United States Department of Agriculture

Forest Service
Pacific Northwest Region

ENVIRONMENTAL ASSESSMENT

BOLOGNA BASIN SALVAGE

February 2004

- **CHAPTER II – ALTERNATIVES**

Umatilla National Forest
Heppner Ranger District

Grant County, Oregon

Lead Agency: **USDA Forest Service**

Responsible Official: **Andrei Rykoff, District Ranger**
Heppner Ranger District
P.O. Box 7
Heppner, OR 97836
(541) 676-9187
http://www.fs.fed.us/r6/uma/heppner/index.htm

For Information Contact: **Bart Lander, Planner**
North Fork John Day Ranger District
P.O. Box 158
Ukiah, OR 97801

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CHAPTER II - ALTERNATIVES

This chapter describes and compares the alternatives considered for the Bologna Basin Salvage project, and provides a basis for choice among options by the decision-maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social, and economic effects of implementing each alternative.

ALTERNATIVE DEVELOPMENT

The interdisciplinary team used the purpose and need statement, together with information from field reconnaissance, to develop the *Proposed Action* (Alternative 2). The decision-maker directed the interdisciplinary team to avoid salvage or thinning within Riparian Habitat Conservation Areas and Old Forest (as defined in the Region 6 Interim Old Growth Guidelines (USDA Forest Service 1993), or in the Interim Ecosystem Standard of the Eastside Screens). This direction was intended to avoid effects in the most sensitive areas and to make analysis more efficient so as much economic value of the dead trees would be retained as possible if harvest is chosen. There are no inventoried roadless areas or lynx habitat in the project area. Stands in which more than half of the trees were estimated to have 50 percent or less defoliation were considered for commercial thinning. Stands where more than half of the trees were estimated to have greater than 50 percent defoliation were considered for salvage. Units were located and activities were designed to avoid changes in water quality or measurable effects on federally listed fish and wildlife species.

Alternative 1, *No Action*, was defined as no change from current management. In other words, the stands would not be salvaged or thinned, but other activities not associated with the proposed action (such as road maintenance, grazing, etc.) would continue.

The key issues then served as a basis for development of one other alternative to the Proposed Action, while tracking issues were addressed either by avoiding connected actions or by mitigating their effects. Alternative 3 addressed water quality concerns by not harvesting Unit 13 in order to avoid the use of a forwarder trail that would lie partially within a Riparian Habitat Conservation Area. This alternative also constrains the yarding system to the use of full tree suspension[1] on all units. This logging system would reduce the potential for soil disturbance or compaction.

[1] Full tree suspension: Harvester/forwarder or other low-impact logging system that would result in effects similar to that experienced under a harvester/forwarder system. This system limbs the trees, leaving logging slash in the stand. The harvester drives over the slash – resulting in less soil compaction – and carries the logs to the landing, rather than dragging them – resulting in less soil disturbance.

Both of the action alternatives are consistent with Forest Plan direction and Forest Service Policy, and meet State and Federal laws and regulations.

ALTERNATIVES DROPPED FROM CONSIDERATION

REDUCTION OF MAXIMUM HARVESTABLE TREE SIZE

One alternative suggested during the scoping period would place either a maximum size limit of 12 inches or 16 inches diameter breast height on harvested trees. This would preserve habitat for neotropical migratory birds while allowing some harvest. The size restriction was based upon snag requirements for neotropical migratory birds and smaller woodpeckers. These alternatives were dropped from further consideration because:

- The District's proposed action would already leave three snags per acre in salvage and commercial thin units to address this concern. In salvage units, the proposed action would also leave 16 green replacement trees per acre as required by the Forest Plan, as amended.
- Neither of these alternatives (the 12-inch nor 16-inch maximum diameter) would reduce stand density and fuel loads enough to satisfy the purpose and need. Multiple silvicultural objectives would be either compromised or nullified entirely by leaving stocking levels in trees over 16 inches in diameter. The primary vegetation objective of this project is to adjust composition, structure, and density in such a way as to move them back to within their historical ranges of variability. This objective is based on the assumption that vegetation issues such as high levels of crown-fire susceptibility, insect risk, and other indicators of deteriorating ecosystem integrity cannot be addressed without treating overly dense forests containing low-vigor trees.
- Implementing a 16-inch diameter limitation would render the thinning treatments ineffective (with respect to meeting the desired condition objectives) because residual (post-treatment) stand density levels would remain above critical thresholds for wildfire and insect susceptibility (this means that implementing the thinning treatments would not accomplish the intended objective), or that residual stand density levels would be under the thresholds but close enough to shorten treatment longevity (thereby requiring a follow-up treatment in the near future).
- There are 16 units for which commercial thinning was the recommended treatment. Of those units, 14 have an overstory size class code that is at least 16 inches in diameter at present (this does not mean that all trees exceed 16 inches; it just means that the average or mean diameter for the overstory layer is at least 16 inches). This means that the thinning would adjust little or none of the overstory stocking, and all of the treatment objective would need to be accomplished in the understory layers only.

Three of those units do not have an understory, so the 16-inch limitation would render a commercial thinning as nonviable for those three units.

- Of the 13 commercial thin units with an understory, all of them have a size class code of 6.5 or greater, which refers to a diameter range of 9 to 16 inches. Therefore, all of the commercial thinning units have a preponderance of trees, and basal area, that are predominantly 9 inches in diameter and larger and a preponderance of basal area in trees 9 inches and greater. Since the vegetation database indicates that a relatively minor proportion of the basal area is present in trees under 9 inches in diameter, it would be difficult or impossible to meet the treatment objective (reduce tree stocking to sustainable levels) without removing some proportion of the large-tree component.
- Stand exams are available for some of the treatment units (five of the salvage units and five of the commercial thinning units). Stand exams for the commercial thinning units were reviewed and it was found that the basal-area stocking objective (residual stocking of 50 square feet per acre of basal area on dry sites where ponderosa pine is the featured species) could not be met at least 60 percent of the time if the basal area associated with all trees 16 inches and over were retained.

NON-HARVEST RESTORATION ACTIVITIES

Another alternative that was suggested during scoping was to identify wildlife enhancement and ecosystem restoration activities without using harvest or commercial tree thinning. This alternative was dropped from further consideration because:

- The interdisciplinary team considered other wildlife enhancement projects. However, designing the project specifically to enhance wildlife habitat in the short term would not fulfill the purpose and need of the project. The proposed action is intended to prevent wildfire from degrading wildlife habitat in the short term, and to enhance wildlife habitat in the long term by promoting healthier stands.
- The interdisciplinary team considered non-harvest restoration activities focusing on just the purposes of reducing the amount of standing fuel, reducing the probability of the spread of secondary insects, and reducing tree stocking and restoring forest species compositions in live stands. Prescribed fire was the only activity that could potentially address these purposes, but in an area such as Bologna Basin, with its heavy fuel loadings and dense canopy closure, using prescribed fire without prior mechanical entry would not meet the desired objectives in an orderly or timely fashion. In addition, using prescribed fire in an area with significant canopy mortality from insect infestation would induce an active crown fire[2]

[2] Active crown fire: A fire in which a solid flame develops in the crowns, and the surface and crown phases advance as a linked unit dependent on each other. This is opposed to passive crown fires in which trees torch as individuals, reinforcing the spread rate, but are not basically

under the right conditions. Under the present conditions, young dead defoliated trees would serve to act as ladder fuels allowing fire to transition from the ground to tree canopies where it would have the opportunity to become a passive or active crown fire and create control problems from high flame lengths, intensities, and spotting.

To meet management objectives, using only prescribed fire would reduce stand densities by inducing mortality in understory trees. Standing dead trees would remain and create new down and woody fuels loads in matter of a few years. Using only fire to meet management objectives would require several fire entries to reduce fuel loadings and manipulate vegetation growth to encourage the desired forest condition and species composition.

NO HARVEST IN C3 – BIG GAME WINTER RANGE

The interdisciplinary team considered an alternative that avoided treatments within the C3 – Big Game Winter Range area to avoid reducing habitat quality for elk in this area. However, out of the total 1,003 acres proposed for treatment, 689 acres are designated C3. This alternative was dropped from further consideration because (1) the salvage portion of the proposed action would occur in the C3 management area, and (2) removing this much land from the proposed treatment would not achieve the purpose and need on the majority of the land area that needs treatment.

HARVEST IN WINTER TO PROTECT SOILS

The interdisciplinary team considered harvest only in winter when the ground is frozen to protect soils and provide for maximum flexibility for implementation. However, this alternative was dropped because:

- Much of the treatment area is in C3 – Big Game Winter Range, and Forest Plan standards restrict management activities during the big game winter use period (December 1 to March 30 or April 15).
- Much of the treatment area is below the Forest Plan standard for the habitat effectiveness index, a measure of habitat quality for elk, and winter harvest would put additional disturbance on elk.

INCREASE HABITAT EFFECTIVENESS INDEX

Holding other factors constant, reducing open road density in winter will increase the habitat effectiveness index in a given area. Currently, there are 47.3 miles of road open within the Monument Winter Range during the winter use period. This results in an open road density of 0.5 miles per square mile in the winter range. The habitat effectiveness index is currently at 67 and is expected to remain at 67

different from surface fires; and independent crown fires in which fire advances in the crowns alone (Van Wagner 1977).

after the proposed action is implemented.

A sensitivity analysis was done to estimate how many miles of road would have to be closed in the winter to raise the post-project habitat effectiveness index to the Forest Plan standard. Raising the habitat effectiveness index value to 70 would eliminate the need for a Forest Plan amendment, allowing the proposed action to occur. For the existing condition, the analysis found that 23.7 miles (50 percent) of roads open in the winter, would have to be closed to result in a habitat effectiveness index of 70[3]. Next, the habitat effectiveness index was calculated, combining the effects of the closing of these 23.7 miles of road and the conditions expected after the proposed action. This analysis found that the habitat effectiveness index would still only attain a value of 70.

The sensitivity analysis was taken further by estimating the habitat effectiveness index with all roads in the Monument Winter Range closed during the winter use period. Closing all roads resulted in a habitat effectiveness index of 73, both prior to implementation of the proposed action and after implementing the proposed projects.

The sensitivity analysis showed that road density alone is not the major factor contributing to the substandard habitat effectiveness index for the Monument Winter Range. As demonstrated previously, closing all roads in the Winter Range would increase the habitat effectiveness index by 6 points, whether the proposed action was implemented or not. Other factors contributing to the substandard habitat effectiveness index are (1) the size and distribution of cover-forage across the winter range and (2) the amount of low quality cover.

Creating addition patches of forage, within cover patches, scattered across the winter range, would increase the size and distribution of cover-forage and therefore increase the habitat effectiveness index value in the Monument winter range. However, this would require additional acres to be harvested, to increase the amount of shrubs, grasses and forbs available for forage. In addition, forage patches would need to be distributed over a larger area to effectively improve the habitat effectiveness index value.

The amount of quality cover generally relates to the limited amount of satisfactory cover and the large amount of marginal cover. In general, there is twice as much marginal cover in the Monument Winter Range than there is satisfactory cover. This condition is inherent to dry, lower elevation, south-facing slopes, and overall low site productivity, in the John Day River watershed. Essentially, the capability of the site to develop and sustain a high level of cover quality is questionable because of the dry site characteristics in the Monument winter range.

Although closing 50 percent of the open roads during the winter use period would allow the proposed action to occur without a Forest Plan amendment, this alternative was eliminated because it would require the Forest Service to close more roads than identified in the District Assess and Travel Management plan and further reduce administrative and public access to the 59,800 acres of Forest

[3] This would result in a winter open road density of 0.26 miles per square mile.

Service land in the Monument Winter Range.

ALTERNATIVES STUDIED IN DETAIL

ALTERNATIVE 1: *NO ACTION*

OBJECTIVES

- To allow natural recovery, with the associated risks and benefits.
- To provide a baseline for comparison with other alternatives.

DESCRIPTION

The District has received comments in response to this and past projects in this area requesting that nature be allowed to "take its course." This alternative would allow the stands identified as needing treatment at this time to progress through natural successional processes at their own rate. Current biological and ecosystem processes would continue as they are in the present condition. Current management direction and existing activities such as grazing, fire protection, and road maintenance would continue (Figure 5).

ALTERNATIVE 2: *PROPOSED ACTION*

OBJECTIVES

- Capture the maximum possible salvage value of dead and dying timber in stands severely defoliated as a result of the 2001 tussock moth outbreak, subject to environmental constraints.
- Reduce the probability of the spread of bark beetles and woodboring insects.
- Convert dry-forest stands to a species composition and structure compatible with the historical range of variability to improve future health and fire resistance of treated stands.
- Address the issue of protecting adjacent private property

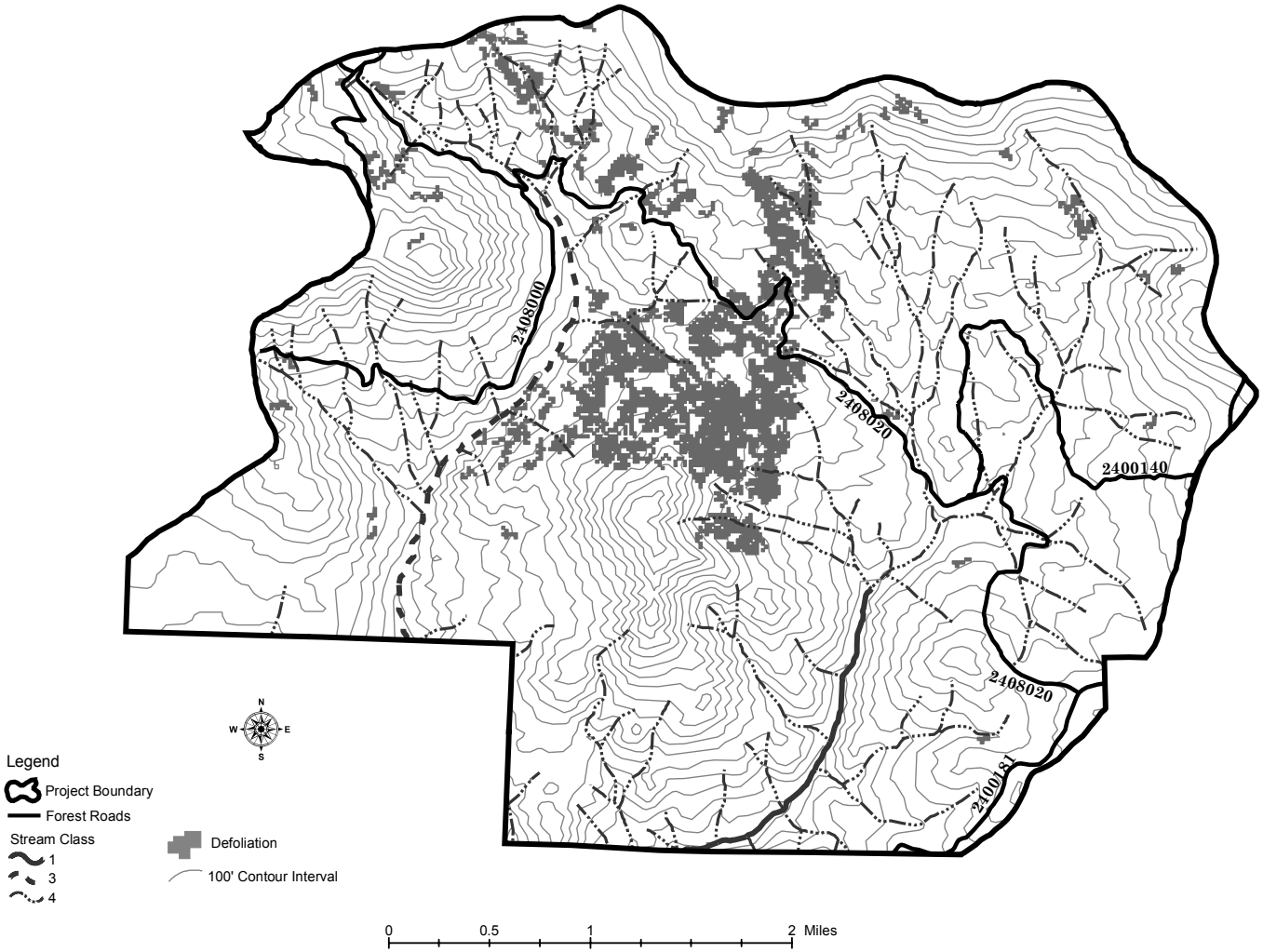

Figure 5. Alternative 1

DESCRIPTION

The proposed action would use a combination of harvest, thinning, juniper removal, and planting on 1,003 acres to move stand densities and species compositions closer to the historical range of variability for the Bologna Basin area. All these activities are discussed below in more detail under their associated subheadings. Tables 5 and 6 show how these activities are linked. Figure 6 shows a map illustrating their location within Bologna Basin.

Table 5. Alternative 2 Proposed Salvage

					Post-Harvest Treatments			
Unit	Area (Acres)	Forest Plan Mgt. Area	Est. Volume (CCF)[1]	Harvest System	Burn	Non-commercial thin	Remove Juniper	Plant
6	13	E1	200.0	Whole tree	X			
13	8	E1	311.5	Full tree suspension	X		X	X
14	6	C3	103.8	Whole tree		X	X	
15	12	E1	80.8	Full tree suspension		X	X	
16	52	C3	900.0	Whole tree	X			X
17	34	C3	588.5	Whole tree	X			
18	47	C3	542.3	Whole tree	X			
19	28	C3	484.6	Whole tree	X			X
20	47	C3	813.5	Full tree suspension	X			X
21	78	C3	900.0	Whole tree		X	X	
22	12	C3	207.7	Whole tree	X			X
23	8	C3	138.5	Whole tree	X			X
28	15	C3	230.8	Whole tree		X	X	
29	24	C3	276.9	Whole tree		X	X	
30	24 25	C3 E1	553.8	Whole tree		X	X	
33	95	C3	1644.2	Full tree suspension		X	X	X
Total	**528**		**7819.2**					

[1] CCF = 100 cubic feet.

SALVAGE TIMBER HARVEST

Salvage timber harvest would occur on approximately 528 acres. During salvage harvest, many of the dead trees would be removed except for those retained as snags. In addition, some of the live trees within salvage units would be removed to attain the recommended stocking levels. Stocking would be maintained in compliance with the Forest's marking guide to maintain target basal areas. In both salvage and commercial thinning units, the healthiest and most vigorous trees would be left standing. Ground-based logging systems would be used throughout all units. No equipment would operate in areas where the average

slope is greater than 35 percent. Where soils pose a concern based on field observations, only a system similar to a harvester/forwarder system would be used. Whole tree yarding[4] would be allowed where soil conditions do not pose a concern.

Access to harvest units would be provided using the existing road system and temporary roads. All roads used would need minor repairs such as surface leveling and improvement of waterbars to make them suitable for hauling. Approximately 0.9 miles of temporary roads would need to be built to access units 16, 21, 24, 26, and the northern portion of Unit 33.

After the temporary roads have served the project's purpose, the timber sale contractor would eliminate ditches, outslope the roadbed, remove ruts and berms, effectively block the road to normal vehicular traffic where feasible under existing terrain conditions, and build cross ditches and water bars, as staked or otherwise marked on the ground by the Forest Service.

Approximately 9.9 miles of closed roads would have to be temporarily opened for the project. Of the 9.9 miles of closed road to be used, 1.2 miles currently exist within Riparian Habitat Conservation Areas (Figure 7). These closed roads include the following Forest Service roads:

- 2400145
- 2407030
- 2407031
- 2407032
- 2407041
- 2407045
- 2408022
- 2408024
- 2408026
- 2408030
- 2408031
- 2408034
- 2408050
- 2408051
- 2408060

Access improvements on these roads would require removal of entrance treatments, which include guardrails and earth berms, removal of some trees that have re-grown in the roads, leveling the roads with a blade, and installation of water bars. No culverts would be installed or bridges constructed. After the completion of the project, the roads would be waterbarred as necessary and closed to vehicular traffic, as required by the timber sale contract.

In the salvage units, three snags would be left per acre along with a minimum of 16 green replacement trees.

COMMERCIAL THINNING

Commmercial thinning would occur on 475 acres that contain stands in which enough live trees still remain that stocking is outside of the historical range of variability. Thinning would reduce tree densities in each unit to the recommended stocking levels for the site-specific plant association(s) as

[4] Whole tree yarding: A harvesting system in which trees are cut and dragged to the landing. The tree is limbed at the landing and logging slash is either hand piled or mechanically piled for later disposal. A harvester/skidder system is an example of a whole tree yarding system.

specified in Powell (1999)[5]. Access to harvest units was described in detail in the *Salvage Timber Harvest* section (page 30).

Table 6. Alternative 2 Proposed Commercial Thinning

Unit	Area (Acres)	Forest Plan Mgt. Area	Est. Volume (CCF)	Harvest System	Post-Harvest Treatments: Burn	Non-commercial thin	Remove Juniper	Plant
1	19	E1	127.9	Full tree suspension	X			
2	6	E1	40.4	Full tree suspension	X			
3	75	E1	504.8	Full tree suspension		X	X	
4	<1 36	C3 E1	242.3	Full tree suspension		X	X	
5	11	E1	74.0	Full tree suspension		X	X	
7	14 45	C3 E1	397.1	Full tree suspension		X	X	
8	38	C3	255.8	Full tree suspension	X			
11	73	C3	842.3	Full tree suspension	X			
12	36	C3	242.3	Full tree suspension	X			
24	15	C3	173.1	Whole tree		X	X	
25	15	C3	173.1	Whole tree	X			
26	9	C3	60.6	Whole tree		X	X	
27	4	C3	26.9	Whole tree	X			
31	8 <1	C3 E1	53.8	Whole tree	X		X	
32	64	E1	430.8	Full tree suspension		X	X	
34	7	C3	47.1	Whole tree		X	X	
Total	**475**		**3692.3**					

[5] The predominant plant association in the project area is Douglas-fir/snowberry (PSME/SYAL). Other plant associations in the project area are grand fir/elk sedge (ABGR/CAGE), Douglas-fir/mountain mahogany/elk sedge (PSME/CELE/CAGE), and Douglas-fir/oceanspray (PSME/HODI). In the Douglas-fir series, target basal areas are 60 to 80 square feet per acre. In the grand fir series, target basal areas are 80 to 90 square feet per acre. In the ponderosa pine series, target basal areas are 40 to 60 square feet per acre.

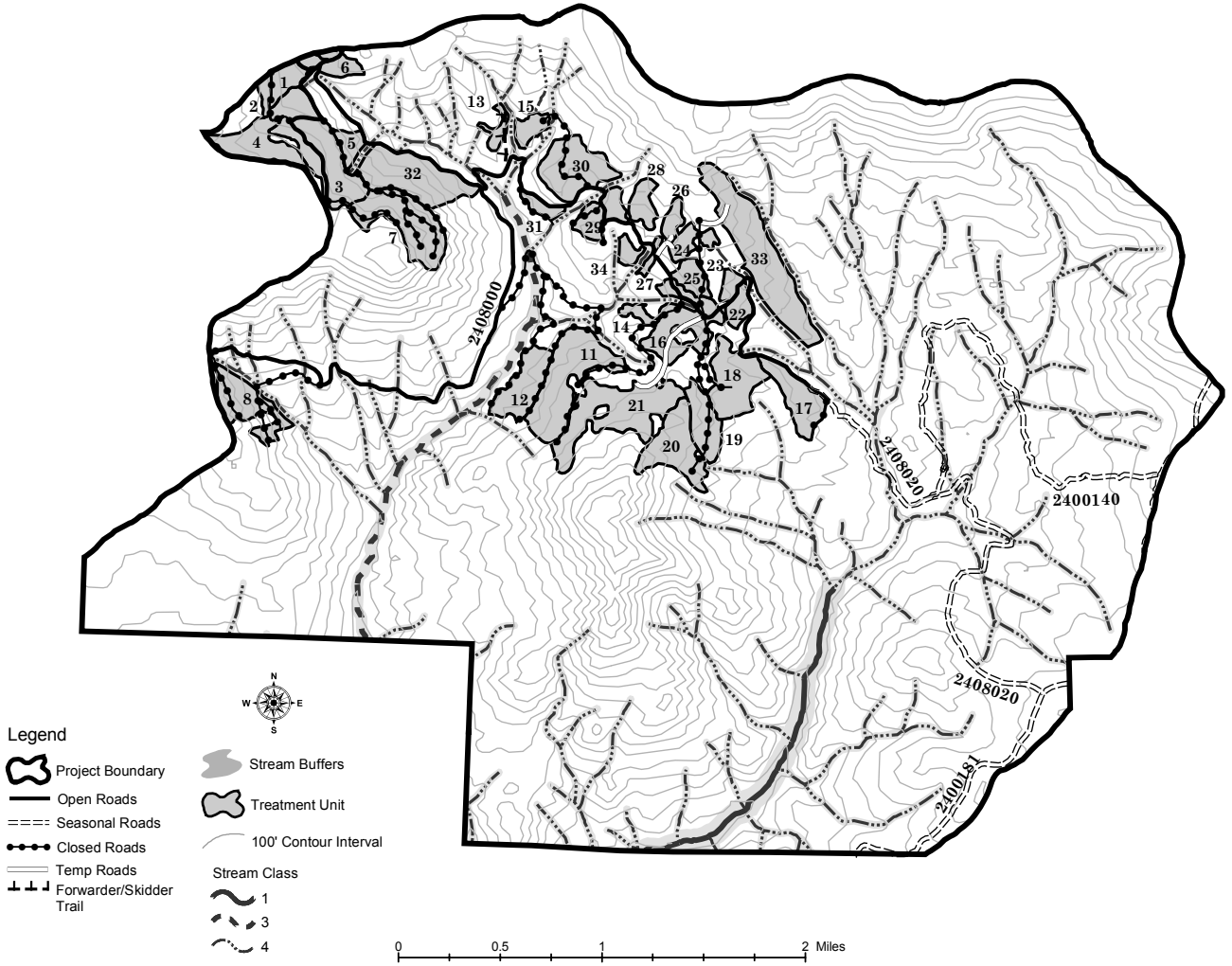

Figure 6. Alternative 2 Treatment Units

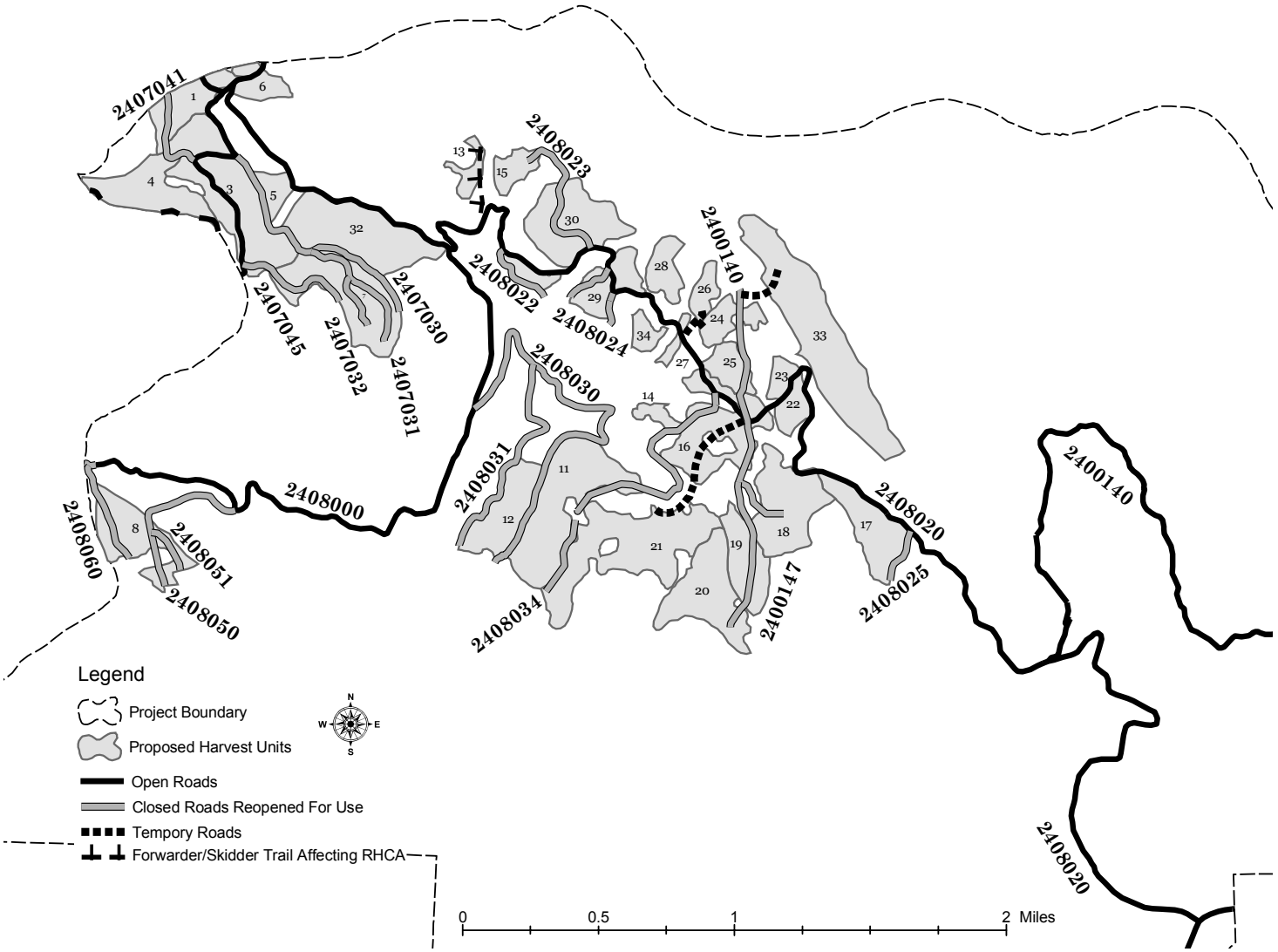

Figure 7. Proposed Road Use for Bologna Basin Salvage Alternative

Silvicultural prescriptions would favor retention of early-seral species such as ponderosa pine and western larch, along with healthy Douglas-fir. These trees are most resistant to fire, drought stress, and insect attack. Diseased, suppressed, or deformed trees would be preferentially removed in order to improve forest health. No live trees[6] 21 inches diameter at breast height or greater would be removed, consistent with Forest Plan Amendment #11 "Eastside Ecosystem Screens." Riparian Habitat Conservation Areas would be delineated on the ground where they are adjacent to units and no thinning would occur within their boundary (consistent with Forest Plan Amendment #10 "PACFISH").

Snags and down wood would be retained at levels specified by the Forest Plan and the Umatilla National Forest's Interim Snag Guidelines (USDA Forest Service 1993). Where down wood levels are deficient, additional down logs would be left after harvest.

NON-COMMERCIAL THINNING

Non-commercial thinning would occur on approximately 555 acres. Saplings, generally up to 7 inches in diameter at breast height, would be thinned to promote tree vigor, improve insect and disease resistance, and restore or maintain a sustainable species composition. Non-commercial thinning would occur within the proposed commercial thin and salvage units identified in Table 5 and Table 6.

Debris created by non-commercial thinning would remain on the ground unless the resulting fuel load is excessive (greater than 9 tons per acre). Debris that exceeds this limit would be grapple piled[7] and burned when weather permits.

JUNIPER REDUCTION

Juniper reduction would occur on approximately 571 acres. This area overlaps the 555 acres of non-commercial thinning, plus an additional 16 acres in harvest units 13 and 31. Many of the juniper trees between 18 inches in height and 16 inches diameter (taken at breast height) would be cut to (1) promote vigor of the remaining live trees, (2) increase water availability for other trees and plants, (3) increase forage for big game and domestic livestock, (4) decrease fire hazard by reducing ladder fuels within the project area boundary, and (5) reduce juniper abundance to a level that is more consistent with what would have been produced by the historical fire regime (frequent, low-intensity fire).

No cutting within juniper rangeland ecosystems is proposed. However, cutting of juniper is proposed within plant associations where juniper would typically not occur in significant numbers (and it currently is). Cut trees would be left in place so associated nutrients will remain, and resulting debris would be treated as

[6] Any tree with any green needles is considered a live tree.

[7] Grapple piling: A process for the removal of harvest debris in which a track-mounted mechanism grabs and lifts harvest debris and moves it into piles.

discussed under non-commercial thinning. Juniper on rocky outcroppings or in areas where other trees do not exist or will not grow would be retained.

FUELS TREATMENTS

Following salvage and thinning activities, 448 acres of the highest fuel concentrations would be prescribe burned. This burning would reduce debris created by harvest activities to a Forest Plan standard of 9 tons per acre in the 0- to 3-inch size class and reduce average residue depth to the Forest Plan standard depth of 6 inches. This treatment would also prepare the units proposed for planting. Of this area, 199 acres would be underburned, and 249 acres would be pile burned. Burning would be done over a 3- to 5-year period.

In units allowing whole tree yarding, skid trails may require additional mechanical treatment to form debris into piles for burning. Landings (where limbs and tops are removed from the logs and logs are stacked for transport) would have debris concentrated into large piles, which would be treated later. Debris in units designated for full tree suspension yarding would be left in a more uniform arrangement (because limbs and tops are removed where the tree is cut). These fuels would dry at a faster rate and be available for burning throughout the year. Non-commercial thinning and juniper removal would result in debris piled at a rate of 3.5 piles per acre and burned at a later date.

All treated units scheduled to be prescribed burned would be prepared to prevent fire from escaping the burn area. Preparation measures may include the construction of fire-line and hazardous tree removal. In many cases, existing roads, trails, and other natural barriers would provide the necessary protection. Where natural barriers do not exist, fire control lines would be constructed. Control lines would be constructed by hand in areas where machine use is not appropriate (e.g. steep slopes). Hand-constructed line would clear fuels from a 3- to 8-foot wide area, exposing 1 to 2 feet of mineral soil. In other areas, control line would be constructed by machine, using bulldozers or tractors to create a 10-foot wide fuel clearing with 3 feet of mineral soil exposed. In areas with heavy woody fuel concentrations, equipment and/or personnel would be used to break up and disperse fuel concentrations. These concentrations of woody debris would be scattered to reduce fire intensities and flame lengths during burning activities. This would allow for better fire control during prescribed burning in these areas.

Additional chainsaw work may be required for hazardous tree removal. During prescribed fire treatments, water would be made available for any needed fire suppression. Availability of water may be accomplished with the use of water backpack pumps or from all terrain vehicles patrolling during prescribed burning. Control lines would also be patrolled to scout for spot fires or any unforeseen hazards.

Once prescribed burning activities are complete, constructed fire lines would be rehabilitated to reduce erosion and promote natural recovery. Rehabilitation may consist of waterbaring, scattering woody debris across constructed lines, seeding

and mulching. Waterbar construction would reduce the potential of soil displacement and sediment transport. Seeding and mulching would take place on mechanically constructed lines to reduce erosion potential and compaction.

TREE PLANTING

Tree planting would occur on approximately 190 acres[8]. Tree planting is designed to restore tree cover in openings where post-harvest stocking would not meet Forest Plan requirements. Planting would also reestablish an ecologically appropriate mix of 80 percent early-seral (Ponderosa pine) and 20 percent late-seral (Douglas-fir) species on the dry-forest sites proposed for harvest. Coniferous tree seedlings would be planted in designated areas and, in the case of salvage units, planting would occur within 5 years of timber harvest (as required by the National Forest Management Act). Animal damage control would occur concurrently with tree planting in areas where it is needed (Vexar® tubing of seedlings to control browse and gopher trapping).

FOREST PLAN AMENDMENT

This alternative would also require the Forest Supervisor to amend the Umatilla National Forest Land and Resource Management Plan with a Forest Plan Amendment to reduce the Forest Plan's habitat effectiveness index standard for this project from 70 to 67. The standard reads:

> *"Elk habitat will be managed on designated big game winter ranges to achieve a habitat effectiveness index of no less than 70, including discounts for open roads to motorized vehicular traffic, as described in Wildlife Habitats in Managed Forests (Thomas and others 1979). The habitat effectiveness standard will be measured on an individual winter range basis"* (Forest Plan page 4-152).

The method prescribed for the calculation of Habitat Effectiveness Indices is described in Appendix C of the Forest Plan. The habitat effectiveness index for a given area depends upon three habitat characteristics (1) percent of potential elk use in response to cover for the land type, (2) road density, and (3) the quality of cover, defined as either satisfactory and marginal cover. The habitat effectiveness index is based upon quantitative analysis of each of these three components.

The habitat effectiveness analysis for this project showed that the proposed project would not change the habitat effectiveness index within the affected winter range. The existing habitat effectiveness index is 67, and would remain at 67, below the Forest Plan standard of 70, after the project. However, analysis showed that the proposed project would affect the quality of cover, changing some of the satisfactory cover to marginal cover. This represents a decrease in habitat quality. Because the proposed change reduces the quality component of

[8] Although the total area of units proposed for planting is 249 acres, planting would occur on only 190 acres designated within those units.

the habitat effectiveness index, the proposed project is not in conformance with Forest Plan Standards and Guidelines. In order to proceed with the proposed project, the Forest Supervisor proposes to amend the Forest Plan following procedures described in Forest Service Handbook 1909.12, Chapter 5, Forest Plan Implementation and Amendment Process.

The reduction of this standard would apply only to the Monument winter range and the site-specific project called Bologna Basin Salvage.

ALTERNATIVE 3

OBJECTIVES

- Recover some value from dead and dying timber in stands severely defoliated as a result of the 2001 tussock moth outbreak.
- Reduce the probability of the spread of bark beetles and woodboring insects.
- Convert dry-forest stands to a species composition and structure compatible with the historical range of variability to improve future health and fire resistance of treated stands.
- Protect water quality and fish habitat (Key Issue 2) primarily through the use of best management practices and other mitigation measures.
- Minimize sediment production (Key Issue 2) by not using a forwarder trail in a Riparian Habitat Conservation Area.
- Minimize soil disturbance (Key Issue 1) by requiring full suspension yarding on all units.

DESCRIPTION

Alternative 3 includes all of the activities stated in Alternative 2, however some activities were changed or dropped to reduce the chance of sediment reaching streams. These changes are discussed below in more detail under the associated activity subheadings. Table 7 and Table 8 show how activities are linked. Figure 8 shows a map illustrating their location within Bologna Basin.

SALVAGE TIMBER HARVEST

No forwarder trails would be allowed within Riparian Habitat Conservation Areas. As a result, Unit 13 would be dropped. Access and minor road repairs would occur exactly as specified in Alternative 2. Approximately 520 acres of salvage timber harvest would occur.

A yarding system that fully suspends de-limbed logs on the way to the road (instead of dragging the entire cut tree) would be required on all harvest units to reduce effects on soils and potential for sediment.

Table 7. Alternative 3 Salvage Units

Unit	Area (Acres)	Forest Plan Mgt. Area	Est. Volume (CCF)	Harvest System	Post-Harvest Treatments: Burn	Non-commercial thin	Juniper Removal	Planting
6	13	E1	200.0	Full tree suspension	X			
14	6	C3	103.8			X	X	
15	12	E1	80.8			X	X	
16	52	C3	900.0		X			X
17	34	C3	588.5		X			
18	47	C3	542.3		X			
19	28	C3	484.6		X			X
20	47	C3	813.5		X			X
21	78	C3	900.0			X	X	
22	12	C3	207.7		X			X
23	8	C3	138.5		X			X
28	15	C3	230.8			X	X	
29	24	C3	276.9			X	X	
30	24 25	C3 E1	553.8			X	X	
33	95	C3	1644.2			X	X	X
Total	**520**		**7665.4**					

COMMERCIAL THINNING

Commercial thinning would occur on approximately 475 acres (same as Alternative 2), but the yarding system would be limited to full log suspension in all units.

NON-COMMERCIAL THINNING

Non-commercial thinning would occur on 555 acres.

JUNIPER REDUCTION

Juniper reduction would occur on approximately 563 acres (all overlapping with the non-commercial thinning areas, plus another 8 acres in unit 31).

FUELS TREATMENTS

Following salvage and thinning activities, prescribed burning of fuels would occur on 440 acres (the 8 acres associated with Unit 13 would not be necessary). Of this area, 199 acres would be underburned, and 241 acres would be pile burned. Residual fuels in all units would be left in a more uniform arrangement due to the exclusive use of a full tree suspension yarding system. Fuels treated by this method would dry at a faster rate and be available for burning in either spring or

fall.

Non-commercial thinning and juniper removal would result in debris on the ground and woody debris piled at a rate of 3.5 piles per acre and burned at a later date.

Table 8. Alternative 3 Commercial Thinning Units

Unit	Area (Acres)	Forest Plan Mgt. Area	Est. Volume (CCF)	Harvest System	Post-Harvest Treatments: Burn	Non- commercial Thin	Juniper Removal	Planting
1	19	E1	127.9	Full tree suspension	X			
2	6	E1	40.4		X			
3	75	E1	504.8			X	X	
4	<1 36	C3 E1	242.3			X	X	
5	11	E1	74.0			X	X	
7	14 45	C3 E1	397.1			X	X	
8	38	C3	255.8		X			
11	73	C3	842.3		X			
12	36	C3	242.3		X			
24	15	C3	173.1			X	X	
25	15	C3	173.1		X			
26	9	C3	60.6			X	X	
27	4	C3	26.9		X			
31	8 <1	C3 E1	53.8		X		X	
32	64	E1	430.8			X	X	
34	7	C3	47.1			X	X	
Total	**475**		**3692.3**					

TREE PLANTING

Tree planting would occur on approximately 190 acres[9] (same as Alternative 2). Animal damage control would occur concurrently with tree planting in areas where it is needed (Vexar® tubing of seedlings to control browse and gopher trapping).

[9] Although the total area of units proposed for planting is 241 acres, planting would occur within only 190 acres designated within those units.

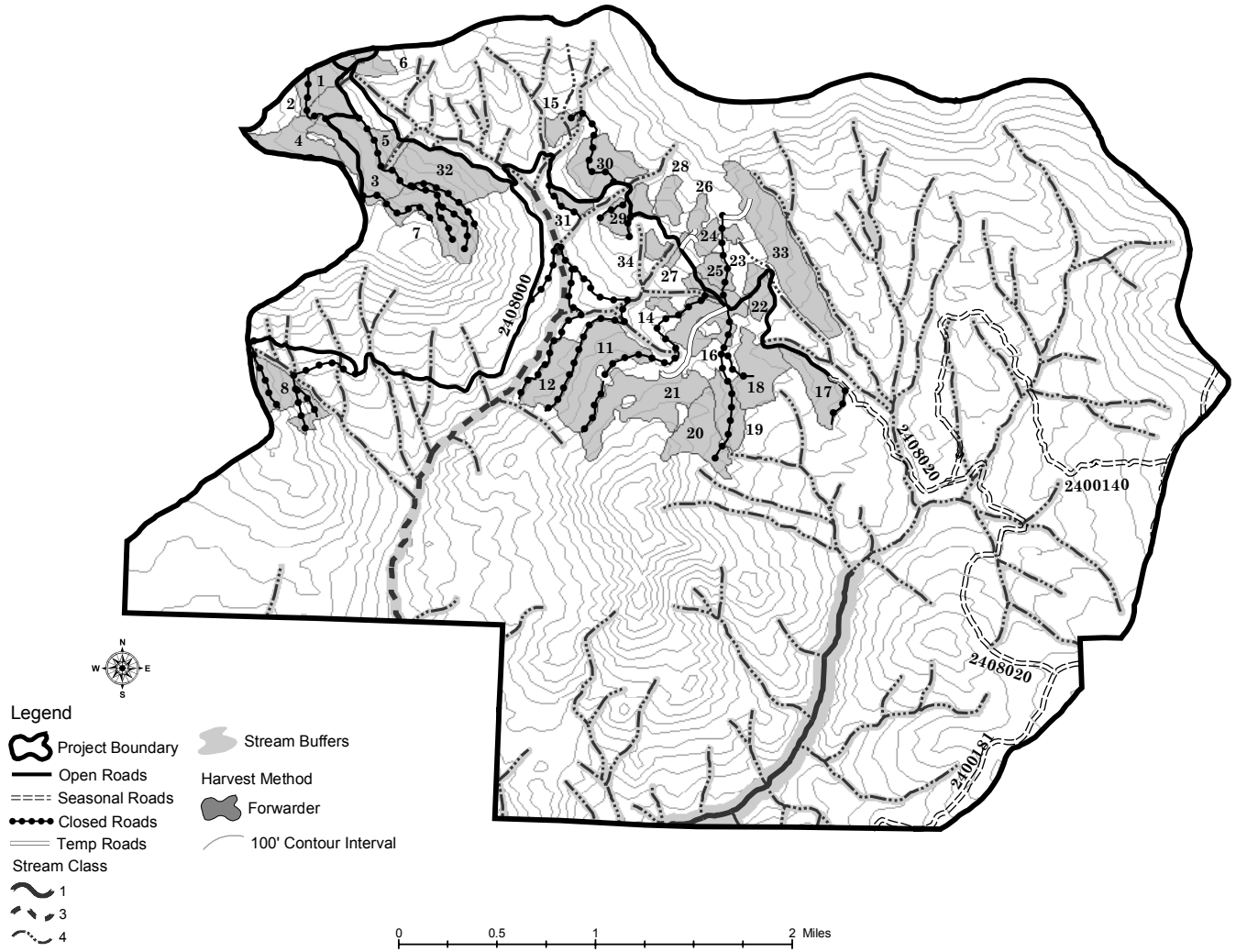

Figure 8. Alternative 3 Treatment Units

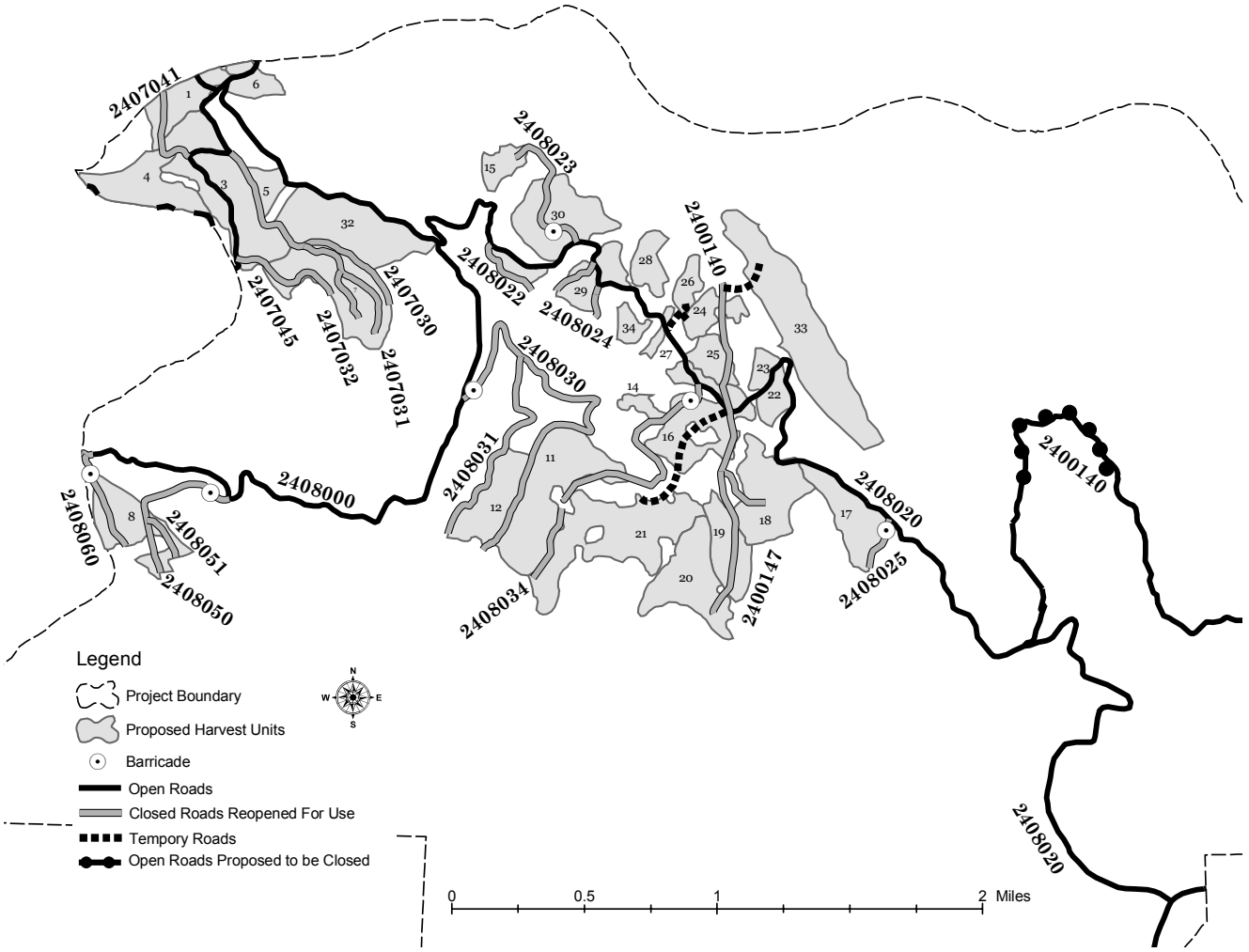

Figure 9. Proposed Road Use for Bologna Basin Salvage Alternative 3

ROAD CLOSURE

In the process of developing alternatives, the Interdisciplinary Team determined that additional measures for the restoration of water quality in fish-bearing East Bologna Creek would be necessary. Roads can affect water quality by channeling runoff and sediment. Forest Road 2400140 is currently open and has two stream fords that channel runoff and sediment directly into East Bologna Creek and also allow vehicle use to erode streambanks. After considering the effects to the forest's transportation system and the needs of the public, the Interdisciplinary Team included the closing of 1.1 miles of Forest Road 2400140 in this alternative (Figure 9). This road closing would achieve an improvement of water quality in East Bologna Creek by eliminating vehicle traffic from two stream fords.

FOREST PLAN AMENDMENT

This alternative would also require the Forest Supervisor to amend the Umatilla National Forest Land and Resource Management Plan with a Forest Plan Amendment to reduce the Forest Plan's habitat effectiveness index standard for this project from 70 to 67. The amendment would be identical to that described in the description of the proposed action (Alternative 2).

POTENTIAL KNUDSEN-VANDENBURG PROJECTS

The following projects and opportunities have been identified as possible candidates to receive funding under the Knudsen-Vandenburg Act. These are commonly referred to as KV funds and are collected from the sale of timber. If harvest occurs, KV funds might not be generated for all enhancement projects listed because timber would primarily be of low value, therefore, other funding sources would be necessary, or the unfunded project would not be implemented.

Sale area enhancement opportunities associated with the action alternatives include:

- Non-commercial thinning and juniper removal
- Noxious weed control
- Treatment of debris created by non-commercial thinning and juniper removal
- Underburning surviving ponderosa pine stands to maintain structure and control undesirable vegetation
- Site preparation and tree regeneration
- Install guardrails on roads in the area to improve closure effectiveness

MITIGATION AND MANAGEMENT REQUIREMENTS

Mitigation measures were developed to reduce some of the potential impacts the various alternatives may cause. Mitigation measures define a set of conditions or requirements that an activity must meet to avoid or minimize potential effects on a sensitive resource. Except as specified, the mitigation measures would be required in both action alternatives. Mitigation measures are not optional.

1. Units will be defined to exclude all riparian areas (streams, seeps, bogs, and springs) from harvest activities. No salvage or thinning will occur within PACFISH Riparian Habitat Conservation Areas [300 feet on each side of class 1 and 2 (fish-bearing streams), 150 feet for Class 3 streams (non-fish bearing perennial streams), and 100 feet for Class 4 (intermittent) streams and springs, seeps, and bogs less than one acre]. If a tree is felled into a Riparian Habitat Conservation Area or unique habitat buffer, the portion inside the protected area will be left in place. In the event that trees are inadvertently damaged within a riparian area, those damaged trees that are determined to be a safety hazard will be cut, dropped, and left. The intent is to avoid disturbance to the riparian area.
2. A list of the USDA Forest Service Pacific Northwest Region General Water Quality Best Management Practices (USDA Forest Service 1988) specific to harvest in this area is included in Appendix A of this document. The intent of these Best Management Practices is to meet Clean Water Act requirements and to protect streams and adjacent areas to maintain aquatic resources.
3. To protect soils, no whole tree yarding will occur in units 1, 2, 3, 4, 5 and 7, 8, 11, 12, 13, 15, 20, 32, and 33. These units will be harvested with a forwarder (or other low-impact logging system that would result in effects similar to that experienced under a harvester/forwarder system) to achieve full suspension of logs. Debris created by the harvester will be placed in front of the harvester in the travel routes to minimize soil disturbance and compaction.[10]
4. No ground-based equipment will operate in areas where the average slope is greater than 35 percent in order to reduce the potential for soil movement. Skid trails, forwarder trails, and other log transportation routes will be controlled by the Forest Service to meet the Best Management Practices and applicable management requirements during timber sale contract administration.
5. Where conditions and safety permit, trees will be felled away from riparian areas, residual conifers, large broken or hollow top snags, dispersed

[10]Alternative 3 was designed so that all harvest would be accomplished with a harvester/forwarder or other low-impact logging system that would result in effects similar to that experienced under a harvester/forwarder system.

campsites, fences, landlines, research plots (ecology plot center markers and condition and trend transect markers) and improvements (i.e. fences, stock ponds, section corner monuments, etc.).

6. Fences and gates will be maintained in their existing condition during harvest activity to prevent cattle from passing between allotments or pastures.
7. The source location, quantity, and timing of water use for dust abatement will be approved by the Forest Service before a sale, in order to protect the water and fisheries resources during times of low water. There are no water sources within the Bologna subwatershed for dust abatement.
8. In Alternative 2, where the forwarder trail to Unit 13 occurs partially within a Riparian Habitat Conservation Area of a Class 4 stream, filter cloth will be installed as needed down slope of the forwarder trail to trap any mobilized soil before it reaches the stream.
9. Equipment crossing ephemeral draws that do not classify as Class 4 streambeds will be confined to designated crossings, and may not otherwise operate within the draw, in order to minimize soil disturbance. Debris will be placed into the crossings to reduce soil disturbance and compaction. Trees within these draws can be cut and dragged or lifted out. Skidding up and down ephemeral draws will be prohibited.
10. Use of heavy equipment will be suspended when weather conditions such as intense or prolonged rainfall, or breakup conditions, would result in excessive wetting of the soil. This is to prevent surface erosion and rutting from the operation of heavy equipment.
11. All skid trails, forwarder trails (except for 0.1 mile of forwarder trail in Alternative 2), and landings will be outside and upslope of Riparian Habitat Conservation Areas. Upon completion of sale activities, skid trails, landings, or exposed mineral soil will be treated as necessary to reduce soil erosion and compaction. This may include seeding, waterbarring, subsoiling of landings, etc. Landings and other heavily compacted areas used during logging operations, where soil conditions are appropriate and where excessive damage to leave trees can be avoided, will be treated with a mechanical winged subsoiler. Displaced soil in berms or ruts will be returned to its prior location.
12. Any seeding will use certified weed-free seed provided by the Forest Service. Native grasses and forb seed will be used as available, otherwise non-persistent exotic species will be provided. Hay and straw used for mulch or erosion control will also be weed-free.
13. A copy of known noxious weed infestations and identification material will be included in the timber sale contract package. Known infestations will be treated by the Forest Service prior to implementation of activities according to the Umatilla National Forest Environmental Assessment for the Management of Noxious Weeds (1995).

14. The Purchaser/Contractor shall certify in writing that off-road equipment is free of Invasive Plants prior to each start up of timber sale or road related operations, and for each subsequent move of equipment onto National Forest lands. Purchaser/Contractor shall employ whatever cleaning methods are necessary to ensure that off-road equipment is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds prior to coming onto National Forest lands. Purchaser/Contractor shall notify the Forest Service at least 5 days prior to moving each piece of off-road equipment onto National Forest lands. Inspect equipment prior to off-loading. Disassembly of components or the use of specialized inspection tools is not required. Equipment in need of cleaning shall be transported off National Forest land to be cleaned, unless otherwise agreed. During fire season, the fire truck, as required to be at the worksite, shall be reserved for fire use and not be used to clean equipment, unless otherwise agreed.

    This requirement does not apply to passenger vehicles or other equipment used exclusively on roads. Cleaning, if needed, will occur off National Forest System lands. Cleaning will be inspected and approved by the Forest Officer in charge of administering the activity.

15. Logging haul routes will be maintained before and after use as needed. Haul will not be permitted down Forest Road 24 from the Forest Road 2407 junction to the Forest Road 22 junction to avoid crossing anadromous fish-bearing streams (Indian Creek and Big Wall Creek).

16. Existing regeneration will be maintained to the extent possible given harvest and prescribed burning constraints. Natural regeneration will be left along open and seasonally open roads outside the road prism to reduce big game vulnerability.

17. Special habitats (such as talus, rocky outcroppings, scab habitats, cliff faces, and meadows) will be protected.

18. Within salvage units, snags will be retained at a density of 3 snags per acre, and replacement trees will be retained at a density of 16 green replacement trees per acre. Within the commercial thin units, 3 snags will also be left per acre. Retain large snags if available, but if there are not enough some smaller snags will be retained to make up the difference. Broken top trees are preferred for their wind firmness.

19. Large down wood will be retained as required by the Forest Plan, as amended by the Regional Forester's Forest Plan Amendment #2 ("Eastside Screens") in 1995 (Table 9).

Table 9. Down Wood Retention per Acre by Plant Association Group

Plant Association Group	Pieces per Acre	Diameter at Small End	Length per Piece	Total Length per Acre
Ponderosa pine	3-6	≥12 inches	>6 feet	20-40 feet
Mixed Conifer	15-20	≥12 inches	>6 feet	20-40 feet
Lodgepole Pine	15-20	≥12 inches	>6 feet	20-40 feet

20. Burn prescriptions (parameters) will be designed to produce low fire intensities. The majority of the burning will take place when heavier fuels and duff moisture contents are high, such as in the spring or in the late fall, when fuel moistures meet burn plan guidelines. Burning with higher fuel moistures will reduce consumption of fuels greater than 3 inches in diameter to satisfy down wood retention guidelines, and to limit the exposure of mineral soil.
21. Prescribed fire will not be ignited in Riparian Habitat Conservation Areas. Fire will not be allowed to burn into Riparian Habitat Conservation Areas and will be controlled by fire control lines. Fire control lines adjacent to Riparian Habitat Conservation Areas, on slopes exceeding 35 percent, and on other sensitive areas where soil disturbance is of concern will be constructed by hand. In other areas where fire line is constructed by tractor, the fire line will be rehabilitated after the burn by returning displaced soil to the line, constructing waterbars, and seeding as necessary.
22. Non-commercial thinning contractors will simultaneously lop and scatter thinning debris to reduce the risk of high intensity wildfire. No non-commercial thinning will occur within Riparian Habitat Conservation Areas.

MONITORING

The following are descriptions of monitoring needed to assure the desired outcome of the various projects. Monitoring for both implementation (whether the project was implemented as planned) and effectiveness (whether overall management objectives were met) will occur. Forest Service personnel would conduct monitoring in areas that have the highest probability of showing effects. At a minimum, monitoring will be consistent with the Forest Plan Monitoring Strategy. Monitoring identified as “essential” will occur if the project is implemented. Other monitoring will be completed as funding permits. An implementation plan will be prepared prior to project implementation that will be used to identify the person(s) responsible for implementation and track project administration and monitoring activities.

1. Units will be spot checked by an aquatic specialist to assure that riparian protection, as delineated by PACFISH requirements and Best Management Practices, is implemented as stated. Boundaries that do not meet mitigation requirements will be adjusted accordingly. This monitoring is considered essential.
2. Number, size, and distribution of snags and down logs will be field checked by Forest Service personnel on a sample of the harvest units. Layout and treatment practices will be adjusted where mitigation parameters are not met. This monitoring is in addition to recording done during sale layout, so will be done as funding is available.
3. The Forest Service representative will spot monitor during and after activities to ensure sediment and soil compaction constraints are met. If constraints are not met, Forest Service personnel will identify and document modifications to be used in future projects. This monitoring is considered essential.
4. Noxious weed species surveys will be conducted by Forest Service personnel prior to initiation of logging and other ground disturbing activities within the project area. This monitoring is considered essential.
5. The District noxious weed coordinator will do spot checks of activities during implementation to determine whether mitigation measures and project risk management plans are implemented. Deviations will be corrected immediately. This monitoring is considered essential.
6. For five years after activities are completed, the District noxious weed coordinator or crew will conduct an annual inventory of the treatment area and access routes to determine if existing noxious weed populations have spread or if new sites have occurred. This monitoring is considered essential.

After prescribed fire treatments, Forest Service personnel will field check a sample of burn units to determine whether the prescription and mitigation (i.e. mortality, mineral soil exposure, fuel load reductions, avoidance of burning in Riparian Habitat Conservation Areas, etc.) have been met. If objectives or mitigation have not been met, additional burning may be delayed or the fire prescription and procedures will be adapted to ensure the mitigation is achieved. This monitoring is considered essential.

COMPARISON OF ALTERNATIVES

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. Table 10 summarizes the alternatives in light of the purpose of the project and the key issues. Table 11 compares the effects of the alternatives in light of needs and key issues.

Table 10. Summary of Differences Between Bologna Basin Alternatives

	Alternative		
	1	**2**	**3**
Treatment Area	0	1,003 acres	995 acres
Number of Units	0	32	31
Salvage Harvest Area	0	528 acres	520 acres
Juniper Reduction Area	0	571 acres	563 acres
Prescribed Burn Area	0	448 acres	440 acres
Forwarder Trail within Riparian Habitat Conservation Areas	0	0.1 mile	0
Year-long Road Closure	0	0	1.1 miles
Volume Harvested	0	11,512 Ccf	11,358Ccf
Harvesting System	N/A	A mix of whole tree yarding and full tree suspension	Full tree suspension Only

Table 11. Comparison of Effects of Bologna Basin Alternatives by Needs and Issues

Need	Alternative 1	Alternative 2	Alternative 3
Reduce the amount of standing fuel	No fuel removal or stand structure modification would occur. Dense ladder fuels would continue to provide an opportunity for crown fire spread. Fuels would accumulate on the ground as trees fall, increasing fuel loads above the current level of 38 tons per acre. The potential for high intensity, difficult to control wildfires would increase over time.	Standing dead fuels and live ladder fuels would be reduced on 1,003 acres. This would also break up canopy continuity, which would reduce the potential for crown fire spread within the treated stands. Initially after treatment, fuels on the ground would be increased and the risk of fire spread would be greater due to debris created by the proposed activities. This increase would last approximately five years (or less in units that are prescribe burned). Fuels would be reduced to the Forest Plan standard of no more than 9 tons per acre. Stands could be more successfully treated over time with prescribed fire due to better control ability.	Standing dead fuels and live ladder fuels would be reduced on 8 fewer acres than Alternative 2. Fuels would be reduced to the Forest Plan standard of no more than 9 tons per acre.
Recover the maximum salvage value…subject to ecological constraints	None of the dead or dying trees would be salvaged, so the economic value of these trees would be lost.	Economic value of dead and dying trees would be recovered from approximately 7,819,000 cubic feet (528 acres).	Recovery of the economic value of dead trees would be about 154,000 cubic feet (8 acres) less than Alternative 2. However, the potential for sedimentation of East or West Bologna creeks would be reduced due to the change in yarding system, the omission of the forwarder trail in the Riparian Habitat Conservation Area, and the closure of Forest Road 2400140.

Need	Alternative 1	Alternative 2	Alternative 3
Reduce the probability of secondary insect spread	Trees that have been infested with Douglas-fir tussock moth would remain and densely stocked stand conditions would continue. As a result, populations of secondary insects would increase and could spread to adjacent healthy stands.	Dead and dying trees that have been heavily defoliated by Douglas-fir tussock moth would be removed and stocking would be reduced on 1,003 acres. This would reduce the likelihood of secondary insect spread and the development of future infestations.	Dead and dying trees that have been heavily defoliated by Douglas-fir tussock moth would be removed and stocking would be reduced on 995 acres.
Reduce live tree densities and restore species compositions	Live tree densities would not be reduced**.** The composition, structure, and function of dry-forest ecosystems in Bologna Basin would remain outside of their historical ranges of variability. As trees grow, densities and related stress on trees would increase, creating conditions for even larger future insect infestations.	Live tree densities would be reduced on 762 acres of densely stocked stands in the dry forest type through commercial thinning, noncommercial thinning, and juniper reduction. This would enhance tree health and stand vigor so that the stands would be less susceptible to future insect infestations. Planting on 190 acres would help restore historic tree species compositions. Overall, the treated acres would contribute to restoration of the historical range of variability for dry forests in the Bologna Basin area.	Stand densities would be reduced on 8 fewer acres than Alternative 2. Planting acres would remain the same. This difference is negligible.

Key Issue	Alternative 1	Alternative 2	Alternative 3
Soils	Slow accumulation of woody material would continue. Buildup of organic material on the surface would increase the productive capacity of the soil but also increase the risk of high intensity wildfire. In that event, large amounts of erosion over a large area would be expected after the fire.	Ground-based yarding systems would result in detrimental soil disturbance on 8 percent of the harvest units (80 acres). Non-commercial thinning and planting would have no measurable effect on soils. Mechanical fuels treatment (if used) would result in detrimental soil disturbance in the range of 0 to 2 percent (0 to 9 acres), however, some of this would overlap the yarding disturbance. Underburning would result in limited soil exposure. Road maintenance would improve drainage, and reduce sediment.	Ground-based yarding would result in detrimental soil disturbance to 6 percent of the project area (60 acres). Non-commercial thinning, planting, mechanical fuels treatment (if used), and underburning would result in the same effects as described in Alternative 2.
Water Quality	No additional sources of sediment would be created. Tussock moth infestation and high stand densities have increased the amount of standing fuels and the risk of high severity wildfire. Fuels and the risk of high severity wildfire would remain high under this alternative. High severity wildfire would detrimentally affect water quality by	Forest health would improve and the risk of high severity wildfire and associated effects on water quality would be decreased on 1,003 acres in Bologna Basin. About 0.9 miles of temporary roads would be constructed to access treatment units. The 0.1-mile forwarder trail to Unit 13 in a Riparian Habitat Conservation Area would require no blading. These logs would be yarded to	Stand densities and standing fuels would be reduced on 995 acres in Bologna Basin. This would improve forest health and decrease the risk of high severity wildfire and its associated effects on water quality. This alternative would drop the 0.1 miles of forwarder trail within the Riparian Habitat Conservation Area proposed under Alternative 2. This alternative would also impose a year-long closure of 1.1 miles of Forest Road 2400140 to improve water quality.

Key Issue	Alternative 1	Alternative 2	Alternative 3
Water Quality (cont'd)	removing stream shade and increasing sediment loads in East and West Bologna Creeks.	road 2408020. Use of whole tree yarding on 424 acres would cause more soil impacts and potential sediment than Alternative 3. This yarding system also creates larger concentrations of debris, which would burn hotter and longer, potentially sterilizing soils beneath. Mitigation measures (see pages 44-47) and best management practices (Appendix A) would help reduce such effects.	Use of full tree suspension yarding in all harvest units would reduce soil disturbance and compaction, which would reduce associated effects on Implementation of the mitigation measures (see pages 44-47) and best management practices (Appendix A) would further reduce such impacts.