

Silvicultural Prescription

Little Jackson Adaptive Silviculture for Climate Change (ASCC) Project

Pagosa Ranger District San Juan National Forest

Prepared by: Steven B. Hartvigsen (Retired), Matthew Tuten and Lance A. Asherin

NEPA Document: Little Jackson Forest Health and Restoration Project Environmental Assessment and Decision Memo, authorized by Kevin C. Khung, District Ranger, September 9, 2007.

Watershed: Turkey Creek.

All treatment units are located in areas designated as suitable for timber production; suitable for a regularly scheduled timber harvesting program (San Juan National Forest, Land Resource Management Plan 2013)

Treatment Units: There are 4 treatment areas containing 12 thinning units for a total of 360 acres.

Purpose of treatments:

- 1) Reduce stand densities, improve stand structure, and remove trees of poor individual health.
- 2) Remove fire-, disease-, insect-, and drought-susceptible white fir while favoring species resistant to these disturbance agents.
- 3) Remove associated conifers in areas with aspen overstories.
- 4) Break up crown fuel continuity, particularly ladder fuels, and remove fuels via harvest or burning activities.
- 5) Provide study areas for research related to Climate Change.

Stand Exam Data: The stand exam for the Little Jackson ASCC project area was collected in 2014.

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Site Description:

- Elevation: 7,400 to 8,600 feet.
- Slopes: 0 – 35%. Most of the stands are on gentle to moderate slopes (less than 25%).
- Aspects: variable – across all aspects.
- Soils:
 - The predominant soils of the treatment units are classified as Mollic Hapludalfs, fine-loamy, mixed, Vertic Hapludalfs, fine, smectitic, and Alfic Argiudolls, loamy-skeletal, mixed. They are very deep and well drained. Soil compaction potential is moderate due to the high clay contents. Soil erosion hazard is slight to moderate.

DESCRIPTION OF STANDS:

History and past activities: Fire-scar dating by Ros Wu indicate a pre-settlement fire regime characterized by low-intensity, high-frequency surface fires (Fire Regime Group I). Prior to approximately 1871 (the last year that tree records indicate widespread fires), fires occurred on average every 15 years.

Stumps indicate that the area was lightly logged about 50-60 years ago. Logging was scattered, in pockets (e.g., above Turkey Creek). Trees of various sizes were removed on the lower slopes. In the mid-1970's, the first significant timber sale took place and the existing road network was established. This appeared to be a prep cut of a two-stage shelterwood. In addition, this area has been used by locals for personal-use collection of firewood and posts/poles, again, primarily on the lower slopes.

Despite past harvest, pre-settlement trees can be found throughout the analysis area and treatment units.

Structure, Density, and Composition: Refer to Appendix D for stand characteristics of each Treatment Unit.

Treatment units include:

- Warm-dry mixed conifer: mixed ponderosa pine with white fir, and Gambel oak understories, grading to scattered pine with Douglas-fir and white fir, some oak, some aspen intermixed.
- Densities vary widely, due to the wide variety of aspects slated for treatment.

Insects/Diseases: Western bark beetle is present in the project area and has been killing individuals, or pockets of ponderosa pine, for several years. The risk of beetle-caused mortality is considered high due to high stand densities and greater-than-normal beetle numbers. Dwarf mistletoe is somewhat scattered.

To a much greater degree, extensive mortality of white fir has occurred, peaking from around 2004-2006. This mortality has been attributed to a combination of the late 1990's-early 2000's drought, coupled with fir engraver beetle striking trees already heavily infected with multiple species

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of root disease, plus extensive fir broom rust foliage infections. A site visit by Forest Health Protection specialist, Tom Eager, confirmed these mortality agents.

Douglas-fir beetle continues to selectively attack and kill large diameter (generally pre-settlement) DF.

Wildlife: The project area serves as transitional or summer range for big game. Stands within the project area provide thermal cover for elk and deer. Other species present in the area include Merriam's turkey, Abert's squirrel, green-tailed towhee, hairy woodpecker, mountain bluebird.

Recreation/Traditional Uses/Visuals: Recreational use is greatest during the fall big-game hunting season. Spring turkey hunting season sees moderate use.

Visitors have historically used the area to harvest firewood, posts and poles, and other miscellaneous forest products.

Visual quality is of moderate concern. The Jackson Mtn Road is widely used as a corridor to access the Turkey Creek trail to reach the Weminuche Wilderness.

Utility and Transportation Corridors: A LPEA powerline and Excel Energy natural gas line share the same utility corridor, immediately north of and paralleling US 160 as it skims the southern portion of the analysis area.

Fuels: Fuels range from moderate to heavy loading in the bulk of the warm-dry mixed conifer where a) white fir has expanded its range downslope into pine-dominated areas, already dense with thick, often tall Gambel oak, and/or where b) Douglas-fir, pine, white fir, and/or aspen, often mixed with thick brush, is both dense with live fuels and increasingly subjected to white fir mortality and subsequent tree-fall, adding to ground fuels. Ladder fuels are present to a great degree, from down and dead fuel, oak, and saplings or poles of white fir (and to a lesser degree, Douglas-fir).

Cultural Resources: A cultural survey for the original Jackson Mountain Timber Sale (a much larger-scale project) was completed in the late 1990's. Only one lithic scatter was found that warrants further attention and protection. This site is well outside the proposed treatment units.

Desired Future Condition: The desired future condition for these stands is a diverse, healthy, vigorous forest landscape possessing the resilience of a naturally functioning ecosystem. The DFC of each experimental treatment varies, refer to Appendix B.

- 1) Warm-dry mixed conifer stands exhibiting a more open and multi-cohort structure with a diverse understory of grasses and herbaceous vegetation, with Douglas-fir sharing dominance (generally to a lesser degree) with pine.
- 2) A large tree character is readily visible across the landscape in pine or mixed conifer stands.
- 3) Healthy aspen clumps mixed with mixed conifer; areas of pure aspen of various size classes, including seedling and small poles.
- 4) Areas of white fir, generally of the same size class (to reduce western spruce budworm defoliation), with vigorous crowns.

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- 5) Diverse age- and size-classes reflecting good individual tree health, in stands with only endemic levels of insects, disease, and parasitic plants.

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Introduction: The modification of the original timber sale design and silvicultural prescription is for the purpose of applying varying active management strategies – i.e., climate change adaptation options (after Millar et al., 2007) of resistance, resilience, and transition – to a specific forest cover type, warm-dry mixed conifer, and monitor long-term changes in order to assist managers in integrating climate change into silvicultural planning and decision-making.

Refer to Appendix A for descriptions of the climate change adaption strategies/options (i.e., resistance, resilience, and transition).

Other supporting information regarding initial project specific desired future conditions, objectives, and tactics attributed to each climate change strategy/option can be found in Appendix B. This information was generated during a March 2014 workshop, designed to draft these goals for this project.

The original silvicultural prescription, composed in 2007 prior to timber designation for the Little Jackson Timber Sale, is found in Appendix C. The reader is encouraged to review this prescription to provide a background on the original project and for general conditions within warm-dry mixed conifer stands to be treated. (Note: this prescription will be applied to portions of contract area cutting units that fall outside of the experimental treatment units.)

Experimental Design: Experimental “units” will range from 20-40 acres each. There will be four replicates, each replicate having one control unit that corresponds to three treatment (resistance/resilience/transition) units. Hence, there will be 16 total units. The treatment units were chosen from already existing thinning units from the original Little Jackson timber sale (LJTS). The selection of treatment units was based on the following factors: a) contiguous (or nearly so) thinning areas at least 75 acres in size or larger (to encompass the three adaptation options), and b) consistency in geographical characteristics (i.e., elevation, slope, and aspect, and c) consistency in vegetation characteristics (forest structure and composition). Each associated control unit was selected from near/adjacent stands, not included in the LJTS, but deemed best to meet the above corresponding factors for their respective treatment units. (The numbering sequence is as follows: C1 [control 1] is associated with T [treatment] 1a, 1b, and 1c.)

Refer to Appendix E and Marking Guides for a more detailed description of the treatment areas.

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<i>ASCC treatment unit</i>	<i>acres</i>	<i>little Jackson timber sale cutting unit</i>	<i>climate change treatment</i>	<i>comments</i>
T1a	29.3	3 & 4	transition	
T1b	28.6	3 & 4	resistance	
T1c	27.9	3 & 4	resilience	
T2a	32.3	15	transition	lower/eastern portion of cutting unit
T2b	32.6	15	resistance	upper/western portion of cutting unit
T2c	37.9	16	resilience	
T3a	26.6	12	resistance	
T3b	23.9	10A	resilience	
T3c	24.5	10C/10B	transition	“+” is part of Laughlin/Jackson CE/DM added ground
T4a	30.8	7A, 8	resistance	
T4b	26.8	7A	resilience	
T4c	28.0	7A, 8	transition	

Purpose: Three climate change adaptive silviculture strategies are to be applied to study the effects on the forest. This will be accomplished by varying the arrangement, species composition, and the basal area represented by 5 inch diameter classes.

Treatment: The bulk of thinning treatments will be- Improvement cutting of warm-dry mixed conifer, and aspen stands (outside of coppice patchcuts).

Following timber harvest, additional thinning of understory trees may be undertaken to rid stands of seedling or sapling sized white fir, via mastication, biomass utilization, and/or other means.

Goals:

Resistance Strategy : Actions that improve the defenses of the forest against anticipated changes or directly defend the forest against disturbance in order to maintain relatively unchanged conditions.

- Maintain species composition in approximately current proportions of ponderosa pine, Douglas-fir, white fir, aspen
- Reduce BA by 40-60% within 5 years
- Create even spacing as possible
- Keep the large ponderosa pine/Douglas-fir., keep old ponderosa pine/Douglas-fir/White fir
- Retain clumps of healthy aspen
- Maintain large-diameter ponderosa pine and Douglas-fir snag component (15 in and greater)
- Reduce ladder fuels, small tree density

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Resilience Strategy : Actions that accommodate some degree of change, but encourage a return to a prior condition or desired reference condition following disturbance.

- Selectively remove White fir, favor ponderosa pine and Douglas-fir for retention
- Reduce BA by 40-60%
- Create openings up to 1-2 acre (not for tree regeneration)
- Relative densities: 60-70% ponderosa pine, 20-30% Douglas-fir, 20% White fir/aspen, <10% oak composition
- Promote clumpy, multi-cohort stand structure
- Retain clumps of healthy aspen, if aspen clumps have >30% mortality, then coppice (trigger point)
- Maintain large-diameter ponderosa pine and Douglas-fir snag component (15 in and greater)
- Reduce ladder fuels, small tree density
- A clump is defined as a single cohort group of trees growing within close proximity to each other such that growth form and/or crowns are affected by adjacent trees. The average distance between trees in a clump will vary depending on tree size.
- Clump sizes range from 1/20 to ¾ of an acre with 2 to 40 trees. Most of the time, clumps will run from 3 to 8 trees in size.
- Openings between clumps will be up to 1 acre in size (though generally smaller – these are productive sites where greater density is expected) and will be variable in size, shape and pattern. Generally, markers will be increasing the size of existing openings by 20-40%.

Transition Strategy Actions that intentionally accommodate change and enable ecosystems to adaptively respond to both new and changing conditions. The transition option combines adaptation concepts that are frequently referred to as *response* and *realignment*.

- Retain, in priority, ponderosa pine, Aspen (N slopes or swales), Rocky Mountain Juniper, Douglas-fir
- Remove **all** White fir
- Target BA of 40
- Sanitation treatment (trigger point – implement to hit average canopy openness targets of 30-40%)
- Plant ponderosa pine if compositional target (trigger point) is not attained
- Enhance existing openings
- Maintain large-diameter ponderosa pine and Douglas-fir snag component (15 in and greater)
- Reduce ladder fuels, small tree density

Follow-up Burning: Following harvest treatments, initiate a recurring (5-15 yr. interval) prescribed burning program to manage understory vegetation, prepare the forest floor for natural tree regeneration, encourage establishment of fire-tolerant understory herbaceous vegetation, reduce

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and manage accumulated activity and natural fuels, and recycle nutrients locked up in duff, litter, and humus layers. The first burn should be conducted as soon as possible after completion of the thinning. A second prescribed burn should be planned for 5 to 8 years after the first burn.

Detailed Activity Summary

Activity	Activity Code	Year	Description
Single tree selection cut	4154	2016-2018	Fell and/or remove timber; timber sale, stewardship or service contract
Rx burn	1010, 1111, 4491, 4541	2019-2021	Rx burn for activity and natural fuels reduction, site prep, ecosystem restoration; approximately 2 yrs. after harvest
Rx burn	1110, 1111,	2023-2026	Repeat Rx burn for activity and natural fuels reduction, site prep, eco-restoration; approx. 3-5 yrs. after 1 st burn
Rx burn	1110, 1111,	2034, 2044, (approx.)	Repeat rx burn for activity and natural fuels reduction, site prep, ecosystem restoration, at 5-15 yr. intervals
Silvicultural exam and diagnosis	4320, 4315	2022, 2026, 2035	Monitor stand development and examine for treatment potential
Monitor for insect/disease and animal damage	4343	2017+	Throughout mgmt. period with emphasis 1 to 2 years following treatment activities

MITIGATION

Refer to the Environmental Assessment and Decision Notice for information on mitigation.

Reviewed and Certified by: /s/_____ Date:_____

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Certified Silviculturist