CHAPTER 2 – ALTERNATIVES

2.0 – INTRODUCTION

This chapter contains a description of the process used to formulate alternatives; a description of alternatives considered but eliminated from detailed study; a detailed description of the action alternatives and the implementation requirements designed into the alternatives. This chapter concludes with a listing of the monitoring and evaluation needs associated with the alternatives.

2.1 - PROCESS USED TO FORMULATE ALTERNATIVES

This chapter describes in detail the Proposed Action that was developed with extensive collaboration under the Healthy Forests Restoration Act (HFRA) authorities to meet the purpose and need described in Chapter 1. This project is wholly within the wildland urban interface described in the Klickitat and Skamania County, Washington Community Wildfire Protection Plan (2006), and is designed to protect, restore, and enhance forest ecosystem components. Therefore, no alternatives to the proposed action are required. The no-action alternative will be analyzed in order to fully describe its consequences.

2.2 – ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Prescribed Fire Only

The use of prescribed fire (under burning) was considered for all stands in the Catherine planning area and eliminated from detailed analysis because the present level of fuel loading and fuel configuration does not support the safe application of this management tool alone in this Wildland-Urban Interface. The exclusion of fire has resulted in an increase in fuel loading, with accumulations of needle duff, branches, brush, and under-story trees, creating a "fuel ladder" which allows surface fires to travel upwards into shrub under-stories and then to tree crowns. Prescribed burning would probably burn hot with high flame lengths lethal to all trees, including large trees.

Prescribed burning only became a prescription within a wider framework of tools—for example in the Burdoin Mtn. subarea where stands have been thinned, the existing grassy meadows within the Catherine subarea, or other areas with light fuel loads.

No treatment of Steep Slopes and Stands with No Access

The Management Plan does not allow new roads in the Open Space zone and the collaborative group was not in favor of introducing the negative effects of temporary road building on steep slopes (>30%) in the area. Such road building would also be costly. Therefore, there are areas that can only be accessed on foot. The group considered not treating these areas but came to the conclusion that some effort should be made to treat these areas using non-mechanical means or by helicopter where feasible. The driving factor for not recommending this alternative is that it does not meet the purpose and need.

Treatment of 8" DBH or less on Steep Slopes and Stands with No Access

Same reasons as above plus the fuel specialists are of the opinion that some larger diameter trees could be felled and the larger portions left on the ground. Therefore, these stands should be treated to prescription where possible rather than be held to a particular size limit not related to the prescription.

Shaded Fuel Break
The fuel specialists stated that these can be effective if there are fire suppression resources present when the fire hits the fuel break --but they have been proven through experience not to be effective. The collaborative group was not in favor of this approach because it is too single-resource oriented. Therefore, this alternative does not meet the purpose and need.

No Burning
The most important reason not to pursue this alternative is that opening stands through thinning will quickly increase the understory growth and fuel load. Underburning is required to control this growth. The investment of expensive small-diameter thinning can reasonably be offset over years of maintenance underburning which is expected to be much less expensive. However, repeated thinning was not acceptable as a continual tool because it will be too expensive and because the collaborative group has an interest in a more natural means to maintain resiliency. In many areas, burning is the only way to remove the fuels because of access. One of the objectives of this forest restoration is to put fire back into the landscape because it was a basic ecological input in dry forest areas such as Catherine. Mechanical thinning does not and cannot mimic all of the beneficial effects to the ecosystem. Therefore, this alternative does not meet the purpose and need.

2.3 - ALTERNATIVES

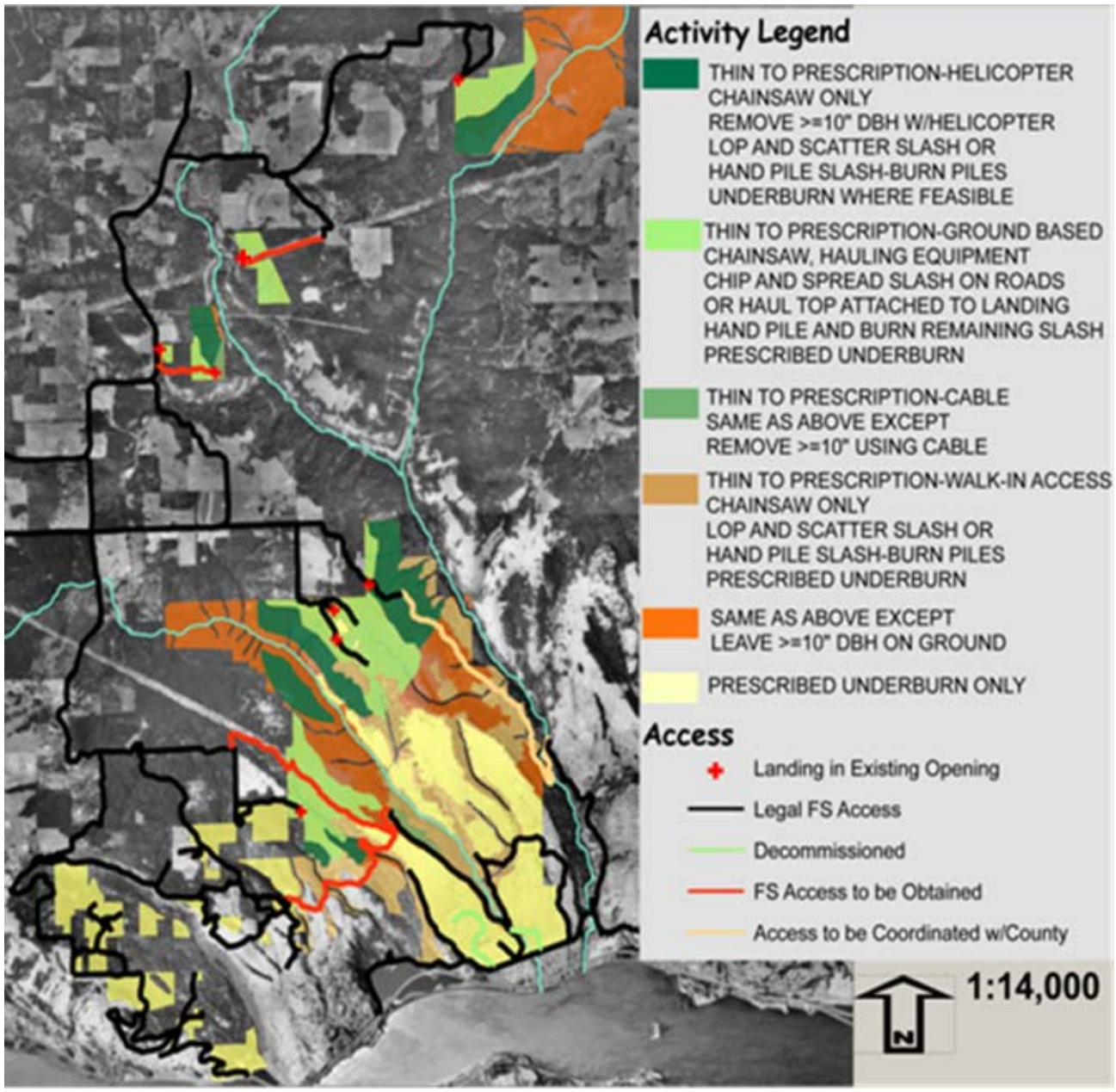
Alternative 1 – No Action Alternative
Under the no action alternative no tree thinning, prescribed fire, or associated actions would occur on federal lands within the Catherine Planning Area to improve fire resilience or restore ecosystem components.

Alternative 2- Proposed Action
This alternative proposes to thin and underburn approximately 2510 acres of Fire Regime I, condition class 2 and 3 tree stands in the Wildland-Urban Interface in the Catherine Creek area, to underburn approximately 1300 acres and retain 290 acres in untreated buffers:

- The proposed action calls for thinning approximately 1,111 acres in the Catherine Creek planning area followed by underburning. Thinning will mostly include trees <21" dbh (diameter at breast height) and will require some road maintenance and landing creation, mechanical tree yarding, piling of slash, and pile burning.
- The proposed action calls for no ground-based mechanical thinning on steep (>30%) slopes and in the oak-pine woodlands (which do not require it). Therefore, approximately 1,399 acres will be thinned using chain saws only followed by hand-piling of slash and pile burning.
- Thinning will be "from below" meaning that the smallest--mostly understory trees in the stands will be removed first to achieve the prescribed canopy closure, species preference and size classes after treatment. Large legacy trees will remain. Lower branches on conifers >12" dbh will be considered for being pruned up to 6 ft. to reduce ladder fuels-->21" dbh at a minimum.

- The proposal includes the release of overtopped oak and of large, legacy ponderosa pine trees by removing trees around them on approximately 500 acres in the Catherine Creek planning area.
- The proposal would create a prescribed underburning schedule for thinned tree stands and areas where fire can be reintroduced without thinning in the planning area. Approximately 1300 acres are proposed for underburning only.
- Slash in excess of what can be left on the ground will be chipped and spread on existing roads, grapple or hand piled and burned. Stands may require a 2.5-3ft. fire-line dug before burning where no other fuel break exists. See preliminary burn plan on page 44.
- Creation of snags where they are below requirements of the CRGNSA Management Plan.
- All stands will be monitored post-activity for invasive plants.
- Haul routes are planned to be on existing roads or tracks except for a small temporary entry to a landing off Snowden Road. See section on roads starting on page 39.
- All decommissioned temporary access and other disturbed areas such as fire-line will be seeded with native grasses and wildflowers.
- The implementation window for project activities within ¼ mile of a bald eagle nest is August 16 - December 31, within 400 ft. of a western gray squirrel nest (or 650 ft. from a goshawk nest) is September 1 - February 28.
- The implementation window for pile burning and prescribed underburning will be set according to weather conditions, air quality requirements, and natural resource conditions specific to the exact location and season. The general season outside of bald eagle nest buffers is July 1-March 15 when moisture and weather conditions are favorable.
- The implementation window for thinning w/o hauling on native surface roads or using ground-based machine operation is July 1-February 28 unless winter range is needed for deer and elk.
- The implementation window for hauling and ground-based machine operation is July 1-October 15. This window may be extended up to February 28 in the event of a prolonged dry period as determined by the contract administrator in consultation with CRGNSA resource specialists.

The table and map on the next page graphically depict the activities described above for this alternative:



PROJECT ACTIVITY IMPLEMENATION WINDOWS (LIGHT GRAY SHADING)												
ACTIVITY	**JUL**	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**
THINNING &	HAULING DRY MILD WINTER								NOT ALLOWED			
HAULING IN	WET WINTER			NOT ALLOWED								
THINNING &	HAULING IN WINTER RANGE					NOT ALLOWED IN SEVERE WINTER						
PRESCRIBED	FIRE								NOT ALLOWED			
THINNING OR	FIRE	WITHIN ¼ MI. BALD EAGLE NEST				NOT ALLOWED						
THINNING OR	FIRE	WITHIN 400' WG SQUIRREL NEST Or 650' GOSHAWK NEST							NOT ALLOWED			

TREATMENT IN WATER RESOURCE BUFFERS & NWFP RIPARIAN RESERVES

Introduction
Treatments within portions of buffers are necessary in order to increase fire resilience and encourage the development of large trees for improved ecological function. The CRGNSA Management Plan requires that a practicable alternative test be applied when buffers are entered by project activities.

Practicable Alternative Test
The CRGNSA Management Plan states that "A practicable alternative (for entering a water resources buffer) does not exist if a project applicant satisfactorily demonstrates all of the following:

- The basic purpose of the use cannot be reasonably accomplished using one or more other sites in the vicinity that would avoid or result in less adverse effects on wetlands.
- The basic purpose of the use cannot be reasonably accomplished by reducing its proposed size, scope, configuration, or density, or by changing the design of the use in a way that would avoid or result in less adverse effects on wetlands.
- Reasonable attempts were made to remove or accommodate constraints that caused a project applicant to reject alternatives to the proposed use. Such constraints include inadequate infrastructure, parcel size, and land use designations."

The Natural Resource Mitigation Plan that is required by the Management Plan when buffers are entered starts on page 36. It is not possible to restore the stands within the buffers without entering them. The following restrictions designed into the project by the collaborative group and the Forest Service reduced the proposed scope of the treatments within the water resource buffers. A reasonable balance was struck between reducing or removing adverse effects while providing the benefits of the restoration to the water resource buffers:

Treatment restrictions for intermittent and ephemeral non-fish bearing streams
Management Plan buffer width: 50 ft.--Northwest Forest Plan (intermittent only): 200 ft.

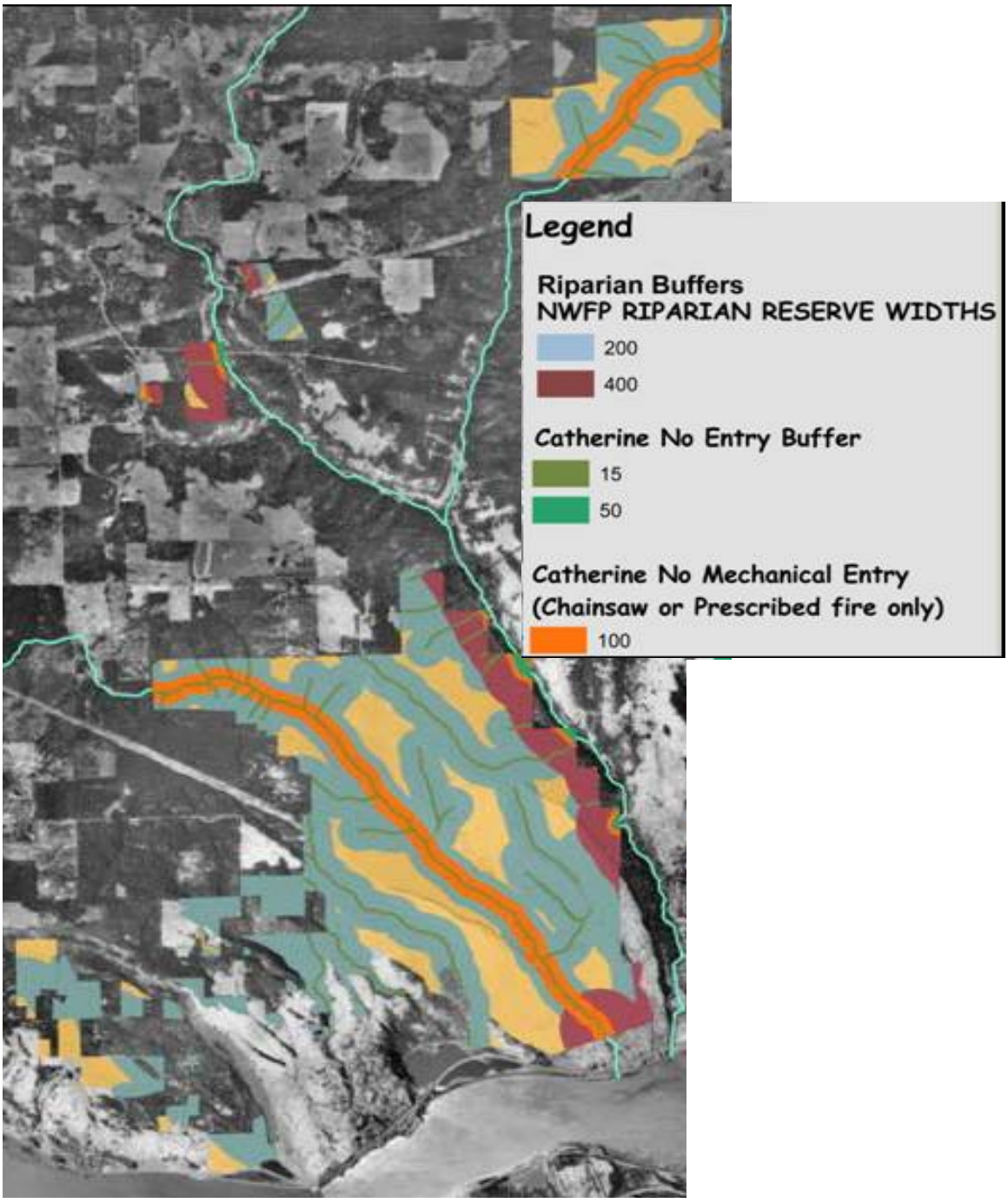
- Intermittent-No thinning or mechanical entry for 15 feet on either side of stream.
- Intermittent and Ephemeral- Ground based yarding, slash piling, or fire-line creation equipment will not be allowed to operate within 20'of channels except to cross them at designated crossings.
- No mechanical constructed fire-line will be allowed within Riparian Reserves

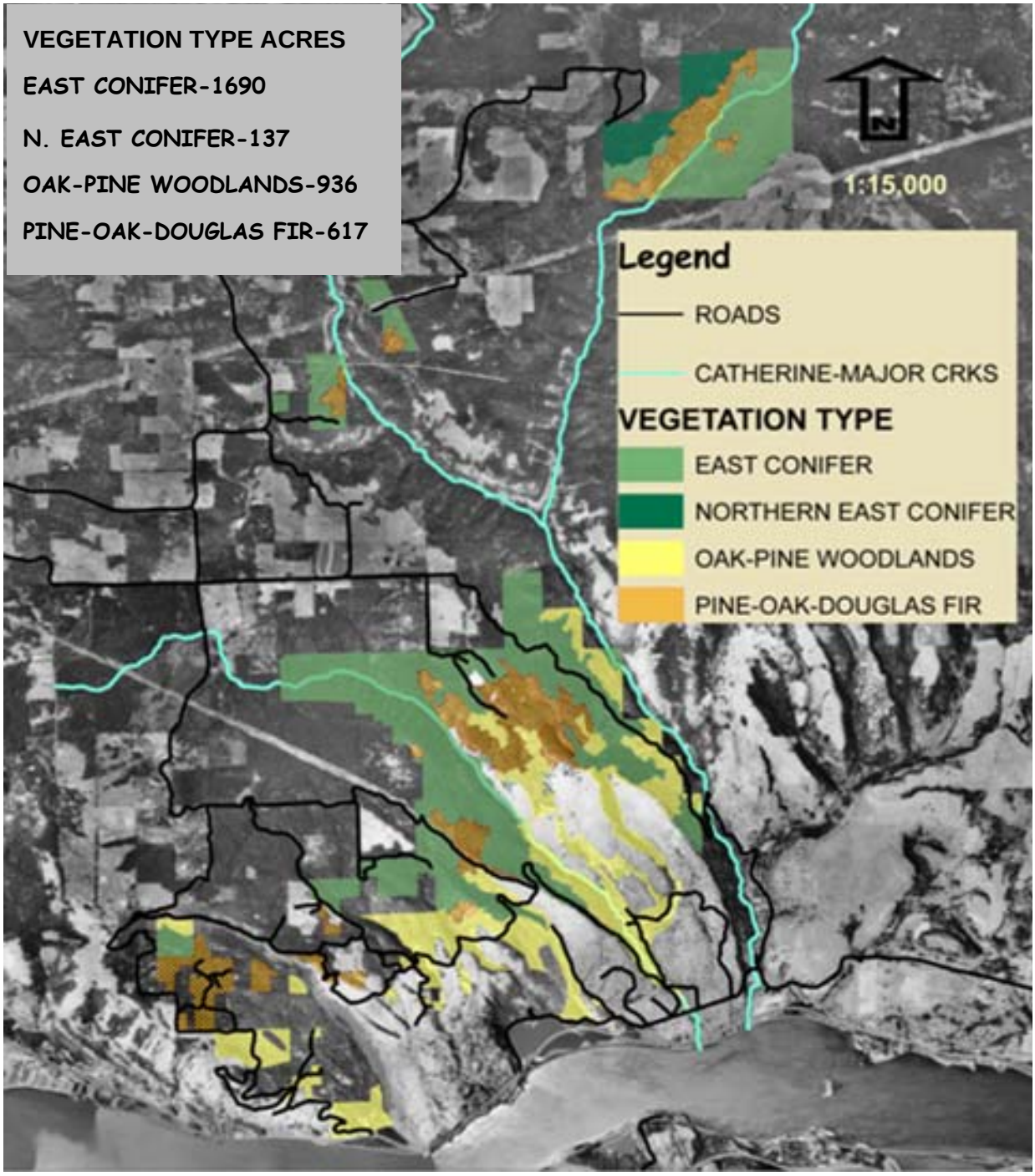
Treatment restrictions for Catherine Cr, Major Creek, and wetland buffers:
Management Plan buffer width: 200 ft.
Northwest Forest Plan buffer width Major Cr: 400 ft.—Catherine Cr: 200 ft.

- 50 feet-No thinning or prescribed fire for 50 feet on either side of stream.
- 100 feet-No mechanical tree removal (i.e. cut using chainsaw only to the prescription for the stand type leaving larger wood on the ground, hand piling slash and schedule underburning if feasible--use sequential entries if necessary). Canopy closure reduction is 50% or less from existing conditions.

- Beyond 100’ but within the buffer, use mechanical means to achieve the prescriptions per stand type such as helicopter or cable yarding if necessary and feasible. No mechanical constructed fire-line will be allowed within Riparian Reserves. Where the use of mechanical methods is not indicated, (such as in oak-pine woodlands), use non-mechanical methods. Where mechanical methods are indicated but not feasible, use the method described in the above bullet for no mechanical tree removal.

- Water resource buffers will be delineated during project layout.




VEGETATION TYPE ACRES
EAST CONIFER-1690
N. EAST CONIFER-137
OAK-PINE WOODLANDS-936
PINE-OAK-DOUGLAS FIR-617
N
1:15,000
Legend
ROADS
CATHERINE-MAJOR CRKS
VEGETATION TYPE
EAST CONIFER
NORTHERN EAST CONIFER
OAK-PINE WOODLANDS
PINE-OAK-DOUGLAS FIR

PRESCRIPTIONS BY VEGETATION TYPE

Northern East Conifer East Fork Major Creek
PRESCRIPTION:
Canopy closure is the primary prescription characteristic and shall influence all other elements.

Thin stands to the DFC average canopy closure of 45%. If large (>=20" dbh) pines are found, preserve by removing all trees within a 30'-40' radius of the center of ponderosa pine >=20" dbh. Preserve legacy largest diameter trees (>20" dbh).

Remove grand fir < 20", create snags> 20" dbh. (Number per acre as per Management Plan)

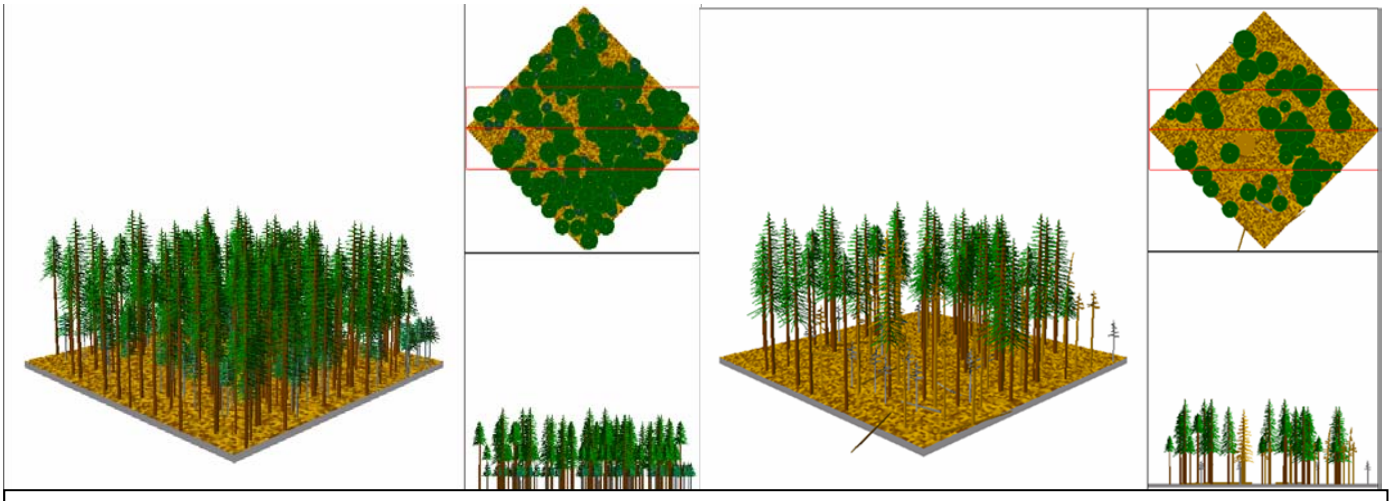
Thin all species from below. Thin to a total canopy no more than 20-30% less than existing canopy while maintaining an average of 45% within the DFC range of 35-65%. Exception is allowed to meet DFC canopy maximum of 65%. Emphasize future diameter growth in the spacing.

Release live oak trees >=10" dbh where found by removing all trees within a 25' radius except leave 1-2 of the largest (>20") conifer trees on the north side if present. Prefer pine.

Set underburning schedule (every 5-10 years) -- conditions will be monitored starting after thinning implementation and slash treatments are complete.

Openings: Created and maintained by underburning.

Snags, Downed Wood, Shrub and Herbacious Layer: Mitigate the effect of thinning and underburning with reference to invasive plants. Snag creation as per Management Plan.



BEFORE THINNING CANOPY 82% AFTER THINNING CANOPY 60%
Forest Vegetation Simulator Model Example for Northern East Conifer

East Conifer

PRESCRIPTION:

Canopy closure is the primary prescription characteristic and shall influence all other elements.

Overstory: Emphasize protection of large legacy pines. Remove all trees within a 30'-40' radius of the center of ponderosa pine >=20" dbh, preferring the largest pine at a rate no more than 3-4 per acre. Leave oak trees >= 12" dbh within radius if present.

No thinning of overstory pine. Remove accumulated duff around legacy pines where a distinct mound has formed. Leave largest diameter fir.

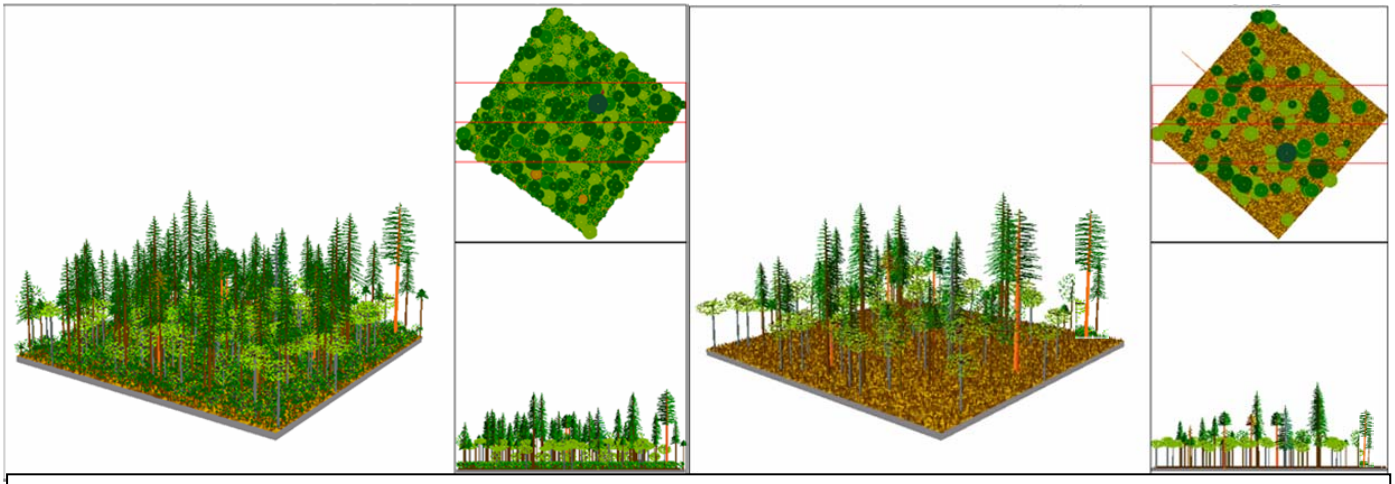
Understory: Thin all species from below. Prefer pine to fir.
Thin to a total canopy no more than 20-30% less than existing canopy while maintaining an average of 60% within the DFC range of 50-70%.

Release live oak trees >=10" dbh within a 20' radius but leave 1-2 of the largest (>20") conifer trees on the north side. Prefer pine.

Set underburning schedule (every 5-10 years) -- conditions will be monitored starting in 5 years from thinning implementation.

Openings: Created and maintained by underburning.

Snags, Downed Wood, Shrub and Herbacious Layer: Mitigate the effect of thinning and underburning with reference to invasive plants. Snag creation as per Management Plan.



BEFORE THINNING CANOPY 66% AFTER THINNING CANOPY 59%
(Canopy is measured without seedlings—canopy is 96% with seedlings)
Forest Vegetation Simulator Model Example for East Conifer

Pine-Oak-Douglas Fir
PRESCRIPTION:
Canopy closure is the primary prescription characteristic and shall influence all other elements.

Overstory: Step 1: Emphasize protection of large pines. Remove all trees within a 30'-40' radius of the center of Ponderosa pine >=20" dbh, preferring the largest pine at a rate no more than 3-4 per acre while leaving 1-2 oak trees >= 12" dbh if present within radius. No thinning of overstory pine.

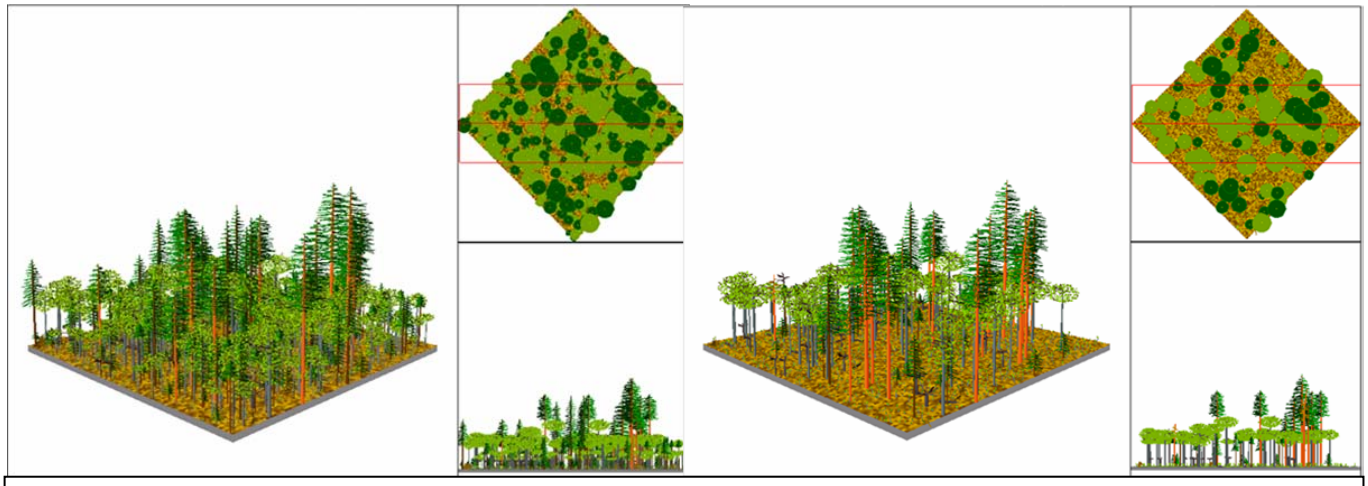
Release DF-overtopped live oak trees >= 10" dbh within a 20' radius but leave 1-2 of the largest (>20") conifer trees on the north side. Prefer pine.

Step 1: Not prescribed for areas within 350 feet of western gray squirrel nest.
Step 2: Check residual canopy from Step 1, if desired total canopy allows, thin understory Douglas-fir to 10% canopy while maintaining total canopy as per "understory" below. Leave largest diameter fir (>20" dbh) unless interferes with getting the desired canopy %.

Understory: Thin all species from below. Prefer pine to fir.
Thin to a total canopy (including overstory) of no more than 20-30% less than existing canopy while maintaining an average of 50% within the DFC range of 30-70%. No thinning of oak >10" dbh. Step 2 not allowed within 50 feet of western gray squirrel nest unless canopy not affected.
Set underburning schedule (every 5-10 years) -- conditions will be monitored starting after thinning implementation and slash treatments are complete.

Openings: Created and maintained by underburning.

Snags, Downed Wood, Shrub and Herbacious Layer: Mitigate the effect of thinning and underburning with reference to invasive plants. Snag creation as per Management Plan.



BEFORE THINNING CANOPY 84% AFTER THINNING CANOPY 59%
Forest Vegetation Simulator Model Example for Pine-Oak-Douglas Fir

Oak-Pine Woodlands
PRESCRIPTION:
Canopy closure is the primary prescription characteristic and shall influence all other elements.

Overstory: Emphasize protection of all large trees. Especially pine >20", oak >10" dbh.
Understory: Thin Oregon oak from below. Thin to a total canopy no more than 30% less than existing canopy while maintaining an average of 50% within the DFC range of 25-60%. Thin areas above 60%. Can thin areas with 25-60% canopy from below if the residual canopy remains at existing per cent.

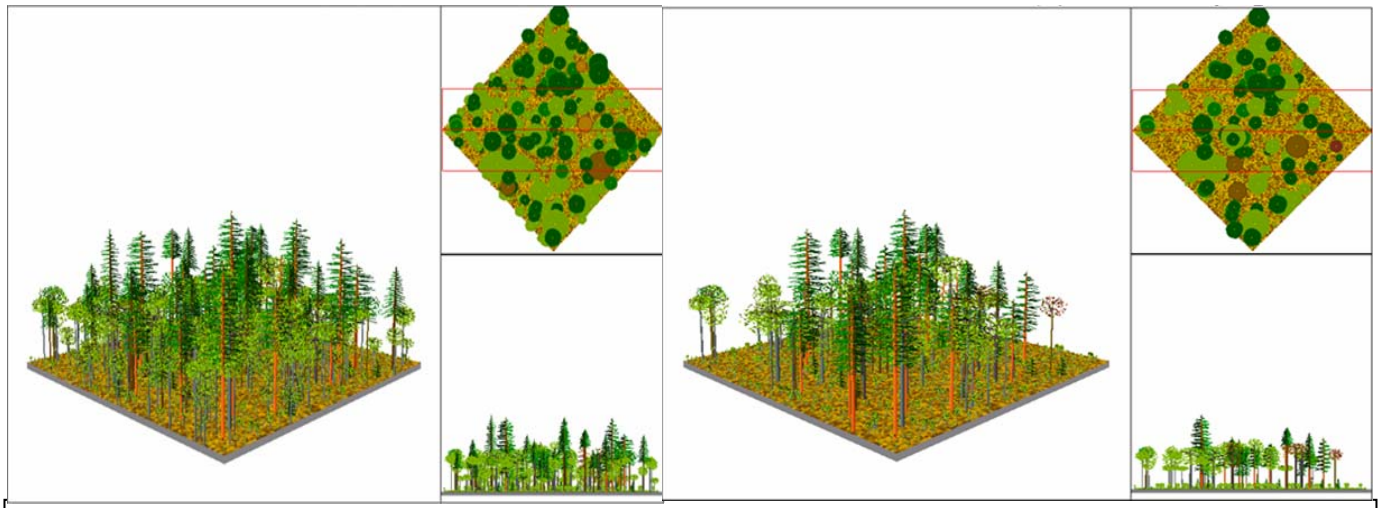
If existing, remove all Douglas-fir seedlings and saplings either by underburning or mechanical means.

Preserve clumps 100' feet away from the base of cliffs, caves, or talus slopes with the following:
Leave untreated clumps of 6-10 oaks spaced 50-150 feet apart (vary).
Treated areas within the 100' buffer are thinned from below in a manner that maintains the existing canopy cover.

Set underburning schedule (every 5-10 years) – Begin underburns in areas not requiring thinning. Monitor conditions in areas requiring thinning after implementation of both thinning and slash treatments.

Openings: Created and maintained by underburning.

Snags, Downed Wood, Shrub and Herbacious Layer: Mitigate the effect of thinning and underburning with reference to invasive plants. Snag creation as per Management Plan.



BEFORE THINNING CANOPY 72% AFTER THINNING CANOPY 58%
Forest Vegetation Simulator Model Example for Oak-Pine Woodlands

IMPLEMENTATION REQUIREMENTS

Air Quality

1. Minimize the amount of material burned by making it available for other uses such as personal use firewood and habitat restoration projects as a first priority.
2. When necessary, excess material shall be burned only when weather conditions minimize impacts from smoke. These include: burning on cloudy days when residual smoke cannot be seen; burn during low visitor time periods; and burning during periods of atmospheric instability for better smoke dispersal. Generally these conditions exist or a window can be found in all seasons. It is the most difficult from December to March when inversions are common.

Natural Resources

(Serves as Natural Resource Mitigation Plan as required by CRGNSA Management Plan)

Helpful definitions:

- **Haul Routes**-Existing roads chosen to accommodate vehicles up to the size of a log truck.
- **Temporary Road**-A short, (<.5 mile) new natural surface road to a landing built to a standard that will allow both temporary (1-2 years) use by vehicles the size of a log truck and effective decommissioning and restoration.
- **Skid road**-Provides temporary (1 year) access to landings for skidders, tractors, etc. No log truck access and little to no blading is used to create them. Tree removal is usually not necessary. They are usually designated on existing roads or tracks.
- **Skid trail**-Provides very short term access (1 to 3 passes) for skidders, tractors, etc. No log truck access, no blading and no tree removal (other than as per prescription) is used to create them.
- **Landing**-An existing or newly cleared area (up to 150 x 200 ft.) for the temporary storage of logs and slash that may need some minimal blading or grading to create. Usually located in existing disturbed areas such as roads, turnouts, quarries, previous created openings, etc. but may require additional tree removal.

3. This project was designed to use existing roads. New temporary roads shall be considered only if the protection of resources requires it and shall be very short (<.15 mile). Any temporary road shall be pre-designated and agreed to by the CRGNSA hydrologist, engineer and archeologist prior to tree removal activities.
4. Track-mounted piling equipment or other low-impact equipment shall operate on top of slash to minimize soil disturbance where possible.
5. Ground based yarding, slash piling, or fire-line creation equipment will not be allowed on slopes steeper than 30%. These steeper areas will be hand piled if fuel reduction is necessary.
6. No mechanically constructed fire-line shall be allowed within Riparian Reserves.
7. Skid roads determined by the Forest Service to have detrimental soil compaction will be ripped to a depth of 18", water-barred, sown with native grass seed, and mulched with fine slash.
8. Any new temporary roads and all landings not part of an existing road shall be decommissioned and restored as per #7 above as part of contract completion.

9. Scenic Area Management Plan standards for soil productivity will be met in the project area. These state that not more than 15% of an activity area will be detrimentally disturbed. This includes compaction, displacement, puddling and removal of organic layers exposing mineral soil. This will require the designation of skid trails.
10. Ground based yarding, slash piling, or fire-line creation equipment in ground-based treatment areas will not be allowed to operate within 20'of intermittent or ephemeral channels except to cross them at designated crossings.
11. Trees will be directionally felled away from streams and wetlands.
12. All wetland-dependent vegetation shall be left undisturbed.
13. Invasive plant issues shall be part of project effectiveness monitoring and the yearly CRGNSA eradication program shall prioritize needs in the planning area.
14. Clean equipment before entering NFS lands and before moving to each treatment area in a manner that will ensure that it is not contributing to the spread of invasive plants. Known patches of invasive plants shall be avoided to forestall spread until eradicated.
15. Snags and large woody debris shall be provided or preserved as per the CRGNSA Management Plan. Burn pile location shall take less than 10% of the area and shall protect trees, snags, and down wood.
16. Treatment areas shall be reviewed for snag creation needs as part of this project.
17. Snags and down wood shall not be taken for firewood. Firewood permits and signs at cutting areas shall state this prohibition and encourage compliance.
18. Any snags cut for worker safety shall remain on the ground. Snags >12" dbh will not be cut without prior FS approval.
19. Project activities except prescribed fire will occur outside of the growing season of plants and the general nesting/rearing season for birds, gray squirrel and other wildlife species (March 1 through June 30). Prescribed fire shall not occur March 15-June 30.
20. No project activities are allowed within ¼ mile of a bald eagle nest from January 1 through August 15. Nest and roost trees shall be retained.
21. No project activities are allowed within 650 ft. of goshawk nest from March 1 through August 31. Nest trees shall be retained. Surveys to be conducted before implementation.
22. All active western gray squirrel (WGS) nest sites shall have a 50 ft. no-thinning buffer around the nest tree. The trees within the buffer will be limbed to a 10' height to reduce crown fire risk, as needed. As nests are located, the most current WDFW management recommendations will be consulted; currently the 2006 *Draft* Washington State Recovery Plan for the WGS. Deviations from the Management Recommendations may be prescribed to fit local site characteristics, as collaborated with WDFW before implementation.
23. No loud (thinning activities including chainsaws) activity will occur within 400 ft. of active WGS nest trees from March 1 through August 31.
24. If the scenic area or state wildlife biologist determines that the area is needed as winter range (such as due to harsh winter weather), no mechanized equipment (including chainsaws) will be used between December 15-March 1 to reduce cumulative disturbance to deer/elk on their designated winter range.
25. If any sensitive wildlife or flora is located during the project, the Scenic Area wildlife biologist or ecologist shall be notified and appropriate measures taken to ensure protection.
26. Areas where post treatment field surveys indicate that a majority of the vegetation was removed and slow vegetation recovery is expected will be seeded with a native seed mixture to reduce the chance of surface erosion.

27. Revegetate all disturbed areas with desired native bunch grass, forb and shrub species. Appropriate forage species include bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*), Serviceberry (*Amelanchier alnifolia*), arrowleaf balsamroot (*Balsamorhiza sagittata*), deerbrush (*Ceanothus integerrimus*), and others.
28. Known sites of sensitive plant species shall be protected by a buffer (200 ft) around each site within which no pile burning or mechanized equipment (except chain saws) shall be allowed. Any newly found sites will be given similar protection.

Scenic Resources

29. No permanent leave tree marking shall be used except the marking of boundary trees near the base of each tree.
30. Stumps >10" dbh shall be flush cut in the immediate foreground (within 50 ft) of Snowden Road.
31. The landing at Snowden Road shall retain screening from existing trees as seen from Snowden Road wherever safety concerns permit.
32. Minimize the visual exposure of the BPA powerline to adjacent properties by maintaining the tallest screening trees in stands traversed by BPA lines.

Recreation and Recreational Facilities and Access

33. Trail users, residents and the general public will be notified of thinning and underburning activities by posting warning signs at key trail intersections at a minimum of four weeks before the activity. Develop and distribute press release/key messages to local press, outdoor equipment stores, user clubs, user organizations, and the Forest Service web site.
34. Before project commences, pursue necessary agreements with landowners for access.
35. Firewood will be made available to the public only on roads where public access is allowed rather than on roads owned by others where the Forest Service is allowed access for administrative purposes only.
36. The implementation window for hauling and ground-based machine operation is July 1-October 15. This window may be extended to February 28 in the event of a prolonged dry period as determined by the contract administrator in consultation with CRGNSA resource specialists.

Cultural Resources

37. Archeological sites shall be identified in the field and taken out of the treatment boundaries, including the appropriate buffers.
38. Should any historic or prehistoric cultural resources be uncovered during project activities, the Forest Service, or their agents, shall cease work and immediately notify the CRGNSA office and the Washington State Historic Preservation Office (Department of Archaeology and Historic Preservation). If the cultural resources are prehistoric or otherwise associated with Indian people, the Forest Service shall also notify the Indian tribal governments within 24-hours.

Vegetation Management

39. All prescriptions and marking guides shall include canopy closure as a control on the extent of tree removal, and use variable spacing for diversity and to maintain interlocking canopies.
40. De-commissioned landings shall be considered as areas suitable for planting ponderosa pine and/or Oregon oak seedlings.
41. Adaptive Management effectiveness monitoring may require changes to prescriptions after first treatments are monitored. Changes must reflect the intent of the original prescriptions to meet the stated desired conditions, mitigations and effects to resources.

ACCESS AND LANDS INFORMATION

The project area is comprised of land acquired from private parties, with the exception of two 40-acre parcels transferred from Bureau of Land Management jurisdiction to Forest Service jurisdiction. Each acquisition file was examined to determine access status and third party rights. This information is displayed in depth in Appendix C. Access to the Burdoin sub-area was established during development of the Burdoin Mtn. EA.

The map on page 28 indicates which roads require the Forest Service to obtain permanent easement rights where there is existing physical access but no legal access rights, particularly where the physical access is over Bonneville Power Administration (BPA) managed land or easements.

ROAD MAINTENANCE AND LANDINGS

Some of the local roads accessing the project area will need minor reconstruction work to accommodate log haul. All of the local roads used for log haul will require some level of maintenance between the landings and the public road system. Haul routes will be on existing roads or tracks. The hauling window is July 1 – October 15 because most of the local roads providing access are native surfaced and will not support extended season haul without additional cost for reconstruction. This window may be extended up to February 28 in the event of a prolonged dry period as determined by the contract administrator in consultation with CRGNSA resource specialists.

Cost data for minor local road reconstruction and for local road maintenance are from the Gifford Pinchot National Forest publication "Cost Estimation Guide for Road Maintenance", last updated in June, 2006.

Haul Routes

The table below indicates preliminary log haul routes. The routes on National Forest System lands and within the treatment areas will not change, but the actual routes on public roads may change according to the needs of the contractor.

Common point is the intersection of SR 14 with Oak Street in Bingen, Washington. Note that the Forest Service does not currently have access rights on all of the local access roads. Refer elsewhere to the section "Access and Lands Information" for further discussion. Courtney Road is not included in the log haul routes proposed. The section between the end of the existing pavement and a point approximately two miles northerly consists of one narrow lane with few turnouts and tight curves. Reconstruction of this two mile section would be required to accommodate log haul from both operational and safety standpoints.

Preliminary Haul Routes to Bingen, Washington

Access Road	**Forest Service Access Rights**	**Haul Route (public roads unless otherwise noted)**
3119267	Yes	Acme Road – Snowden Road
BPA-3119097	No	Dorsey Road – Acme Road – Snowden Road
Landing, Sec. 3 (1)	Yes	Snowden Road
Upper Major Creek (2)	Yes	Bates Road – Snowden Road

3110320	Yes	Upper Major Creek Road – Bates Road – Snowden Road
BPA-3112300	No	Atwood Road – FS 1230020 – Old Hwy. No. 8 – SR 14
1230020	Yes	Old Hwy. No. 8 – SR 14
3112304	Yes	Bristol Road – Bates Road – Snowden Road

(1) T. 3 N., R. 11 E., NW1/4 SW1/4 SE1/4 Sec. 3, adjacent to Snowden Road.
(2) County road; Forest Service maps a.k.a. 3110000.

Proposed Road Work

CONSTRUCTION AND RECONSTRUCTION

Chapter 4 of Forest Service Handbook 7709.56, "Road Preconstruction Handbook", was used to determine log truck and lowboy minimum lane widths for the type of local access roads to be used for tree removal (Traffic Service Level D, low standard, low use and as further defined in Chapter 4) and forms the basis for determining reconstruction or construction work required. For any given central angle and radius of curvature, the lowboy will require a greater minimum lane width than a log truck. Traffic Service Level D roads typically accommodate log trucks, but not lowboys as vehicles such as yarders and log loaders "may have to be off loaded and walked in". Because of physical constraints, insufficient right-of-way or easement width, and environmental concerns, only one of the local access roads included in this proposal will be designed to accommodate lowboys.

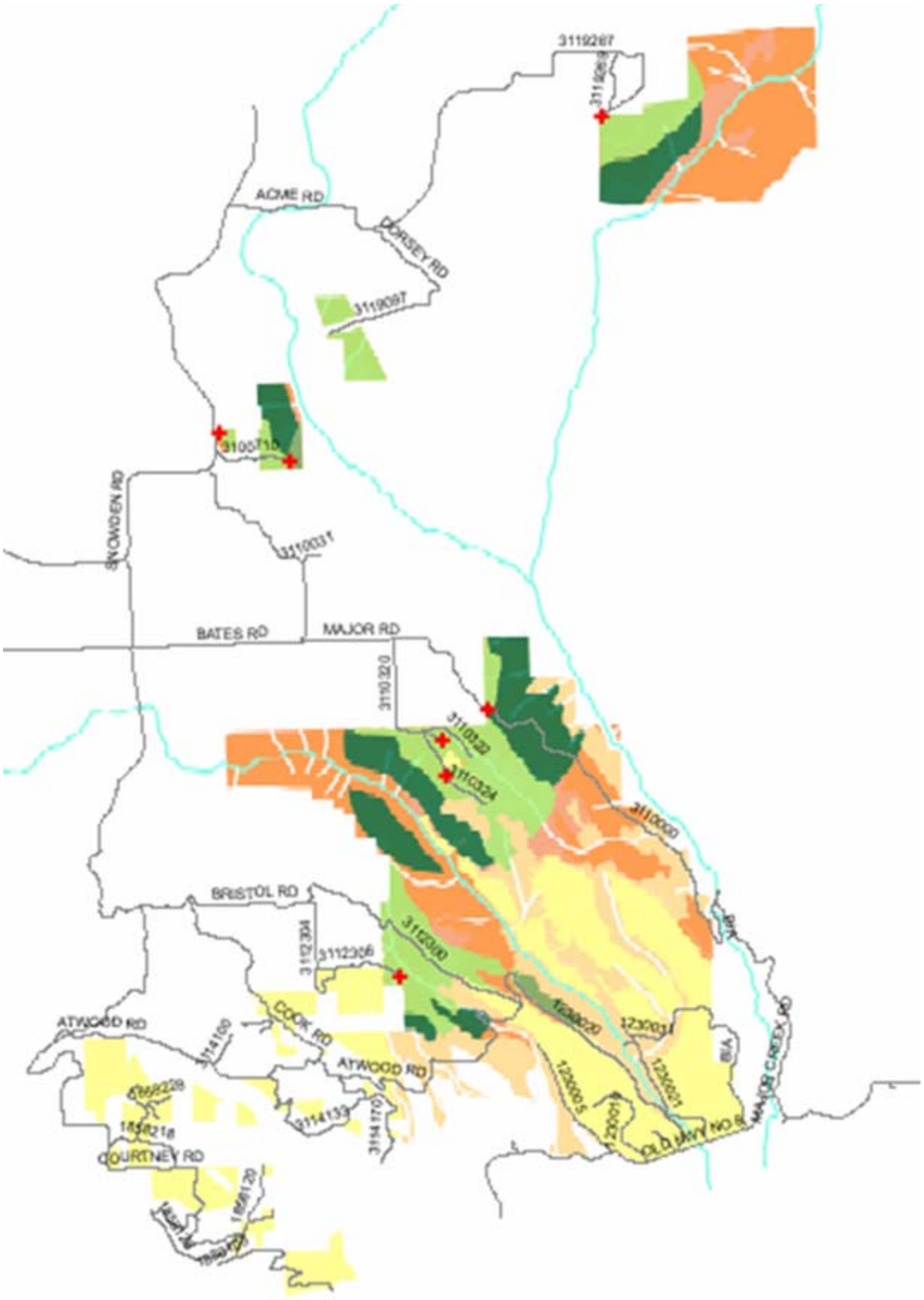
The following table provides a description of the construction or reconstruction work needed to utilize some of the local roads for log haul. A permit from Klickitat County is required where noted.

Roads with Construction or Reconstruction Work to Allow Log Truck Access (1)

Access Road	**Description of Work (all dimensions and quantities are approximate *post haul restoration work included where it is proposed*)**
BPA-3119097	Temporary improvement at the junction with Dorsey Road to provide log truck turning radius. A road approach permit from Klickitat County is required. Anticipated work includes 50 feet of fence removal; clearing 0.02 acre of brush; and grading for a length of 60 feet (by 16 feet wide). Grading involves minimal excavation or fill. *Post haul, reset fence and re-contour graded area.*
Landing, Sec. 3	Temporary road approach to Snowden Road at milepost 7.3 to provide lowboy as well as log truck access. A road approach permit from Klickitat County is required. Anticipated work: relocation of road warning sign; 45 feet of fence removal; clearing by removing four fir trees of 12 inch dbh or less; installing 70 feet of 12 inch culvert pipe in the existing ditch line; grading for a length of 150 feet (average width 20 feet), including 50 cubic yards of excavation and 20 cubic yards of fill; and placing 60 cubic yards of pit run rock surfacing over the first 60 feet of road length. Work adjacent to the County road will require temporary traffic control. *Post haul, remove rock, re-contour graded area, remove culvert pipe, restore road shoulder and ditch line, and reset fence. Work adjacent to the County road will require temporary traffic control.*

3110320	(a) Widen the road on its approach to North Major Creek Road to provide log truck turning radius. A road approach permit from Klickitat County is required. Anticipated work includes clearing 0.01 acre of brush; and grading for a length of 60 feet (by 17 feet wide), with 10 cubic yards of excavation. Work adjacent to the County road will require temporary traffic control. (b) Construct 100 feet of road (by 18 feet wide) at milepost 0.5 to provide log truck turning radius. Work includes resetting a power pole guy line and anchor (by the P.U.D.); 30 feet of fence removal; clearing by removing five fir trees of 4 inch to 24 inch dbh; and grading to level the existing ground surface with minimal excavation or fill. *Post haul, re-contour graded area and reset fence.*
BPA-3112300	Construct 170 feet of road on its approach to the Atwood Road to provide log truck turning radius. Work includes grading (average width 20 feet), with 150 cubic yards of excavation. The constructed road will replace 120 feet of existing road. Place the excavated material from the constructed road into the template of the existing road to be abandoned, contour and seed to native grass.
Atwood Road	Widen the road on the inside of a curve ¼ mile northerly of the junction with Road BPA-3112300 for log truck turning radius. Includes clearing 0.01 acre of brush and small firs; and grading by completing 10 cubic yards of excavation.
1230020	(a) Temporary road approach to Old Hwy. No. 8 at milepost 1.5 to provide log truck access. A road approach permit from Klickitat County is required. Anticipated work: 20 feet of fence removal; installation of a temporary gate to control public access during haul; grading for a length of 60 feet (by 16 feet wide) to level the ground surface with minimal excavation or fill; and placing 40 cubic yards of pit run rock surfacing over the first 60 feet of road length. Work adjacent to the County road will require temporary traffic control. *Post haul, remove rock, re-contour graded area and reset fence. Work adjacent to the County road will require temporary traffic control.* (b) Mitigate severe "bumps" between milepost 0.05 and 0.15 by removing the tops of existing exposed rock masses, or by constructing ramping on either side of the "bumps" with placement of a total of 50 cubic yards of pit run rock. (c) At milepost 0.2, through a total length of 150 feet, provide a reverse curve "swing out" to provide log truck access. Work includes removing 20 cubic yards of rock slope to increase road width by 5 feet at the existing angle point in the road (transition to existing road width 60 feet northerly); and placing 10 cubic yards of open graded rock in the flat area south and east of the existing angle point in the road to form the "swing out" area.

(1) Lowboy access provided where noted.


ACME RD
DORSEY RD
SNOWDEN RD
BATES RD
MAJOR RD
BRISTOL RD
ATWOOD RD
COOK RD
ATWOOD RD
COURTNEY RD
OLD HWY NO 5
MAJOR CREEK RD

ROAD MAINTENANCE

All of the local access roads used for log haul will require some level of maintenance work. The type of maintenance work to be completed is described by category as follows:

- *Pre-haul* – minor log out, spot brush/limb up, fill waterbars, remove ruts, remove minor slough or slide material.
- *During haul* – blade once, remove minor slough or slide material.
- *Post haul* – reestablish waterbars and other drainage, shape the roadway.
- The heaviest *pre-haul* maintenance work is described as follows:
- BPA-3119097-remove deep ruts.
- North Major Creek Road-remove moderate to deep ruts and complete moderate to heavy brush out, milepost 0.9 to milepost 1.4. A permit from Klickitat County to perform work within County road right-of-way is required.
- BPA-3112300-remove moderate depth ruts.
- 3112306-heavy brush out.

ACTIVITY CREATED FUELS TREATMENT

There are several methods proposed to treated the wood residue from the thinning prescription implementation:

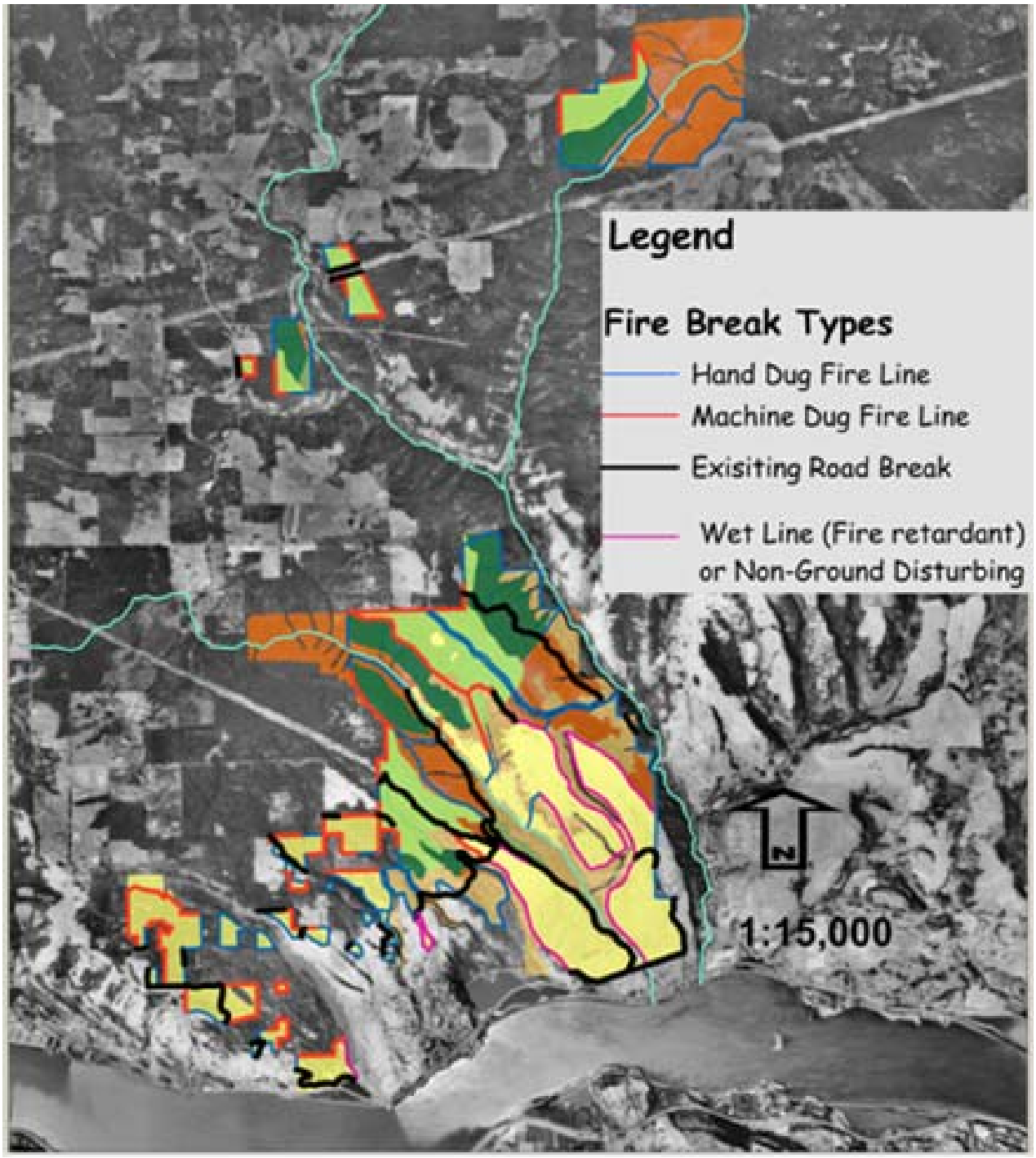
- Hand Pile-approximately 1,464 acres
- Grapple Pile-approximately and/or yard tops attached, chip at landing (spread chips on road)—approximately 619 acres.

PRESCRIBED FIRE IMPLEMENTATION

The purpose of prescribed burning is to reduce the survival of encroaching Douglas-fir seedlings and the number of new oak and pine tree seedlings, reduce surface fuels, reduce litter and duff depth, increase canopy base height, and provide other benefits that are known to occur when fire-adapted landscapes are brought closer to being within the range of natural variability. Prescribed burning is best used in areas with lighter fuel loads. It is estimated that 1,300 acres are currently available for treatment without pre-thinning. Approximately 2,510 acres will require thinning and slash pile burning before prescribed fire can be applied. Future maintenance burning will be needed to limit regeneration and maintain low levels of surface fuels. The CRGNSA fire specialists will evaluate areas for prescribed fire as funding becomes available. Prescribed fire implementation plans will be prepared before treatment. Existing fire breaks and new fire-line will be required to ensure control. Fire-line will be constructed as needed (about 200 acres underburning per year) and will be sown with native grasses following use. The following priorities will be used for fire breaks based on safety and feasibility:

1. Existing roads and other existing breaks.
2. Wet-line (fire retardant) or non-ground disturbing hand-dug fire-line.
3. Hand-dug fire-line.
4. Fire-line dug using small (trail-sized) equipment.
5. Machine dug fire-line using larger equipment.

The map on the next page indicates a preliminary plan for how these priorities apply:


Legend
Fire Break Types
Hand Dug Fire Line
Machine Dug Fire Line
Exisiting Road Break
Wet Line (Fire retardant)
or Non-Ground Disturbing
N
1:15,000

FINANCIAL FEASIBILITY ANALYSIS and SCHEDULE

According to the "Catherine Forest Restoration Economic Feasibility Analysis" (Forest Resource Enterprises, November, 2006), mechanical tree removal systems to be considered consist of helicopter, tractor, and cable systems. The helicopter system is the most expensive method but is considered necessary to avoid the building of temporary roads for access.

The designated landings and several of the roads that access the project area will need minor reconstruction and pre-haul maintenance work. The estimated positive residual value were for Douglas-fir trees >=10" dbh considering removal costs including transportation. A positive residual value means that costs will be offset by the revenue generated and thus will be feasible to accomplish.

Tree Removal System	Estimated Acres	Estimated Average DBH Removed
Helicopter	492	
Ground based	588	
Cable	31	
Total	**1111**	14.6
Non-Mech Thinning	1399	
No thin-buffers	290	
Total project – ALT 2	**2800**	

Attribute	Helicopter	Ground Based	Cable
Acres with positive residual value	492	588	31
Estimated total value, positive residual value	$ 228,381	$ 880,218	$ 39,591

It is assumed that, due to the acres listed above with positive value, stewardship funds will be available to cover the cost of removing the <10" dbh trees as per the prescription, pile slash, and create the necessary fire breaks in the mechanically entered areas. The helicopter areas may be treated separately if necessary (when costs are at a level to make it feasible to proceed). All other mechanically thinned areas are currently scheduled for implementation in 2008.

Total cost for the 1,399 acres of <u>non</u>-mechancial thinning @500.00 per acre is $699,500.00.
At the current CRGNSA federal allocation rate of approximately $100,000.00 per year, it will take more than six years to complete. Prescribed underburning will cost approximately $250.00 an acre to implement. At the current CRGNSA federal allocation rate of $50,000.00 a year, prescribed fire could proceed at approximately 200 acres per year unless funding is increased.

<u>ROAD MAINTENANCE COST SUMMARY</u>
The table which follows summarizes the estimated costs for road work associated with hauling logs, including an estimated cost for landing development from the earlier cited reference by Forest Resource Enterprises. The cost of acquiring easements where required is not included in this table.

Summary of Estimated Costs for Local Access Road Work

Access Road	Length, Miles	Minor Reconst.	Road Maint.	Develop Landings	TOTALS
3119267	1.1	$0	$2,200	$500	$2,700
BPA-3119097	0.6	$800	$1,500	$500	$2,800
Landing, Sec.3	0.1	$1,500(1)	$0	$500	$2,000
Upper Major Creek Road	1.4	$0	$1,600(2)	$500	$2,100
3110320	0.8	$0	$1,600	$500	$2,100
3110322	0.4	$0	$800	$500	$1,300
3110324	0.7	$0	$1,700	$500	$2,200
BPA-3112300	1.1	$1,000(3)	$2,400	$1,000	$4,400
Atwood Road	0.3	$0	$700	$0	$700
1230020	0.6	$2,700	$3,200	$500	$6,400
3112304	0.3	$0	$1,200	$0	$1,200
3112306	0.5	$0	$1,200	$500	$1,700
TOTALS	8.9	$6,000	18,100	$5,500	$29,600

(1) Includes traffic control on Snowden Road.

(2) Estimated work for milepost 0.7 to milepost 1.4. Final work required depends upon Klickitat County requirements.

(3) Includes item a) only from the above table "Roads with Minor Reconstruction Work to Allow Log Truck Access".

2.4 - MONITORING AND EVALUATION NEEDS

The following monitoring needs were developed using an adaptive management stance with regard to this project. The areas treated in the first year of implementation would be monitored and the information gained would be used in the next year's implementation. It will afford information for better implementation as the project progresses over time:

Implementation Monitoring

Evaluate the efficiency of the implementation by answering the following:

- Did marking guides fully represent the prescriptions
- Did thinning results match prescriptions?
- Were applicable implementation requirements reflected in contracts?
- Were all implementation requirements useful?
- Were all implementation requirements carried out?

Effectiveness Monitoring

- Evaluate the effectiveness of the implementation requirements.
- Evaluate riparian area buffer treatments with reference to bank stability.
- Evaluate the changes in fire size and intensity over the landscape.
- The CRGNSA Archeologist should field review treatment areas that are adjacent to protected heritage resources to determine if the avoidance measures adequately avoided the resource or if the treatment revealed a larger area than was previously found.
- Measure percent area with encroaching Douglas-fir.
- Measure percent area with large, well spaced, pines and oak
- Measure any change in number of western gray squirrel nests in project area.
- Measure acres reduced ladder fuels.

If we assume that this stand is a fir dominated East Conifer or Northern East Conifer stand, then the above is a possible DFC of a well-spaced cathedral forest with a potential for very large trees.