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Jackson Advisory Group Recommendations to the California State Board of Forestry and CAL FIRE on Late Seral Development Prescriptions for Brandon Gulch Timber Harvest Plan

[Italics used to denote notes or outline material to be developed]

1. Introduction

Excerpts from Charter and other guiding documents --recognizing the primary JDSF goal of timber management, the secondary land use of recreation, desire to enhance broad ecosystem values, and advancement of late seral conditions. (Appendix 1).

Settlement agreement calling for revision of THP and setting goals for prescription. (Appendix 2)

2. Existing stand conditions (see Appendix 3a)

The Brandon Gulch timber harvest area is located within the south fork of the Noyo River watershed (Figure 1, aerial photo). Productivity is Site Quality II and III with considerable variability across the area. The forest has grown up after early logging in the late 1800s and early 1900s and averages 129 trees per acre greater than 12 inches dbh with an average basal area of 373 square feet (Appendix 3b). Species composition is 70 percent redwood, 20 percent Douglas-fir, 5 percent grand fir and hemlock, and 5 percent hardwoods. Diameter distribution by species is shown in Figure 2 *(to be taken from Appendix 3c).*

Dominant and codominant trees have good form and vigor with few epicormic branches, bole cavities, or broken tops.

There are approximately three snags per acre greater than 20 inches in diameter and are primarily young growth Douglas-fir. Down logs are infrequent. Old growth stumps commonly have basal hollows or cavities.

Brandon Gulch has been surveyed for potential marbled murrelet nesting habitat with no apparent likelihood of "take or impact". Surveys for northern spotted owls have shown the presence of activity centers within 1.3 miles. Streams are well-shaded but lack large woody debris desired for good coho salmon and steelhead trout habitat.

Recreation on the area is currently at a low level consisting of one day-use area, several campgrounds, and recreational trails (Roads 360, 362, and 1000) used by hikers, bikers, and equestrians.

The area has historic logging and railroad sites as well as evidence of use by Native Americans.

3. Desired stand conditions (See Appendix 4)

As redwood stands move to late seral stage, species composition will likely have a higher proportion of redwood with reduction in associated species. Old forest canopy densities range from approximately 20 on alluvial sites to 150 trees per acre on the relatively lower site qualities. Older forests at JDSF, which grow on sites of medium quality, will have higher average stand densities, smaller average tree size, and lower relative proportions of redwood.

Older redwood stands have highly variable vertical structure with Douglas-fir limited to the upper canopy and shade-tolerant species at lower positions. Understory plants will likely increase in abundance as light becomes more available as stands age. Also as stands age, aggregated spatial patterns of redwood clonal clumps typical of younger stands become less distinct due to self-thinning.

Tree size is primarily a function of growing space and site quality. When conditions are ideal, such as on alluvial flats, it is possible to grow an eight-foot-diameter redwood tree in 100 years. On the less productive JDSF, attainable tree size will be higher on the more productive lower slopes (Site Quality II) and lower on the upper slopes (as low as Site Quality 5) with most sites at Jackson in the middle of the site quality scale. *[Refer to Lindquist & Palley second growth yield tables even though these are for "fully-stocked stands"?]*.

Large trees eventually become naturally-fallen large logs that commonly persist on the forest floor for as long as the tree stood. These logs and coarse woody debris stabilize soils, provide substrate for conifer regeneration as well as habitat for wildlife. On upland sites, these structures may occur on 10-20 percent of the forest floor.

Old growth redwood stand characteristics can be illustrated in terms of species/size class distributions. *[Provide graphs from Caspar OG 1929 and other illustrative material showing stand condition and development?]*.

4. Recreation and aesthetic considerations (See Appendix 5)

Roads and trails. Roads 360, 362, and 1000, are used by hikers, horse riders, and trail bike riders and are valued for providing aesthetic experiences and overviews of the Forest. Trails used by equestrians should provide adequate width and overhead height clearance. Sherwood Trail should be maintained to prevent erosion. Trails should have larger setbacks on the downslope side to lessen visible impacts of timber harvesting. Trails along streamsides are especially scenic, consequently the setbacks, particularly along Brandon Gulch and the North Fork of the Noyo River will be protected according to State Forest Practice rule requirements. *Any more specific guidelines? See additional note page 7.*

Existing campsites provide a remarkable sense of solitude and therefore careful attention is required to ensure adequacy of setback size. Recommended setback size is xxxx. Thinning, if used in the setback areas, should be limited to enhancing understory development and future screening.

Cable corridors should, as far as possible, be aligned at angles to trails to minimize visibility.

Landings and access routes should be minimized to restrict invasion of exotic plants and old landings should be cleaned up and planted unless being reused. All access roads and landings should be decommissioned by covering with slash to limit use, stabilize surface soil, and to assist regeneration and understory development.

5. Wildlife Considerations (See Appendix 6)

The California Wildlife Habitat Relations model, although not explicitly designed to model "late seral" as a distinct type, permits the projection of likely wildlife occurrence in redwood forests of Mendocino County. Redwood stands were predicted as having 167 wildlife species. Of these, none were found exclusively in young stands, 123 species were likely to occur only in older forests having elements such as decadence, down woody material, trees greater than 24 inches dbh, and a multi-layered canopy with cover from 40-60 percent, and 44 species were likely to occur in both conditions. The model predicts that 60 species were insensitive to stand conditions, 56 minimally sensitive, 19 species moderately sensitive, 9 species strongly sensitive, and 23 species predicted to have no habitat value in young stands (e.g., Vaux's swift, spotted owl, giant salamander, and possibly Pacific fisher). *These predictions suggest that ……. (Brad?)*

6. Forest Ecosystem Considerations

Biological diversity (fauna and flora) should be evaluated prior to the first and second entries to determine what management activities are needed to ensure long-term conservation of existing or needed species common to late seral forests in the Brandon Gulch area (see JDSF Management Plan page 107). Attention should be addressed not only to the presence of these species, but ensuring conditions for diverse and healthy ecosystem processes and functions. As stated in the Management Plan (page 108), survey protocols should be established after consultation with state and/or federal agencies, recognizing that the Brandon Gulch area is not designated primarily for research purposes.

7. Recommended Prescription

One prescription of two entries is recommended for Brandon Gulch. Prescription emphasis is on accelerating the development of the basic elements of late seral conditions in the context of timber management and enhancement of recreational opportunities within a 100-year period (Appendix 2).

The difference between this JAG-recommended, single prescription and standard prescriptions with a timber management focus is its emphasis on the development of complex, multi-layered forest structure, avoidance of regeneration, emphasis on diverse horizontal stand variability, and provisions for enhancing ecological diversity. Focusing on vertical stand structure results in prescribing treatments in terms of overstory, mid-story, and lower story canopy strata that are more directly linked to management goals that include concerns for recreation, wildlife, ecosystem diversity, and wildfire behavior. This approach will need translation from conventional forestry prescriptions that are primarily expressed in terms of diameter classes.

To provide guidance on the sensitivity of redwood stands to alternative prescriptions, ten preliminary runs projecting growth and yield were made using the CRYPTOS model and a 60-year growth period. The model showed relatively little sensitivity to different prescriptions of light, medium, and heavy partial harvests in terms of likely tree size, basal area, volume, and yields. The MASAM model, developed to project leaf area development and run using the same CRYPTOS prescriptions, provided insights into regeneration development and similarly suggested little difference among the prescriptions tested. The three light, medium, and heavy treatments are all likely to result in rapid crown closure that will limit regeneration and the development of a younger cohort of trees (Appendices 7 and 8). Both CRYPTOS and MASAM models provide only stand average and not spatially-explicit information. Horizontal or spatial variability can only be provided through tree-marking protocols.

The following structural guidelines are recommended:

1) Species Composition (percent)

	Redwood	Other Conifers	Hardwoods
Higher Site Quality	80-90	5-15	0-10
Lower Site Quality	65-75	15-20	5-15

These species composition goals apply to the dominant and co-dominant components of the canopy.

2) Density (trees per acre)

	Site Quality	
	Higher	Lower
12-28 inches dbh	30-50	30-50
>30 inches dbh	30-50	10-30

The higher ends of these stocking targets are preferred to allow for unforeseen mortality and to ensure reliable, long-term recruitment of coarse woody debris.

3) Vertical structure and canopy density

Vertical structure is defined and obtained by application of the above species composition and density guidelines. Prescription application should be placed on the development of multiple tree layers and strata, which in turn provide light and microclimate characteristics favorable to diverse populations of understory plants, animals, fungi, and lichens.

Translate diameter distributions into 3 canopy strata.

4) Horizontal structure and spatial distribution

The prescription should be aimed at enhancing random or mosaics of spatial heterogeneity.

Regeneration will be coincident with and incidental to stand treatments, and the level of light thinning prescribed should limit light levels sufficiently to minimize the

development and competitiveness of regeneration and redwood sprouts. No attempt should be made to set targets for or to manage regeneration.

Sprouts will, generally, be thinned to variable levels to promote random stem distribution. Whole clumps will not be removed to minimize establishment of a new cohort of regeneration. Some clumps should remain unthinned to promote slow tree growth and fine tree rings. Some suppressed trees will be left to provide heterogeneity. About 10 percent of clumps should be unharvested and remain unthinned and about 10 percent of clumps should be heavily thinned.

Most thinning should be done from below and remove suppressed and some co-dominants.

5) Snags and Coarse Woody Debris

Snags: JDSF Management Plan guidelines (page 106) will be followed, and preferably exceeded, requiring no less than three snags per acre -- two greater than 20 inches dbh and one greater than 30 inches dbh -- distributed unevenly across the landscape. Active creation of Douglas-fir snags in the first entry might not be feasible due to their current condition and small size. Creation of redwood snags or snag tops is recommended as a useful demonstration of attempting to meet late seral conditions.

Coarse Woody Debris: JDSF Management Plan guidelines (page 107) will be followed, and preferably exceeded, requiring no less than three down logs per acre 20 feet long -- two greater than 16 inches dbh and one 24 inch dbh at the large end -- distributed unevenly across the landscape. If the stand is currently deficient in this material, trees should be felled to meet this goal since the Management Plan guidelines are unlikely to adequately meet levels of coarse woody debris normally found in stands approaching late seral condition.

Potential wildlife trees should be retained considering both the short-term period between treatments and the long-term period beyond the second entry. Trees retained for potential wildlife values, snags, and coarse woody debris should vary in vigor from apparently vigorous to, especially, dominant Douglas-fir that exhibit low vigor, slow-growth (finer rings), and are diseased, have heavy limbs, and cavities (while recognizing safety issues).

The presence and quality of snags and coarse woody debris should be assessed prior to the second entry and treatments developed for their enhancement.

6) Prescribed Burning

Prior to the harvesting era, the return interval for low-intensity forest fires in the Mendocino redwood forests was 5-25 years. It would be desirable to reintroduce fire into the ecosystem to reduce the levels of light fuels to reduce wildfire risk and to enhance botanical species diversity. It is recommended that, after the first prescription entry which will be done mechanically, stands be evaluated using the adaptive management principle to determine whether progress towards desired stand structure could be advanced and demonstrated by prescribed burning on suitable portions of the area. The burning would

not affect the redwood component and would promote plant diversity, create char on large, down woody material, and encourage basal cavities or goosepens. Ecologically, the preferred time for burning is in the late fall which corresponds to the normal burning period and creates desirable levels of heat. Of course, timing of burning will be governed by operational constraints.

The current, unusual, 600-acre lightning-cause fire on JDSF that burned under the canopy will provide excellent opportunities to observe and demonstrate ecological effects, ash bed that promotes rarer understory plants, tree basal scorching (particularly from radiant heat from reburned old stumps in clump centers), open basal cavities, litter removal, tree and shrub mortality, snag and coarse woody debris formation, sediment and watershed effects, all of which will guide prescribed burning goals, criteria, and prescriptions.

8. Prescription Application, Tree Marking, and Operational Guidelines

Entry 1: Time 0 yrs. Prescribe to achieve half-way target goals. Remove ~35% of existing trees. Higher proportions of trees will be removed from those diameter classes with higher numbers of trees. Encourage prescribed burning after harvest.

Entry 2: Time +20 yrs. Evaluate stand conditions and response to first entry. Prescribe new goals to reach target LSD goals in an additional +20 yrs (40 yr from initiation of first treatment). Remove perhaps ~35% existing trees with higher proportions from diameter classes with higher numbers of trees.

JDSF old-growth retention policy will be implemented (Page 104 JDSF Management Plan).

Details on the use of three canopy strata to guide prescriptions, if adopted, will need to be developed.

Tree marking should provide the larger trees variably levels of enhanced growing space. Clumps should be thinned to various levels. Small sub-dominant and suppressed trees will commonly not be marked for cutting but left for shade and site occupancy to repress regeneration -- their numbers will probably be reduced incidentally through logging operations. The better subdominants should be favored to contribute to the mid-canopy stratum.

Emphasis should be placed on developing stand variability, minimizing impacts on ecosystem components and functioning, and sensitivity to aesthetics. Stand heterogeneity is expected to increase with age and stand development.

Tanoak and other hardwoods will receive no special treatment in the first entry but will be retained for wildlife and other values. This may depart from the JDSF Management Plan guideline (page 107) of retaining hardwood tree composition at approximately 10 percent (West end of Forest) to 15 percent (East end of Forest) of stand basal area. Hardwood composition and quality should be evaluated prior to the second entry and treatments considered to balance or enhance its role in the late-seral forest.

Understory: Shrubs and groundcover should be impacted as little as possible

Legacy trees and clumps: Avoid skid trails, treatments, and logging damage that are likely to affect existing ecosystem components and structures needed to provide critical elements of ecosystem and late seral values.

Species protection and Habitat Management: Following guidelines in the JDSF Management Plan (page 110) prior to both treatment entries, the area should be surveyed for species protection using standard protocols endorsed by the appropriate federal or state agency. Protection measures should follow JDSF Management Plan guidelines (beginning page 110).

Exotic invasive plants should be controlled using guidelines established in the JDSF Management Plan (pages 10, 28, 38, 51, 93).

Logging debris away from trails and visitor use will be treated using standards within the Forest Practice Rules. If visible from trails and visitor use and on entrances to access roads and landings, logging debris should be lopped and scattered. *(current plan (pages 119 and 273) calls for "slash abatement within 50 feet of road, which I think is aimed at reducing fire risk -- OK, or should there be a "visual distance" guideline that might differ up- and down-slope?)*

Buffers and setbacks will be established according to the JDSF Management Plan (page 275) that include special considerations being given to aesthetics within 300 feet of campgrounds and day-use areas. *Additional language Peter and Vince?* Riparian buffers will conform to standards of the California Forest Practice Rules. *OK or do we want to consider variants for demonstration?*

9. Demonstration, Interpretation, and Education Considerations

Suggestions include:

- Maintain costs and other details of administration and operation for use by other landowners.
- Identify key challenges to managing for late seral development.
- Evaluate the applied silvicultural prescription for advancing late seral development.
- Identify and explain effects of treatments on ecosystem components such as understory and tanoak.
- Use interpretative signs and self-guiding trails to inform the public regarding stand growth and the use of silviculture to enhance late seral conditions.
- Old railroad up the North Fork of the Noyo River provides an excellent opportunity to provide public information on logging history and forest recovery from past logging operations that were commonly carried out both in and alongside streams.
- Encourage opportunities for diverse "outside" initiatives for demonstration (and research). One possibility is treatment(s) such as branch and/or canopy manipulation aimed at enhancing late seral development.
- Create snag-top or snag redwoods for wildlife habitat.

- Develop questionnaires to solicit hiker, camper, horse-rider and recreationist reactions to forest treatments aimed at providing timber products while moving the stand towards late seral conditions and maintaining recreation values.

10. Concluding Remarks

Brief comparison of JAG recommended prescription vs. previous JDSF THP approach from 1999 in the intent to advance late seral stage and other values.

Suggestion that JAG observe/participate/advise in application of silvicultural prescription, timber harvesting, and subsequent follow-up evaluations.

Appendices

1. Excerpts from Charter and possibly other sources giving JAG direction on late seral prescriptions.
2. Prescription goals from Settlement Agreement.

3a. Brandon Gulch Forest Stand and Resource Description

3b. Brandon Gulch UNIT FRI Report.

3c. Brandon Gulch Stand Table

4. Old Redwood Forest Stand Characteristics
5. Recreation and Aesthetic Considerations
6. California Wildlife Habitat Relations Assessment of Consequences of Late-Seral Management on JDSF
7. Summary of Projections of Preliminary Prescriptions for Brandon Gulch Using the CRYPTOS Simulation Model.
8. Projections of Leaf Area Index for Brandon Gulch Preliminary Prescriptions Using the MASAM Simulation Model.

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