This alternative would not treat stands that occur along the urban interface to reduce the risk of insect, disease, or wildfire. Since no harvesting would take place the economic value of the dead and dying trees would not be recovered. There would be no money generated from timber sales to aid in monitoring, stand improvement, wildlife, fisheries, recreation, and fuel reduction projects. Within the next ten-year period the risk of insect outbreak and the risk of increased levels of disease are moderate to high. In the long-term, the risk of insect outbreak in the next ten to twenty years would be approaching high. Forest health would suffer from no treatment.

Purpose and Need Objective #3 – Winter Range Habitat

Forage plants in plantations and more open forest stands would slowly decline in productivity as growing conifers begin to out-compete with them for sunlight, water, and soil nutrients. Improvement toward the Cover:Forage ratio goal of 50:50 would not occur in designated winter ranges in the project area; winter range areas would accumulate more cover, while forage values would decline.

This trend could be reversed by a large-scale wildfire. Ground and ladder fuels would continue to increase incrementally in forest stands across the project area. The potential for a large, intense wildfire to remove whole stands of conifers would increase over the long run. In the case of such an event, the resultant increase in sunlight on the forest floor would promote the growth of upland shrubs, grasses, and forbs; thereby providing new forage for big-game. However, high-intensity fires have the potential to burn large expanses of forest and result in very large openings. Forest edge associated species such as big-game may under-utilize the interiors of such large openings, owing to the absence of nearby cover.

[11] The historical range of variability was developed by a team of specialists from the Colville and Okanogan National Forests and was based on conditions in the pre-settlement era. The range of variability is the spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors.

Stand-replacement wildfires are the most likely to provide good growing conditions for noxious weeds. With high intensity fires there would be more overhead canopy removed (higher light levels), more duff consumed (exposing soils), and less living vegetation for newly established weeds to compete with for sunlight, water, and soil nutrients. In areas of heavy weed infestation, existing native plants could be replaced, including those palatable to big-game animals. Large infestations could change the way the animals use the landscape by effectively reducing the area of suitable forage habitat.

Description of Proposed Project Design for Alternative B

The following design criteria are accepted practices that have proven effective in mitigating adverse effects of timber harvest and fuels treatment associated activities. These actions would be taken to avoid, minimize, reduce, eliminate, or rectify the effects of management activities (40 CFR 1508.22). Best Management Practices (BMPs) are methods, measures, or practices selected by the ID Team to meet nonpoint-source erosion control needs. Ground-based logging systems may include tractor and/or cut-to-length systems.

Fire/Fuels

1. Develop burn plans so that the mineral soil surface is not oxidized to a reddish color, so that the forest floor litter and duff layer is retained over most of the burn area, and so that small unburned patches are retained. Avoid detrimental soil conditions on areas greater than 100 square feet[12]. Maintain at least 30-45% effective ground cover after prescribed fire (FSM 2521.03). Develop prescriptions to retain a mosaic of soil cover conditions. Applies to all prescribed fires; see appendix A for additional information on where prescribed burning would occur. *(soils)*
2. Unit 1 and stands 3001732, 3002065, 3002119 and 3002120: These soils are sensitive to prescribed fire. Maintain at least 60% effective ground cover after prescribed fire (FSM 2521.03). *(soils)*
3. Unit 54: Leave slash on the ground for one winter prior to prescribed burning.*(soils)*
4. To prevent powerline "flash-over" where activities are adjacent to power transmission lines, design requirements would include road dust abatement and equipment grounding chains. (special uses)
5. Prescribed burning should be conducted in such a way that it does not negatively affect power transmission lines, power poles, towers, or other associated structures. Smoke from fires can cause arcing or flashover of powerlines. Timing of burning or management of fuels immediately adjacent to powerlines should be designed to minimize the potential for flashover. *(special uses)*
6. Holders of authorizations in potentially affected areas should be notified prior to the initiation of burn projects. *(spec. uses)*
7. Design fuel treatment and fire suppression strategies, practices and actions so as not to prevent attainment of Riparian management Objectives and to minimize the disturbance of riparian ground cover and vegetation. *(fisheries)*
8. Allow low severity fire to back into the RHCAs[13] where preparation to keep the fire out of the riparian areas would cause more damage than letting the fire creep into the RHCA. This is to avoid fire lines that run 300 feet parallel to stream channels, using foam near stream channels, and running hose lays. These activities are more harmful than letting the fire die out in the RHCA. *(fisheries)*
9. Prescribed burning would need to be coordinated with the range staff prior to implementation in order to assess potential prescribed fire impacts on grazing management. *(range mgmt.)*
10. Grazing permittees would be notified prior to implementing any prescribed fire within the project area by district fire staff. *(range mgmt.)*

[12] Soils are considered to be detrimentally burned when the mineral soil surface has been significantly changed in color, oxidized to a reddish color, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer.
[13] RHCA = riparian habitat conservation area

Vegetation Management *(silviculture)*

11. Areas of root rot infection would be regenerated to resistant or tolerant species such as ponderosa pine, western larch, and western white pine which are less susceptible to *Armillaria* root rot.
12. Reforest areas receiving regeneration harvest within 5 years after harvest.
13. Slash piles containing high amounts of LP which are at risk to create or continue the spread of bark beetles should be burned as early as possible in fall. Delaying the slash pile burning for firewood cutting may increase the potential for pine engraver and mountain pine beetle buildup. Except for unit 54, firewood cutting from piles should be allowed as soon as possible after the unit is completed. This would reduce the slash available for the beetles to invade.
14. No old-growth stands, structural stage 6 or 7 (late or old) stands are proposed for treatment within the analysis area. If any stands are identified as old-growth, structural stage 6 or 7 during future reconnaissance or unit layout, they would be excluded from the harvest activity.
15. Protect all select trees[14] within the project area. This includes retaining shelter trees[15] around the select tree to reduce the risk of blowdown. Remove or modify both the ground and ladder fuels adjacent to the select tree to insure its survival in the event of a wildfire or during site prep burn activities. Select trees are part of the Forest tree improvement program and are designated for cone and seed collection.

Noxious Weeds

16. Noxious weeds that occur within the project area and on Forest Service routes that access the project area would be treated prior to any harvest or ground disturbing activities.
17. All roads that are proposed to be closed shall be closed as soon as the required project activity, wood gathering, and harvest activity are completed to minimize the probability of noxious weed infestation.
18. Inclusion of Contract provision BT6.35 - Noxious Weed Control, or its equivalent, would be used to require cleaning of all off-road equipment prior to entry onto National Forest System lands.
19. Noxious weed prevention would be conducted as prescribed in the *Colville National Forest Weed Prevention Guidelines* and *Preventing and Managing Invasive Plants* Record of Decision. These documents set forth the practices to be followed to minimize the introduction of noxious weeds and minimize conditions that favor the establishment and spread of noxious weeds.
20. Seeding of grasses or other cover plants is required where soil is disturbed by harvest, hazard fuel reduction, or road activities.
21. All straw or hay used for mulching or watershed restoration activities would be weed-seed-free, as documented by inspection letter from a Washington State Noxious Weed Control Board or by using legally certified weed-free material from states with a certification program.
22. Road segments containing infestations identified for treatment under the Environmental Assessment for Integrated Noxious Weed Treatment, Colville National Forest (USDA, 1998), and proposed for full or partial obliteration in the Misery Lake project would be treated prior to obliteration. Follow-up monitoring and re-treatment of areas behind road closures and/or obliterated roads must be conducted, at a minimum, once a year for the first two years after the treatment or until such time as it can be verified that the weed infestation has been effectively treated.

[14] Select trees are used for the collection of seed to develop genetically improved tree stock, and for general reforestation needs.
[15] Shelter trees provide a microclimate (shade, temperature), as well as being a seed source in a regeneration unit. Shelter trees surrounding a select tree help reduce the risk of blowdown.

23. During road reconstruction, any surfacing material (rock and gravel) would be taken from sources that are known to be free of noxious weeds. Any pits used as rock sources would be treated to eradicate all noxious weeds from the pit area prior to hauling material from the pits.

Threatened, Endangered, and Sensitive Species (TES)

24. TES Species - If a TES species is found in the project area while project activities are occurring, a biologist would be consulted as to measures required to protect the species and its essential habitats.
25. Roadside Hiding Cover - To the extent feasible, enough low vegetation would be retained along open roads adjacent to harvest units to maintain existing line-of-sight distances from the roads into the units. Typically this would entail retaining brush, seedlings, saplings, and pole-sized trees in clumps or linear strips that are at least 20 feet wide. Prescribed fires would not be started within these forested "buffers". If necessary, fuels would be pulled away from the road edge or a fuel break would be cut to minimize the loss of vegetation from the roadside buffer.
26. Large Live Trees – No live trees 21 inches in diameter or larger would be marked for removal, with the exception of those located within new, ground-based or skyline equipment corridors, roads, landings, or rock pits. Old equipment corridors and landings would be re-used to the extent feasible.
27. Dead Wood Habitats –

    a) snags – No snags would be marked for removal within harvest units. Some snags may need to be cut down within new road and equipment corridors, landings, rock pits, and for worker safety. Snags felled for these reasons within harvest units would be subject to the down log requirements described below.

    b) down logs

    lodgepole dominated stands
    - No portion of logs that are 14+ inches in diameter at the large end would be removed.
    - At a minimum, an average of 15-20 down logs that are 8 inches in diameter at the small end and greater than 8 feet long (120-160 feet linear length) would be retained per harvested acre (Lowe, 1995).

    mixed conifer habitat types
    - No portion of logs that are 20+ inches in diameter at the large end would be removed.
    - At a minimum, an average of 15-20 down logs that are 12 inches in diameter at the small end and greater than 6 feet long (100-140 feet linear length) would be retained per harvested acre (Lowe, 1995).

    Pulp material (non-saw logs) could be removed from equipment corridors provided the above down log requirements are met. Any additional removal of down logs to meet fuel concerns would be reviewed on a site-specific basis by the district Wildlife Biologist, Fuels Specialist, and Timber Sale Administrator.
28. Within-stand Diversity
    - When thinning dry forest stand types (ponderosa pine/Douglas-fir), some over-story leave trees would be left in clumps. An average of 2-3 clumps would be retained per harvested acre. A clump would consist of 2-6 ponderosa pine or Douglas-fir trees that have forks below dbh or are closely spaced (2-8 feet apart). This would provide pockets of higher basal area and interlocking tree canopies at the stand level.
    - In shelterwood harvest units that border meadows, clumps of reserved trees would be located on the edges of the meadows to the extent feasible. Shelterwood harvest units on big-game winter range would be laid out so that no point in a unit would lie further than 600 feet from forested cover.

- Where the opportunity exists, 3- 5 acres patches of shade tolerant regeneration/intermediate sized trees would be maintained within harvest units to provide hiding cover for deer. Where pockets of thermal cover at least three acres in size exist within harvest units, they would be excluded from the units.
- No hardwood trees would be marked for removal, with the exception of those located within new equipment or road corridors, landings, or rock pits.
- Hollow trees, broken-topped trees, and trees with broom rusts would be reserved from harvest, to the extent feasible.

29. Habitat Connectivity – Shelterwood harvest would not occur within mapped travel corridors for old-growth associated species. Project activities within mapped travel corridors would maintain;
    - corridor width of 400 feet,
    - medium and large trees,
    - overhead canopy closure within the top third of site potential, and
    - some understory in patches or scattered clumps to assist in supporting stand density and cover (Lowe, 1995).
30. Riparian Habitats – Timber harvest or mechanical fuels reduction units would not be located within areas containing riparian vegetation.
31. Winter Operations – The wintering period for big-game is from December 1 to March 31. If timber harvest occurs during this time, all activities would be confined to units located on one side of the Bonneville Power Administration (BPA) power transmission corridor in a given winter. The other half of the sale area would provide a secure area that ungulates (and wolves) could displace to if they are disturbed by the project. Thus, if winter activities were scheduled to occur west of the BPA corridor in a given winter, no winter activities would occur east of the corridor, and vice-versa. One exception to this would be Unit 44, which would be located east of the BPA corridor but could be logged in the same winter as units west of the corridor.
32. Raptor Nest Protection – During project implementation, the FS would monitor the known goshawk territory in the Upper North Fork of Ruby Creek. If nesting activity is documented or suspected, no project activities would occur within a mapped, 400-acre post-fledging area (PFA) from March 1 to August 15, in order to avoid disturbing the nesting pair and young. If other raptor or great blue heron nests are discovered in the project area, a biologist would be consulted as to measures required to protect the birds and their nest trees/stands.
33. Snags – Following timber harvest, if shelterwood harvest units have less than the prescribed number of snags per acre, the Forest Service would create additional snags by top girdling, inoculation with forest pathogens, or other means. Snag creation within commercial thinning and other partial harvest units is not planned since only a fraction of the green trees would be logged and any existing snags would be much easier to retain.

Sensitive Plants

34. For All Activities:
    - If a sensitive species is found in the project area while project activities are occurring, a botanist would be consulted as to measures required to protect the species and its habitat.
    - Management standards direct the Forest to maintain viable populations of all sensitive plant species known from the Forest. Develop and implement a plan to monitor selected populations of sensitive plants in the analysis area to evaluate the effects of implementation of the project.

35. Commercial Treatments
    - Implement a site-specific "no activity buffer" based on topographic features and Forest Botanist recommendations. In the absence of Forest Botanist recommendations, use the following guidelines:
        - Implement a "no activity buffer" of 250 feet in all directions of the periphery of all sensitive plant populations.
    - Avoid log landings and tree felling in meadows with sensitive plant populations.
36. Noncommercial Treatments
    - Implement a site-specific "no activity buffer" based on topographic features and Forest Botanist recommendations. In the absence of Forest Botanist recommendations, use the following guidelines:
        - Avoid precommercial thinning activities within 150 feet of known sensitive plant populations (units 64 & 68).
37. Road Construction or Reconstruction Activities
    - Locate new roads at least 250 feet from sensitive plant populations.
    - Limit reconstruction of existing roads to the existing template in the vicinity of sensitive plant populations.

Roads

38. When available, use existing roads, unauthorized roads, and landings for temporary roads, skidding and landing. Tractor fire-line and cut-to-length (CTL) trails should be coordinated to minimize the overall impact. *(soils)*
39. Close roads to use when wet and rutting is likely to occur. Consider rocking if road use under wet conditions is required. *(soils)*
40. A six-rail metal livestock gate would be installed on the new road construction that traverses unit 25. The gate would be installed at the location where the road would cross the existing fence in that unit. Installation would occur immediately following road construction. *(range mgmt.)*
41. The specified road that would be constructed off of the Ruby Creek road to access units 6 and 7 would be closed with a gate so that the permittee would have administrative access to manage their livestock. *(range mgmt.)*
42. Logging slash would be dispersed on either side of any new road crossings of streams within active livestock allotments to limit access and damage to riparian and instream habitat from potential over utilization by cattle. *(fisheries)*
43. Avoid sediment delivery to streams from the road surface. On new roads and reconstructed roads outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is infeasible or unsafe. Route road drainage away from potentially unstable stream channels, fills, and hillslopes. *(fisheries)*
44. Avoiding side-casting of soils or snow during plowing or reconstruction on road segments within or abutting Riparian Habitat Conservation Areas. *(fisheries)*
45. Post-Project Road Management *(TES)*
    - Dependent on the amount of wood available in logging slash piles, selected closed roads could be opened to the public for firewood gathering over one season. The FS would sign these roads as open for woodcutting up to a specified closure date.

- The FS would write closure orders prohibiting all motorized travel on new road segments, with the exception of administrative uses including US Air Force Survival School operations. Following all post-project work, the FS would effectively close selected roads (both new and existing roads) throughout the project area using some combination of ripping, slash piling, installing berms/boulders/plantings on the road entrances, etc.
- If an existing gate is being driven around by off-highway vehicles, the gate would be moved to a more effective location. An example of an effective gate location is directly in front of a bridge spanning a deeply incised draw.
- The FS would monitor the effectiveness of road closures each year for five years following the timber sale. If a given closure is not 100% effective at prohibiting unauthorized, motorized travel on the road, the FS would implement actions necessary to improve the closure.

Fisheries

46. Protection of wetlands, springs and seeps: Timber harvest and ground-based activities would not occur in wetlands, springs, seeps, and streams using INFISH riparian guidelines. Streams were identified within or adjacent to units 3-6, 9, 12-18, 21-23, 33-35, 37, 39, 44-46, 48-50, 52, 55-59, and 62-68. Wetlands, springs and seeps were identified in units 3, 6, 8, 9, 11, 12, 16, 29, 20, 27, 38, 39, 40, 41, 42, 49, 54, 53, 58, 59, 62 and stand 3002065 (fuel treatment unit). It is likely additional areas would be found during project layout.

47. Road Decommissioning - All riparian roads and road segments with unstable slopes proposed for closure should be drained, ripped, and seeded if they are currently accessible with machinery. All culverts, within these road sections, should be removed and channels restored if accessible with machinery. Proper sediment catchment materials such as, but not limited to, straw bales and silt fence shall be constructed and maintained during the duration of the activity. The Colville National Forest Guide to Seeding and Planting Vegetation would be used for all site restoration activities on disturbed soils.

Water and Soil

Best Management Practices

Best Management Practices (BMPs) are the primary mechanism to enable the achievement of water quality standards.

The following Best Management Practices have been selected and designed to meet water quality standards for the Misery Lake Environmental Assessment. The full text of these project-specific BMPs is located in appendix E of the EA.

PT-1	Timber Sale Planning Process
PT-2	Timber Harvest Unit Design. See INFISH S & G TM-1
PT-3	Use of Erosion Potential Assessment for Timber Harvest Unit Design
PT-4	Use of Sale Area Maps for Designating Water Quality Protection Needs
PT-5	Limiting the Operating Period of Timber Sale Activities
PT-6	Protection of Unstable Lands (applies to all units, including mechanical fuel treatments)
PT-7	Streamside Management Unit Designation
PT-8	Streamcourse Protection (Implementation and Enforcement)
PT-9	Determining Tractor-Loggable Ground
PT-10	Log Landing Location
PT-11	Tractor Skid Trail Location and Design
PT-12	Suspended Log Yarding in Timber Harvesting (Applies to all skyline units)

PT-13	Erosion Prevention and Control Measures During Timber Sale Operations (Applies to all units, including mechanical fuel treatment units)
PT-14	Revegetation of Areas Disturbed by Harvest Activities (Applies to all units, including prescribed fire and mechanical fuel treatment units)
PT-15	Log Landing Erosion Prevention and Control
PT-16	Erosion Control on Skid Trails (Applies to all units, including prescribed fire and mechanical fuel treatment units)
PT-17	Meadow Protection During Timber Harvesting
PT-18	Erosion Control Structure Maintenance
PT-19	Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
PT-20	Reforestation
PT-21	Servicing and Refueling of Equipment
PT-22	Modification of the Timber Sale Contract (TSC)
PR-1	General Guidelines for the Location and Design of Roads
PR-2	Erosion Control Plan Submittal, Approval, and Application
PR-3	Timing of Construction Activities
PR-4	Location, Design, and Construction of Stable Road Cut and Fill Slopes
PR-5	Road Slope and Waste Area Stabilization (Preventive)
PR-6	Dispersion of Subsurface Drainage Associated with Roads
PR-7	Control of Surface Roadway Drainage
PR-8	Constraints Related to Pioneer Road Construction
PR-9	Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects
PR-10	Construction of Stable Embankments (Fills)
PR-11	Control of Sidecast Material
PR-12	Control of Construction in Riparian Habitat Conservation Areas (RHCAs)
PR-13	Diversion of Flows Around Construction Sites
PR-14	Bridge and Culvert Installation and Protection of Fisheries
PR-15	Disposal of Right-of-Way and Roadside Debris
PR-16	Specifying Riprap Composition
PR-17	Water Source Development to Protect Water Quality
PR-18	Maintenance of Roads
PR-19	Road Surface Treatment to Prevent Loss of Materials
PR-20	Traffic Control During Wet Periods
PR-21	Snow Removal Controls to Avoid Resource Damage
PR-22	Restoration of Borrow Pits and Quarries
PR-23	Obliteration of Temporary Roads and Landings
PF-1	Fire and Fuel Management Activities
PF-2	Consideration of Water Quality in Formulating Prescribed Fire Prescriptions
PF-3	Protection of Water Quality During Prescribed Fire Operations
PF-4	Minimizing Watershed Damage from Fire Suppression Efforts

PF-5	Repair or Stabilization of Fire Suppression Related Watershed Damage
PRM-1	Range Analysis, Allotment Management Plan, Grazing Permit System, and Permittee Operating Plan
PRM-2	Controlling Livestock Numbers and Season of Use
PRM-3	Controlling Livestock Distribution within Allotments
PRM-4	Rangeland Improvements
PW-1	Watershed Restoration
PW-3	Protection of Wetlands
PW-4	Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control & Countermeasure (SPCC) Plan
PW-7	Water Quality Monitoring
PVM-1	Slope Limitations for Tractor Operation
PVM-2	Tractor Operation Excluded from Wetlands and Meadows
PVM-3	Revegetation of Surface Disturbed Areas
PVM-4	Soil Moisture Limitations for Tractor Operation

Soils

48. Revegetate all disturbed areas regardless of the cause. These disturbed areas may be caused by road construction or reconstruction, the development or use of landings, commercial timber harvest, piling, masticating, or prescribed fire. It is especially important to treat strips of bare ground that are perpendicular to the slope. See appendix A for additional information on where activities are proposed. (*soils, noxious weeds*)

49. For CTL units, forwarder trails should be about 40 feet apart and, at least in part, effectively buffered by available slash, snow, or frozen ground conditions. Available slash would be placed on ground ahead of the timber-felling machine to minimize compaction; and the same trail would be used by the forwarder. Generally, the slash needs to be about 10 inches deep prior to compaction by the equipment to provide sufficient compaction buffering.

50. CTL equipment shall not be operated when ground conditions are such that excessive damage would result. The kinds and intensity of control work done by Purchaser shall be adjusted to ground and weather conditions. For post-sale activities, heavy equipment would be similarly limited to acceptable soil conditions.

51. Harvest activities may be timed to occur during snow periods and/or frozen ground to minimize compaction. Depending on the firmness of the snow, the amount and quality of slash, and the frozen ground conditions, the snowpack may range from as little as 2-4 inches of compacted snow over frozen ground, or may require as much as 8 to 10 inches of compacted snow when the ground is not frozen and insufficient slash is available. Snow over frozen soil is the most effective. Frozen ground means ground remains hard and frozen after the equipment has passed, and does not break-up. All units harvested with a CTL system must use something to buffer the trails and reduce compaction. This buffering may be done with slash, snow, frozen ground, or a combination.

52. Mechanized equipment – including felling equipment, piling equipment, masticators – would generally not be allowed to operate off of designated skid trails unless specifically approved by the timber sale administrator (TSA) or contracting officer's representative (COR). Under dry soil conditions, the Forest Service may approve a single pass by felling, piling, or masticating equipment. If the purchaser or contractor requests to use ground-based equipment in skyline or helicopter units, the request would be reviewed and considered on a case-by-case basis. That would allow the Forest Service to consider all the pertinent conditions at the time of the request – soil moisture content, rock content, the exact equipment

proposed, volume to be removed, slash available, and other mitigating circumstances such as snow or frozen conditions.

53. Mechanized fuel treatment (grapple piling or mastication) is proposed in areas that would be yarded with skyline and helicopters. This equipment would be limited in a manner similar to other equipment (see #54 below). Single pass, some slash on trail, 40-foot spacing, dry conditions. Limit the number of go-back trails.

54. Minimize compaction in areas that have higher levels of existing detrimental soil conditions, applies to:

    - Unit 3 – Log in the wintertime over snow/frozen conditions to minimize additional compaction; masticate fuels under dry or snow/frozen conditions.
    - Units 44 and 45 – Logging season is not restricted. Masticate fuels. Rip trails to a depth of about 12-15 inches with a winged ripper, rip FR 2700006 and landings to a depth of about 18-24 inches.

    Slope limitations and erosion control: Equipment that compacts and bares the ground (e.g., tractor logging; tractor fuel breaks) would be limited to slopes less than 35%. Short pitches may be steeper. Avoid long steep trails. Design the tractor fuel breaks to facilitate drainage (not long, straight trails) and install cross-drain structures (e.g., waterbars) to dewater.

    Units 3, 30, 31, 43, and stands 3003019 and 3003039 have high erosion potential. Equipment that compacts and bares the ground would be limited to slopes less than 30%.

    Equipment that leaves effective ground cover (e.g., CTL, masticators) would be limited to slopes less than 40%. Short pitches may be steeper, such as the access from the road. Retain at least 80% effective ground cover on the steeper pitches. (BMP PT-9, PVM-1) CTL trails, where the slash mat has failed, may require some structural drainage (e.g., waterbars) to dewater the trail.

55. Equipment shall not be operated when ground conditions are such that excessive damage would result. The kinds and intensity of control work done by Purchaser shall be adjusted to ground and weather conditions and the need for controlling runoff. Erosion control work shall be kept current immediately preceding expected seasonal periods of precipitation or runoff. (BMP PT-13)

56. Retain fine organic material and soil cover through machine piling. Any contract used for machine piling slash would require slash to be retained on the trails.

57. If skyline corridors become deeply entrenched, install waterbars to dewater the corridor. (BMP PT-16)

58. Appropriate suspension of logs would be required in the timber sale contract for cable, skyline, and helicopter units to keep the forest floor intact. One-end suspension may not be feasible in the vicinity of rock outcrops and "knobs". (BMP PT-12)

59. To the extent possible, and consistent with the project's purpose and need, leave on site the tops and branches of the timber removed. Some material may need to be removed or masticated to reduce fire risk.

60. Units 21, 22, 27 and 3003019 are near potentially unstable terrain. During layout these units were designed to avoid the unstable areas as described in the soil report. In addition avoid any activities that would concentrate water onto these potentially unstable sites (e.g., landing design).

61. In areas that have recognized OHV use, design and implement the ground-based yarding system so that it is unattractive to OHV riders. Trails covered with slash are not as attractive to OHV riders. Applies to all ground based units, but may be especially important in units near the county road, near the powerline, and in the general vicinity of Squirrel Meadow and McElroy Meadow. See appendix A for a list of units where ground based logging would occur.

Scenery Management

62. Cable logging system: keep cabled corridors as narrow as possible to reduce contrasting line effects; oriented away from viewing locations (Washington State Hwy. 20 , State Hwy. 31 and LeClerc Creek Road [County Route 9325]) when possible. Where skyline corridors are necessary, they would run to a series of small landings rather than in a fan shape to one large landing. Designated skid trails would be kept to the minimum number and width needed to accomplish the harvest operations. This applies to units 21, 22 and road access to units 56 and 57.
63. Created opening: use irregular shaped openings (no straight lines or corners—line, form) with grouped leave tree islands to reduce visual contrasts; and limiting the size of created openings (soil color contrasts). Skid trails or roads would be designed to keep the linear openings perpendicular to the normal line of sight.
64. Mimicking natural density changes around created openings, and retaining the natural variances within the stand rather than "evening out" the spacing of trees, would help to reduce the obvious character changes occurring in the overall landscape.
65. Canopy texture: prescriptions should call for the retention of the highest number of trees per acre appropriate for a thinning, thus maintaining enough forest canopy to meet the middleground Partial Retention Visual Quality Objectives (VQO) (leave trees may be grouped or clumped). This applies to all units with a prescription of thinning or thinning/shelterwood.
66. Where pockets of hardwoods greater than ¼ acre in size exist, maintain the hardwoods for diversity of pattern and color.
67. Road Construction: preserve the existing vegetation below constructed system and temporary roads as much as possible for screening.
68. There are several proposed pit developments in the analysis area, and all fall within Management Area 6. All locations have the potential to be seen briefly in middleground and foreground from State Highway 20, with a greater potential of being seen in middleground from County Route 9325 (LeClerc Road) (Concern Level One and Two viewing locations). To meet the Partial Retention Visual Quality Objective for the area, any development would be topographically and/or vegetatively screened from the Concern Level One and Two viewing locations.
69. Visual objectives specific to unit 22, within the immediate foreground zone (0-300 feet) of State Highway 20:
    - Obvious stumps would be recut to be flat and flush with ground level in order to reduce the evidence of logging activity,
    - Logging slash would be lopped and scattered. Larger pieces of logging slash would be placed parallel to the road so the cut face of the log is not facing the road,
    - The prescription should call for the retention of the highest number of trees per acre appropriate for a thinning within 300 feet of Highway 20,
    - Following completion of harvest activities, flagging ribbon and boundary or other tags would be removed where visible from the road. Ribbon and tags would be removed by District recreation personnel.

Recreation

70. Slash should be lopped and scattered within viewing distance of dispersed campsites.
71. Upon completion of activities, any dispersed campsite that was used for treatment activities must be returned to its pre-project condition.
72. The site located in the southwest ¼, section 15, T. 30 N., R. 45 E. (immediately south of unit 44) is an established dispersed camping area with a user-installed toilet and camping area, and it is adjacent to

user-created OHV trails. This site would be protected during operations. A buffer of trees (approximately 200' wide no-cut strip around the campsite, plus an adjacent 100' wide thinning strip within this unit) would be left around the dispersed site.

73. There would be no treatments conducted during high-use holiday weekends (Fourth of July, and Labor Day weekends).
74. No hauling would occur during weekends.
75. Natural barriers would be left along roads and trails in shelterwood treatment areas to prevent OHV access. Slash and other operation-created debris may also be used to discourage OHV use of skidder or forwarder trails.
76. Project-created hazards adjacent to dispersed sites (i.e., partially burnt snags) shall be mitigated as soon as practical. The district recreation staff would review the dispersed sites following harvest and fuel treatment operations to determine hazard treatment needs. The recreation staff would also implement hazard removal procedures.
77. During project activities, no new dispersed recreation opportunities would be created within RHCAs. This includes activities such as creating spots for camping or parking in RHCAs. (*fisheries*)

Range Management

78. Existing, known range improvement projects would be protected from damage which may result from harvest and burning activities. Known range improvement projects are located in the following units; 25, 27, 44, 50, 53, 58 and 65. Should these range improvement projects become damaged as a result of the proposed activities, contract provisions would provide for their repair.
79. All rangeland improvement projects, such as developed springs, water troughs, and fences not previously identified by the NEPA inventory and analysis, would be delineated on timber sale maps and protected during harvest and burning activities. Should range improvement projects become damaged as a result of the proposed activities, contract provisions would provide for their repair.
80. If natural barriers to livestock are breached by the proposed activities, fencing would need to be constructed to limit livestock dispersal. There is a potential need for approximately 1.5 miles of fencing along units 15, 16, 17, 18, 21 and 24 and approximately 0.5 miles of fencing in or adjacent to units 53 and 58. The Rangeland Management Specialist would be responsible for conducting follow-up visits to areas listed above to determine the need for barriers. These visits would be conducted for the first and second years following treatment. Where barriers are installed, the rangeland management specialist is responsible for checking the improvement within one year after its completion to ensure the effectiveness of the barrier as outlined in the Colville National Forest's Environmental Management System.
81. A stock driveway would be constructed in the southern end of unit 44 to allow livestock to be trailed from the creek crossing near the southeast corner of unit 44 southeast to the corral in the powerline right-of-way.
82. Disturbed soil in areas that have the potential to lead cattle out of the allotment would be seeded with non-palatable species. Specific units include; 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 53, 58 and 65.

Heritage Resources

83. Historic properties must be avoided during implementation of project activities.
84. When falling trees near historic resources that could potentially damage the site, the trees need to be felled away from the historic site. Yarding and/or skidding must also avoid sites.

85. The Forest Archaeologist or qualified Heritage Program personnel would identify sites on the ground and would coordinate with appropriate project personnel to provide location information to road, presale, and fuels treatment crews.

Special Uses

86. Authorized improvements, such as the Bonneville Power Administration and Public Utility District No. 1 powerlines, would be protected:
    - For units located immediately adjacent to powerline corridors, trees should be directionally felled away from the lines.

Special design criteria for Air Force Survival School

87. Protect USAF road improvements needed to meet USAF access needs on the 27000002, 27000423, and 2700004 roads, including any improvements they have made to the Ruby Creek road (rock, culverts, ditches, drivable drains, etc.).
88. Timber sale administration staff would notify Air Force Liaison Officer when planning to start winter operations to coordinate with Survival School activities.
89. Coordinate all helicopter logging and burning with the 36th RQF before operations occur.
90. The Survival School would be permitted access behind newly installed gates on the existing roads in the training area. The gated roads would require a Survival School lock.
91. All burning activities, such as fire traffic on the roads, smoke affecting the AF helicopters and areas closed only to fire personnel, must be closely coordinated with the Survival School within the occupied training area, with enough lead-time to allow survival training to be adjusted if need be (more than one month).
92. Protect the no hunting signs or replace them if destroyed.
93. The Survival School would coordinate with the Forest Service for removal of hazard trees in winter camp areas, which may result after prescribed burning from 0 – 15 years after the burning takes place.
94. Roadwork in the training area needs to be coordinated on existing open roads during the time when the USAF is occupying the training area.

2. Alternative B (Proposed Action)

This alternative emphasizes Reduction of Hazardous Fuels, Forest Health, and Improvement to Winter Range Habitat. Both commercial (timber sales) and noncommercial (including mechanical treatments and prescribed fire) activities are proposed. Approximately 4.8 miles of specified road construction, 0.5 miles of temporary road construction, and approximately 20.8 miles of road reconstruction are proposed with this alternative. A portion of forest road 2700005 (0.94 miles) is proposed for obliteration due to its close proximity to Ruby Creek. This section of the road would be relocated and the new section would become the 2700107 road. Approximately 8 miles of Forest Service roads were determined to be no longer needed for long-term management. Those roads are planned to be decommissioned, or removed from the Forest transportation system, by either physical closure or obliteration. All new roads would be closed after the project is completed, per Forest Plan direction, with the exception of the 2700107 (which relocates part of an existing, open road). Completion of all road-related project activities would result in a net decrease of 3.2 miles of road from the Forest Service transportation system.

Additional new gravel sources are desirable in this analysis area to minimize rock haul costs. Commercial sources are available in the Ione and Newport area, but it is generally more economical to develop new sources or utilize existing sources on National Forest System land due to the shorter haul distance on agency land as compared to that of commercial sources. New rock sources within the analysis area could be further developed to provide material for road construction, reconstruction, or maintenance. These rock sources

could also provide rock material needed by the US Air Force for road maintenance within their permit area. Potential new sources of aggregate and rip rap located in this analysis area are:

SW ¼ SE ¼ Sec. 3 T35NR43E (Road 3100501) – long-term development could be up to 3 acres in size;

NW ¼ SW ¼ Sec. 3 T35NR43E (Road 3100510) – long-term development could be up to 5 acres in size;

SW ¼ NW ¼ Sec.3 T35NR43E (Road 3100510) – long-term development could be up to 5 acres in size;

SW ¼ NE ¼ Sec. 3 T35NR43E (Road 3100500) – about 50 cubic yards of rip rap material is available along the existing road (no long-term development is expected)

Other rock material sources for the analysis area may be developed out of the Gardiner Pit and Ruby Quarry sites. Refer to maps in appendix B for proposed treatment locations.

Purpose and Need Objective #1 – Reduction of Hazardous Fuels

This alternative would help reverse the vegetative trend predisposing the Misery Lake analysis area to larger, more severe wildfires than what historically occurred. Prescribed fire and mechanical fuel treatment would reduce the continuity of fuels and reduce fuel loads, which in turn would reduce the possibility of a large stand-replacing fire as well as reducing the chance of fires damaging private property. Alternative B would treat approximately 6,624 acres with prescribed fire and mechanical fuel treatments. Table A-1 in appendix A shows the method of fuel treatment recommended for each unit or stand in this alternative.

Mechanical Fuel Treatments may include machine or grapple piling, noncommercial tree felling, and hand piling. Mechanical fuel treatments may also prepare the stands for future underburning, or where prescribed fire will likely result in losses to the residual overstory.

Purpose and Need Objective #2 – Forest Health

Alternative B would commercially treat approximately 2,815 acres that were identified for treatment due to forest health concerns. Noncommercial treatments would include precommercial thinning western white pine pruning on approximately 427 acres and tree planting of approximately 643 acres with early seral species such as western white pine, western larch, and ponderosa pine.

Figure 2. Decadent lodgepole pine stand

Overall, 3,242 of 9,873 acres in the analysis area would receive some type of silvicultural treatment to improve stocking levels, stand vigor, and move the stands toward target condition and towards the historical range of variability of structural stages. High-density stands would be treated to reduce the future hazard of insect and disease outbreaks. Treatments would not occur in actual riparian vegetation but would occur in the upland portion adjacent to the riparian. Thinning from below within small areas of the RHCAs would increase diameters of leave trees to provide shade and future large woody debris and reduce the short-lived LP component. Other areas would be treated to encourage development of existing advanced regeneration such as Engelmann

spruce, redcedar, and hemlock. Table A-1 in appendix A shows the silvicultural treatment recommended for each unit in this alternative.

Purposed and Need Objective #3 – Winter Range Habitat

Timber harvest, mechanical fuels treatments, and low-intensity, prescribed fires proposed with this alternative would reduce ground fuels and continuous fuel ladders. Future wildfires that occur in treated stands should burn cooler and would be less likely to ascend into the crowns of over-story trees. Thus, the risk of a hot crown fire removing forest cover over large areas would be reduced in the project area. Where low-intensity, prescribed fire is employed, decadent vegetation on upland shrubs and grasses would be removed. A "pulse" of nutrients would be released into the soil. Forage plants for big-game should respond to these burns with robust basal sprouting and an increase in palatability for several years following treatment.

Regeneration harvest (i.e. shelterwood) would convert hiding cover to open forage habitat for 15 or more years. Existing browse and green forage plants in these units should become markedly more palatable and productive; particularly where post-harvest underburning occurs. Regeneration harvest would create additional forest edge habitat. Alternative B would move the cover/forage ratio on deer winter range closer to the desired 50:50. Hiding cover blocks of three or more acres would be retained within the larger created openings to ensure that the distance to cover does not exceed 600 feet.

Where intermediate harvest prescriptions (commercial thinning, selection) are used, hiding cover would be locally degraded for five years or more, and essentially removed for at least that long within new skid trails. Based on intermediate harvests completed elsewhere on the ranger districts, there should be enough understory vegetation retained to provide hiding cover at the stand level.

Thinning and selection harvests would target suppressed, intermediate, and co-dominant trees and retain the most vigorous and full crowned trees (including all large trees). There would be less inter-tree competition for light, water, and soil nutrients in the residual stand. Over time, these treatments should promote the rapid development of larger, full crowned trees sooner than had no treatment occurred. High quality thermal cover could be developed in these stands over the long run.

Totals for Alternative B:

Commercial Treatments:

Prescription	Acres
Commercial thin	711
Commercial thin/shelterwood	1726
Selection harvest	222
Selection harvest/shelterwood	88
Shelterwood	68
Total	2815

Post Sale Treatments:

Commercial Trts	Acres	Noncommercial Trts	Acres
Plant	643	Precommercial thin	204
Underburn	1390	Whitepine prune/pct	223
Mechanical Fuels	1425	Underburn	2990
Fire/Fuels	100	Fire/Fuels	292

Request for an Alternative from the Public

The District received one request from The Lands Council to consider developing and analyzing a non-commercial logging alternative. Logging systems and harvest methods were discussed during collaboration with interested individuals and groups and resolved into one proposed action (alternative B). Per direction under the Healthy Forest Restoration Act, development of alternative B through collaboration with the public addressed the concerns expressed by The Lands Council, and no additional alternatives were required.

The District did not receive any other requests from members of the public for additional alternatives.

Table 1. Comparison of Purpose and Need Objectives by Alternative

Purpose and Need Objective #	Measurement	A No Action	B
1	Acres Treated within Analysis Area (fuel reduction)	0	6624
2	Acres Treated (forest health)	0	2815
3	% Overhead Cover[16]	4	4
3	% Hiding Cover	72	59
3	% Increase in Acres with Improved Forage Quality & Quantity[17]	0	37

Table 2. Issue Comparison by Alternative

Issue	Measurement	A No Action	B
Protection of Soil Resource	Change In Detrimental Soil Condition[18]	0	
	a. Acres of new landings	0	20
	b. Acres of new road (permanent & temporary)	0	30
	c. Acres of ground-based logging	0	2,366
	d. Acres of ground-based logging followed by mechanical fuel treatment or fire/fuels treatment	0	1,467
	e. Acres of skyline/helicopter logging with mechanical fuel treatment	0	124
Potential To Spread Noxious Weed Populations	Acres of Disturbed Soil Created by Management Activities	0	375
New Specified Road Construction	Net Change in National Forest System Roads (miles)	0	-3.2
Regeneration Harvest	Acres Of Regeneration Harvest	0	643

[16] Treatments would occur in areas currently having marginal or non-existent cover and would improve cover in the long-term.
[17] See discussion of big-game in chapter 3 (pg. 45).
[18] New landing and new road construction are considered the primary impact on soil productivity due to compaction. Ground-based operations use heavy equipment which has the potential to compact/displace the soil, and bare the soil making it susceptible to surface erosion. Impacts from the heavy equipment can be minimized through project design and are considered shorter-term impacts than landing or road construction.

Table 3. Acres of Proposed Treatments by Alternative

Proposed Treatments	Alt. A	Alt. B
Estimated Acres of Harvest		
Commercial thin	0	711
Commercial thin/shelterwood	0	1726
Selection harvest	0	222
Selection harvest/shelterwood	0	88
Shelterwood	0	68
Total Acres of Harvest	**0**	**2815**
Estimated Volume (Ccf)	0	50,000
Estimated Acres of Fuel Treatments		
Fuels/Fire	0	392
Mechanical Fuel	0	1425
Precommercial thin/WP prune	0	223
Precommercial thin	0	204
Underburn	0	4380
Total Acres of Fuels Treatments within Project Area	**0**	**6624**

MONITORING PLAN

The monitoring activities described below would be undertaken in addition to the monitoring needs identified in the Forest Plan (Forest Plan, Chapter 5).

1. General Monitoring Responsibilities

   The District Ranger has the primary responsibility for implementation of the monitoring plan. The District Silviculturist would be responsible for ensuring that harvest prescriptions are designed in compliance with the project design criteria and Forest Plan direction. The District Wildlife Biologist would ensure that the necessary monitoring for winter range, snag retention levels, old-growth dependent wildlife species, and fish habitat are accomplished. The Forest Fisheries Biologist and District Silviculturist share the responsibility to ensure that the riparian resource and water quality protection measures are correctly prescribed and placed in the timber sale contract. The District Presale Forester is responsible for insuring compliance with listed requirements during field and office sale preparation activities. The Timber Sale Officer is then responsible for implementation of these measures.

2. Specific Monitoring Responsibilities

   Monitoring of project implementation would be the responsibility of Forest and District staff as follows:

Activity	Responsible Position
Preparation of commercial timber sale	PF, S, WB, T, FB, HR, RS, NW
Implementation of commercial timber sale(s)	SA, ER, S, WB, NW
Post-sale activities	S, WB, F, NW, RS, Rec
Fire/fuels treatments	F, S, WB, HR, RS, Rec, NW, FB

WB	Wildlife Biologist	RS	Range Specialist
PF	Presale Forester or Forestry Technician	S	Silviculturist
		SA	Sale Administrator
T	Transportation Planner	ER	Engineer Representative
F	Fuels Specialist	Rec	Recreation Specialist
HR	Heritage Resource Tech.	NW	Noxious Weed Coordinator
H	Hydrologist	FB	Fish Biologist

The position listed first generally has primary responsibility.

POSSIBLE SALE AREA IMPROVEMENT PROJECTS

The following listed activities were identified by the various resource specialists as Sale Area Improvements that could be funded under the Knutsen-Vandenberg Act, within a stewardship contract, or through a service contract. Listing such activities in this Environmental Assessment is required in order for funding generated by the sale of timber under this EA to be used for the listed Sale Area Improvement Activities.

Activities that are included in the selected action (including mitigation measures) for this environmental assessment (Misery Lake Timber and Fuels Management Projects) may be implemented with timber sale-generated or other funds without further NEPA analysis; however, activities not listed within this EA must be the subject of separate NEPA analysis before they may proceed. It should be noted that "separate NEPA analysis" may include NEPA analysis that has already been completed.

No KV projects would take place under the No Action alternative (alternative A).

KV collections are proposed under alternative B to cover:

Vegetation Management

a. Costs involved in regenerating harvest areas. Activities include site preparation for natural and artificial regeneration, planting, and the stocking and establishment surveys.
b. Maintenance of select trees including cone surveys, cone collections, and seed extraction to maintain future seed sources that are locally adapted to the site.
c. Western white pine pruning to reduce the risk of infection by white pine blister rust.
d. Precommercial thinning of timber stands to improve growth, increase resistance to insects and disease, and encourage the species composition needed to meet the desired future condition for the area.
e. Costs involved in planting in underburn areas that historically were open park-like stands of PP, WL and DF and do not have an adequate seed source to regenerate them as a result of past harvests and the fires in the 1930s.

Wildlife

f. Aspen Maintenance/Protection – Small (noncommercial) conifers could be cut down within selected aspen stands to forestall the aspen trees from being shaded out over time. Selected aspen stands on the edges of meadows could be fenced to limit livestock browsing of young sprouts.
g. Forage Seeding - Shelterwood harvest units that are under-burned could be seeded with the Colville National Forest's preferred seed mixes to supplement green forage for wintering big-game.
h. Meadow Maintenance – Small (noncommercial) conifers could be cut down where they are encroaching into McElroy and Squirrel Meadows, in order to keep these sites in an open, productive condition for big-game. Meadows could be burned to remove encroaching conifers and grass thatch, and to rejuvenate grasses.

i. Orchard Maintenance – Apple trees in an old homestead orchard located on the east edge of McElroy Meadows could be maintained (pruned) to benefit bears and other wildlife.

j. Riparian Protection/Enhancement – Stream segments exhibiting over-utilization by livestock could be protected with riparian exclosures. Riparian vegetation could be supplemented with plantings grown from local seed sources, or with cuttings from local stock.

k. Noxious weeds – Following the project, old homestead meadows and other natural openings in the project area could be monitored for new infestations. These could be sprayed with herbicides or hand-pulled.

l. Precommercial thinning - Small (noncommercial) conifers could be selectively thinned in harvest units (ex.; the unit located west of McElroy Meadows) in order to promote the development of future big-game cover.

Range Management

m. Reconstruct the corral in the powerline right-of-way near the southwest corner of unit 44.

n. Construct approximately 2 miles of fencing where natural barriers to livestock movement may be compromised.

o. Modify the fenced exclosure on Ruby Creek within the powerline right-of-way to reduce its length so that it only protects the rehabilitated slide area. As part of this project, a hardened crossing would be installed at the historic livestock crossing that is west of the bridge to protect the stream and stream banks.

p. Based on a post-harvest assessment by the range staff, there may be a potential need for an additional 3 miles of fencing to manage livestock in the Ruby Creek allotment if natural barriers to livestock movement are removed by harvest activities.

Fisheries

q. Replace 2 existing culverts blocking upstream fish passage on the North Fork Ruby Creek drainage within the analysis area with passable structures. These culverts are located where County Road 2489 and FS Road 2700421 cross the creek.

r. Construct a fence to protect an overgrazed riparian and stream habitat in McElroy Meadows.

s. Plant conifers within the RHCAs, between units #44 and 45 and Ruby Creek, to increase sources of future large instream wood and overhead shading. Present riparian conditions indicate a scarcity of trees in the over-story.

t. Restore unnamed perennial stream into its original channel where it presently flows down a segment of FS Rd 3100433 during the decommissioning of said road.

u. Restore streambanks where culverts are to be removed during the decommissioning of FS roads 3100433, 3100430 and 3100445.