APPENDICES

Recommended Late Seral Forest Development Prescription for Brandon Gulch

Report of the Jackson Demonstration State Forest Advisory Group

to

Director
California Department of Forestry and Fire Protection

August 8, 2008

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Appendix 1

Members of the Members of the Jackson Demonstration State Forest Advisory Group and the Late Seral Forest Development Committee

Mike Anderson -- Licensed Timber Operator
Kathy Bailey -- Sierra Club
*Peter Braudrick -- CA Department of Parks and Recreation (ret.), Community
*Linwood Gill -- Registered Professional Forester
*John Helms (Chair) – University of California, Berkeley (ret.)
Mike Jani -- Mendocino Redwood Co.
Mike Liquori -- Watershed Consultant
Jere Melo -- Registered Professional Forester, Fort Bragg City Council
Linda Perkins -- Conservation, Community
*Dan Porter -- Save the Redwoods League
Vince Taylor -- Environmentalist, Community
Forest Tilley -- Registered Professional Forester, Former Manager, JDSF
*Brad Valentine -- California Dept. Fish and Game

*Indicates membership on the Late Seral Forest Development Committee

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Appendix 2

Prescription Goals from Settlement Agreement

Brandon Gulch.

1. The Brandon Gulch THP shall be amended such that the treatment objective shall be "acceleration of the development of late seral forest conditions" (ALSF).

   a. The prescriptions and demonstration protocol for achieving the treatment objective shall be determined by the Director based on consideration of the recommendations of the JAG subcommittee.

   b. The plan shall be treated as a demonstration in ALSF. There shall be an appropriate demonstration protocol as determined by the Director, including objectives and a plan for educating the public, including persons using the area for recreation. Demonstration purposes shall include demonstration of the degree of compatibility of recreation with management for ALSF.

   c. More than one approach to ALSF may be applied within the plan area.

   d. The ALSF protocol and plan made here for the Brandon Gulch THP area is subject to future review by the JAG in the context of developing an overall forest landscape and management plan during the initial implementation period. The JAG may recommend modifications to the protocol and plan as part of its final recommendations to the Director for changes in the JDSF Management Plan.

2. Recreation use will be considered when devising the THP amendments. Potential harvest modifications to reduce visual impact on recreation users, including but not limited to those provided by the Management Plan and the Forest Practice Rules, shall be considered for incorporation in the THP amendments. The JAG subcommittee for providing late seral development prescriptions and protocols shall include this recreation item in its recommendations to the Director.

3. It is the intent of this process that the JAG subcommittee will provide the Director with its complete recommendations regarding changes to the Brandon Gulch THP by August 9, 2008. All materials and information needed for the preparation of a THP amendment for the Brandon Gulch sale, including the Director's decision made in response to the recommendations of the JAG subcommittee, shall be provided to CAL FIRE staff by September 1, 2008. The Brandon Gulch THP amendment must be filed with CAL FIRE by October 15th, 2008. It is intended that the provisions of this agreement shall not preclude on-the-ground timber operations on the Brandon Gulch THP from commencing by April 1, 2009. It is intended that operations to remove substitute timber from other THPs shall be able to commence by August 1, 2008.

C. Camp Three THP.

1. The Camp Three THP shall be amended such that the treatment objective shall be the "acceleration of the development of late seral forest conditions" (ALSF).

   a. The prescriptions and experimental protocol for achieving the treatment objective shall be determined by the Director based on consideration of the recommendations of the JAG subcommittee.

   b. The amended THP shall be treated as an applied research project in ALSF. There shall be an appropriate experimental protocol developed which will include objectives, measurements to be made over time, and the calculation of baseline resource inventories in such areas as timber, botanicals, wildlife, hillslope conditions, and stream characteristics. There shall be included in the protocol a plan for educating the public, including persons using the area for recreation.

   c. Development of baseline resource inventories shall be focused, practical, within available CAL FIRE resources as determined by the Director, and able to be accomplished by April 1, 2009.

   d. Ongoing monitoring shall be focused, practical, and within available CAL FIRE resources as determined by the Director.

   e. More than one approach to ALSF shall be applied within the amended Camp Three THP area. Any ALSF treatment area that includes removal of more than 30 percent of the volume of timber in the treatment area outside of protected stream zones shall be the minimum acreage necessary for scientific validity of the results of the research.

   f. The ALSF protocol and plan made here for the Camp Three THP area is subject to later review by the JAG in the context of developing an overall forest landscape and management plan during the initial implementation period. The JAG may recommend modifications to this designation as part of its final recommendations to the Director for changes in the JDSF Management Plan.

2. Recreation use will be considered when devising the THP amendments. Potential harvest modifications to reduce visual impact on recreation users, including but not limited to those provided by the Management Plan and the Forest Practice Rules, shall be considered for incorporation in the THP amendments. The JAG subcommittee for providing late seral development prescriptions and protocols shall include this recreation item in its recommendations to the Director.

3. Recreation considerations provided for the Camp Three THP area shall be reviewed and may be changed in the future as a part of the Management Plan process for the Initial Implementation Period, including the recreation planning process for JDSF that has been designated as a responsibility of the JAG during the Initial Implementation Period.

4. The harvest plan area shall be modified as shown in the accompanying map "Proposed Modifications to Camp Three THP" (Exhibit A).

a) The area enclosed marked with a pink line shall have no timber harvest activities other than as noted below.

b) The road to be constructed, highlighted in yellow, will be extended to the point shown in the original THP plan to allow, to the extent practicable, cable yarding of the area designated on the east side of the harvest area as cable yarded. No road spurs will be constructed to the west of the new road. Landings may be constructed and trees may be removed along the new road as needed to complete yarding operations. The general intent, however, is to maintain natural stand conditions along both sides of the road where it lies inside the pink line.

c) A hiking trial shall be laid out, but not built as a part of this agreement, as shown in an indicative, conceptual manner in a red dashed line on Exhibit A. Actual layout is expected to vary from the mapped line, based on on-the-ground considerations. The potential recreation use of this potential trail will be considered when devising the THP amendments. Potential harvest modifications to reduce visual impact on recreational trail users, including but not limited to those provided by the Management Plan and the Forest Practice Rules, shall be considered for incorporation in the THP amendments.

d) As indicated on Exhibit A, a portion of the harvest area of approximately 24 acres will be changed from cable yarding to helicopter yarding.

e) The exclusion of an area within the Camp Three THP area from harvesting is subject to later review by the JAG in the context of developing an overall forest landscape and management plan during the initial implementation period. The JAG may recommend modifications to the no-active-management designation for this area as part of its final recommendations to the Director for changes in the JDSF Management Plan.

5) It is the intent of this process that the JAG subcommittee will provide the Director with its complete recommendations regarding changes to the Camp 3 THP by September 19, 2008. All materials and information needed for the preparation of a THP amendment for the Camp Three sale, including the Director's response to the recommendations of the JAG subcommittee, shall be provided to CAL FIRE staff by November 1, 2008. The Camp Three THP amendment must be filed with CAL FIRE by December 15th, 2008. It is intended that the provisions of this agreement shall not preclude on-the-ground timber operations in the Camp Three THP from commencing on April 1, 2009. It is intended that operations to remove substitute timber from other THPs shall be able to commence by April 1, 2009.

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Appendix 3

Brandon Gulch Forest Stand and Resource Description

Prepared by JDSF for JAG, July 2008

The Brandon Gulch timber harvest plan (THP) area is located in Jackson Demonstration State Forest within the South Fork Noyo River watershed. The vegetation type is primarily represented by the Redwood Series (Sawyer and Keeler-Wolf, 1994), or Upland Redwood Forest (Holland, 1986) as is the adjacent area within the JDSF. The closed canopy portions of the THP has a sparse to moderate shrub and herb layer. Surveys have listed from 40 to 60 shrub, fern, forb, and grass species, which are typical of closed canopy stands in this region. The roadsides and riparian areas are richer in species. Some of the upland roads toward the east side of the THP area have the sole occurrence of an endangered plant, *Astragalus agnicidus* (Humboldt milk-vetch). Roadsides also have additional grasses and forbs, including non-native species. These areas also have invasive weeds; most notably jubata grass and French broom.

The forest in the area consists of young redwood/Douglas-fir forest that regenerated following early logging of the old-growth forest in the late 1800s and early 1900s. Following the early logging and burning, the forest was left to regenerate naturally. Most of the young redwood on site is arranged in clumps around the stumps of the former old-growth trees, and appears to be the result of sprouting from the stumps and root crowns. The young Douglas-fir on site is the result of natural seeding from residual trees that survived the logging and burning that occurred. Other tree species present include grand fir, hemlock, tanoak, and madrone. Scattered remnant old-growth trees exist at a density of approximately one tree per 10 acres. Alder and willow are present in a narrow strip along Brandon Gulch and the North Fork South Fork Noyo River.

Disturbances:
The forest in the area exhibits the effects of fires subsequent to the original logging of the old-growth. This general area is adjacent to historic logging camps, where fires were intentionally set up until the 1930s or 1940s in an effort to maintain open ground for cattle grazing. Aerial photographs of the early 1940s exhibit grassy openings and lightly stocked areas, primarily along east and south-facing slopes. Evidence of these fires within the current stands includes fire scar on some of the larger young trees, including basal cavities in some young redwood primarily high on east and south-facing slopes where fires could be expected to be more intense. More recent disturbance has occurred on a smaller scale from mortality associated with in patchy wind damage and low vigor Douglas-fir and tanoak. Former grassy openings were planted with Douglas-fir seedlings during the 1960s. These small patches of pole-sized Douglas-fir exist primarily along the lower east and south-facing slopes.

The forest within the area averages 129 trees per acre greater than 12 inches in diameter (DBH). Of this total, young redwood represents 70% by number, young Douglas-fir 20%, grand fir and hemlock 5%, and hardwoods 5%. The tree diameter range within the area varies from several inches to over 50 inches. Most of the hardwood is substantially smaller in diameter and much shorter than the codominant conifers, occupying a mid- to understory canopy position.

The basal area of all trees greater than 12 inches in diameter averages 373 square feet per acre. Of this total, young redwood represents 72%, young Douglas-fir 22%, grand fir and hemlock 4%, and hardwoods 2%. Total conifer volume averages 82,000 board feet per acre (gross Scribner Scale, 12 inches DBH+). Of this total, young redwood represents 65%, young Douglas-fir 30%, grand fir and hemlock 5%.

Stand Variability:
Stand conditions vary considerably depending upon local soil, aspect, slope, and prior disturbances. On west to south-facing slopes, there is greater evidence of past fires than on the cooler, shaded north and east-facing slopes. These fires probably resulted in early fir mortality, providing additional growing space for redwood and the tanoak between redwood clumps. Redwood tree diameter tends to be larger where fir does not compete significantly in the upper canopy. On north to east-facing slopes that lack evidence of fire, cooler and more moist conditions have resulted in higher fir stocking, but this condition is quite mixed. Where fir and redwood regenerated coincidentally, the fir competes favorably with the redwood, and has obtained a significant height and diameter which is often greater than the redwood growing in immediate competition at the canopy level. Stand-level inventory data suggests that the Brandon Gulch timberstand is quite variable, particularly the Douglas-fir and hardwood component (see stand table variance statistics attached).

Structural Elements:
The crowns of dominant and codominant young trees are primarily of good form and vigor, with limb structure typical of vigorous young stands of this age class, containing few epicormic features, bole cavities, or broken tops.

Snags number approximately 3 per acre (>20 inches DBH), and are primarily young-growth Douglas-fir. Down logs are infrequent, consisting of wind-thrown young Douglas-fir and remnant old-growth redwood remaining from the original logging of the old-growth. Old-growth redwood stumps are persistent in the area, many of which contain basal hollows or cavities. Incidental mortality of suppressed small-diameter redwood, Douglas-fir, and tanoak continues to occur due to competition with the larger, more vigorous overstory trees. This has produced very small diameter snags (2 per acre, most <12 inches DBH).

Geology and Soils:
Published geologic mapping shows the timber sale to be underlain by the Tertiary-Cretaceous Coastal Belt of the Franciscan Complex. This unit consists of well-indurated and locally cemented clastic sedimentary sandstones, siltstones and mudstones, with minor amounts of limestone. Coastal Belt Franciscan volcanic rocks were observed in two locations. The bedrock is mantled by a veneer of colluvium that is typically thickest in the axes of the swales and watercourse channels (Bawcom 2002).

The soils within the THP area principally include the Irmulco-Tramway complex (Ritteman, et. al., 1999), along the lower and mid-slope areas, with the Vandamme complex limited to the major ridge-top area. A minor amount of the Dehaven soil complex is located along Brandon Gulch. These soils are deep and very deep, gently sloping to very steep, well drained soils that

have little seasonal fluctuation in soil temperature and that formed in material weathered from sandstone, on hills.

Conifer growth potential, expressed as site index, is estimated to be Site II and Site III for redwood (50-year base age), based upon relatively small samples obtained in the forest inventory process (FRI) and the original soil survey. There appears to be considerable variability in site potential across the landscape, based primarily upon site-specific soil depth and soil texture.

Wildlife and Fishery:
Wildlife analysis has focused primarily on listed species. The area was evaluated for potential marbled murrelet nesting habitat in 2002, both from a helicopter and the ground. DFG biologists concluded that the timber operations as planned did not appear to "take or indirectly impact MAMU. Northern spotted owl surveys have been conducted annually for almost a decade. Brandon Gulch has several JDSF based activity centers within 1.3 miles, MD 551, 237, 523 and 163. There are two additional activity centers to the north on private timberlands.

Miscellaneous observations near the THP include western tailed frog, Cooper's hawk, osprey, bobcat, and bear. In 2002, limited raptor surveys were conducted, with no detections at the THP site.

The Brandon Gulch THP area is located adjacent to the North Fork of the South Fork Noyo River and Brandon Gulch, a Class I tributary. These streams are habitat for coho salmon and steelhead trout. DFG conducts annual surveys in the area for spawning adult salmonids, resident juvenile fish, and downstream migrants or smolts. The streams in the area are generally characterized as being well shaded but lacking in large woody debris and deep pools, and having an elevated level of fine sediment. Local research has found that a substantial amount of the current sediment supply originated during the original logging of the old-growth forest, and that a significant amount of this historic sediment has been flushed from the stream system during high stream flows over the past 100 years (Koehler et. al. 2001). Large woody debris was removed from the stream system from the 1950s to the early 1990s.

Recreation:
The Brandon Gulch area is utilized for public recreation, though recreational use is low relative to most local coastal state parks. The Camp One day-use area is situated at the confluence of the North Fork South Fork and the South Fork Noyo River, and is a popular site for picnicking, as well as a starting point for hikers, equestrians, and bicyclists. Several campgrounds and individual camp sites are located along the North Fork South Fork Noyo River adjacent to forest road 360 and 361, and within 300 feet of the harvest area. Two hike-in camp sites are located within the Brandon Gulch watershed upstream of the THP area. These two sites are infrequently maintained and rarely utilized. A recreational trail extends along Brandon Gulch (Roads 360 and 362), and equestrians often make loop rides along existing roads in the Brandon Gulch and lower South Fork area, including Roads 1000, 363, and 380. Trails are utilized primarily by equestrians and hikers, though bicyclists use these roads and trails on occasion. Illegal ATV use also occurs on the roads and trails. Though the area is heavily forested, occasional narrow vistas exist along some of the mid to upper slope roadways.

Heritage Resources:
Heritage resources in the general area consist primarily of historic logging and logging camp-related artifacts. The historic Caspar Lumber Company railway once ran along the North Fork South Fork Noyo River, and there were several logging camps located in the general area between 1904 and 1920. Evidence of historic grades and other logging-related excavations exist in several areas along the lower slopes and major watercourses.

Highly disturbed Native American sites exist along the ridge-top road areas well outside of the THP to the north and east. Evidence of Native American use consists primarily of lithic scatter associated with the making and use of stone tools. These sites were likely utilized temporarily on an annual basis, being located along trails between inland areas and the coast.

References:

Bawcom, J. (2002). Engineering Geologic Report Brandon Gulch 2000 Timber Sale, California Resources Agency, Department of Conservation, Division of Mines and Geology, Memorandum to Ross Johnson, Deputy Director, California Department of Forestry and Fire Protection.

Koehler, R.D., K. I. Kelson, G. Mathews (2001). Sediment Storage and Transport in the South Fork Noyo River Watershed, Jackson State Forest, William Lettis & Associates and Graham Matthews & Associates.

Ritteman, Carl, Thor Thorson (1999). Soil Survey of Mendocino County, Western Part , United States Department of Agriculture, Natural Resources Conservation Service.

Appendix 4

Brandon Gulch Unit Forest Resource Inventory Report

FRI Stand Table (Average Stems per Acre)

Brandon Gulch THP

DBH	Young RW		Old RW	Young D-fir	Old D-Fir	Grand Fir	Western Hemlock	Bishop Pine	Other conifers	**Conifer Subtotal**	TO	Other Hardwood	**TOTAL**
6				7.0						7.0	21.1		28.1
8	9.9			5.9						15.8	4.1		19.9
10	7.6			10.4						17.9	4.9		22.9
Subtotal		17.5		23.3						40.8	30.0		70.8
12	9.9			5.5						15.4	1.8		17.1
14	10.3			2.6		1.9				14.8	3.2	0.6	18.5
16	7.8			2.9		0.5	0.5			11.7	1.0		12.7
Subtotal		28.0		11.0		2.4	0.5			41.9	5.9	0.6	48.4
18	11.7			2.0						13.7			13.7
20	10.1			1.6		0.6				12.3			12.3
22	8.6			2.1		0.3				11.0			11.0
Subtotal		30.5		5.6		0.9				36.9			36.9
24	7.4			2.0		0.4				9.9			9.9
26	4.9			1.5		0.4				6.8			6.8
28	3.9			1.3		0.5	0.2			5.8			5.8
Subtotal		16.2		4.8		1.3	0.2			22.4			22.4
30	3.7			1.7						5.4			5.4
32	3.7			1.0		0.1				4.8			4.8
34	2.3			1.2						3.5			3.5
Subtotal		9.7		3.9		0.1				13.7			13.7
36	2.3			1.0		0.2				3.5			3.5
38	1.5			0.9		0.1				2.4			2.4
40	1.0			0.4						1.4			1.4
Subtotal		4.9		2.2		0.3				7.4			7.4
42	0.6			0.2						0.8		0.1	0.9
44	0.7			0.1						0.8			0.8
46	0.4			0.1						0.5			0.5
Subtotal		1.7		0.4						2.1		0.1	2.2
48+	0.7			0.1						0.8			0.8
Subtotal		0.7		0.1						0.8			0.8
TOTAL	109.1		0.0	51.2	0.0	5.0	0.6	0.0	0.0		36.0	0.6	202.6
Conifer Total		166.0											

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Appendix 5

Old Redwood Forest Stand Characteristics

Summary Prepared for JAG by
Dan Porter and Kevin O'Hara, July, 2008

Tree species composition: Douglas-fir and tanoak are the most likely associates of redwood in the prescription areas. Others include grand fir, western hemlock, big leaf maple, red alder, Pacific madrone, and California bay. The initial treatment to encourage development of old forest (aka late seral) structures planned for the JDSF old forest treatment areas will likely increase relative abundance of redwood and reduce other species, particularly Douglas-fir. Tanoak and other relatively shade tolerant broadleaved species may also benefit.

Density: Old forest canopy densities have been reported to range from approximately 20 to 150 trees/ac throughout the redwood range. Redwoods have dominated the stands measured but some studies still report an abundance of other conifers, primarily Douglas-fir. Nearly all previous studies were in Humboldt County and many were in highly productive alluvial sites. The JDSF old forest treatment areas are generally of lower average site quality than these studies. This probably results in higher average stand densities, smaller average tree sizes, and lower relative proportions of redwood than on the highly productive alluvial sites.

Vertical stand structure: Old redwood forests are unique in the longevity of individual trees, tree sizes attained, disturbance histories, and varied canopy architecture. The result of these factors is that redwood vertical structures are highly varied. They can range from stratifications where all height classes are present to structures where a single stratum dominates. Redwoods can occur in all canopy positions. Douglas-fir is generally limited to upper positions. Other species with greater shade tolerance can be found in other positions: however, no species possesses the longevity of redwood and rarely occupy the upper stratum in old stands. The JDSF old forest treatment areas appear to have a dominant canopy stratum with significant numbers of trees in lower and suppressed canopy positions. This is typical of a redwood forest developing after a heavy harvest treatment.

With advance age and development of old forest structure, canopy heterogeneity can be expected to increase, diversifying the understory light environment. Assuming source populations are still present, vascular plants will respond by partitioning newly created light environments. The number of vascular plant species per unit area is generally expected to increase as the stand moves out of the stem exclusion phase. However, competition, legacy affects and natural disturbance can all affect the distribution of vascular plant populations in a non-random, site specific manner.

Horizontal spatial stand structure: The ability of redwood to reproduce vegetatively results in spatially aggregated patterns of tree stems. These patterns are most distinct in younger stands and least apparent in old forest stands. Tanoak and other sprouting species also form aggregated patterns whereas other species that regenerate exclusively by seed tend to be more randomly

dispersed. The JDSF old forest treatment areas presently have strongly aggregated spatial patterns of redwood. Additionally, there are strong clonal patterns in redwood that usually transcend sprout clumps and indicate separate sprout clumps are of the same clone. Similar patterns may exist in old forest stands as well. Aggregated spatial patterns tend to decline with stand age due to competition and self-thinning within sprout clumps. Thinning within sprout clumps results in resprouting from cut stems, but the competitiveness of these sprouts depends on the light environment. Cutting all stems in a clump results in more competitive sprout response and favors development of a new cohort of trees. The aggregated spatial pattern can be reduced through thinning, but may tend to shift trees from one cohort to another rather than removing trees.

Existing evidence suggests pressettlement disturbances in coast redwood was of low to moderate severity except in specific locations prone to catastrophic, stand replacing events (i.e. inner gorges, highly unstable soils). Coupled with the longevity and shade enduring qualities of coast redwood, we can expect the horizontal structure of late seral forests to thus be predominantly uneven-aged and redwood dominated. Some pressettlement fires appear to have been severe enough to affect late seral stand dynamics by killing and reestablishing cohorts of fire sensitive conifers (i.e. western hemlock, Sitka spruce) and increasing growing space for shade intolerant species. Because the ultimate cause of moderate severity pressettlement fires (lightning or human) is difficult to discern, the resulting unimodal and bimodal distributions of associate species should be interpreted with caution.

Tree sizes: Redwood is noted for the large size of individual trees. Tree size is a function of disturbance regime, growing regime, and site quality. Genetics may also be a factor. Although redwood trees are able to withstand disturbances such as fire and wind, trees that experience fewer or less severe disturbance stresses probably live longer than others. Density of stems affects competition and trees with less competition reach greater sizes than trees with greater competition of the same age. Site quality affects the rate of growth of both stands and individual trees. Trees on more productive sites can therefore reach a given size in less time than trees on a less productive site. This favors large trees because stands become more resistant to disturbances earlier, they may be subject to less disturbance stress to reach a given size, and better sites may have less fire and wind disturbance events than poorer sites. When conditions are ideal, it is probably possible to grow an eight-foot diameter tree in 100 years. Tree sizes on lower productive sites would be proportionally less. The JDSF old forest treatment sites range considerably in site productivity ranging from productive lower slopes to relatively low productive upper slopes. On the conventional scale of site classes used for coast redwood, these sites probably range from class 5 (least productive) to class 2. The majority of the two treatment areas probably falls within the middle of the site class scale.

Large trees eventually become naturally fallen large logs that may persist on the forest floor for as long as the tree stood. Large log in upland settings or coarse woody debris stabilize soils and offer a particularly important substrate for conifer regeneration from seed in northern old-growth redwood forests. Although highly variable by site, these structures can cover up to 10 – 20% of the forest floor in upland sites.

Appendix 6

Two Redwood Stands at Rio Dell after Three Thinnings

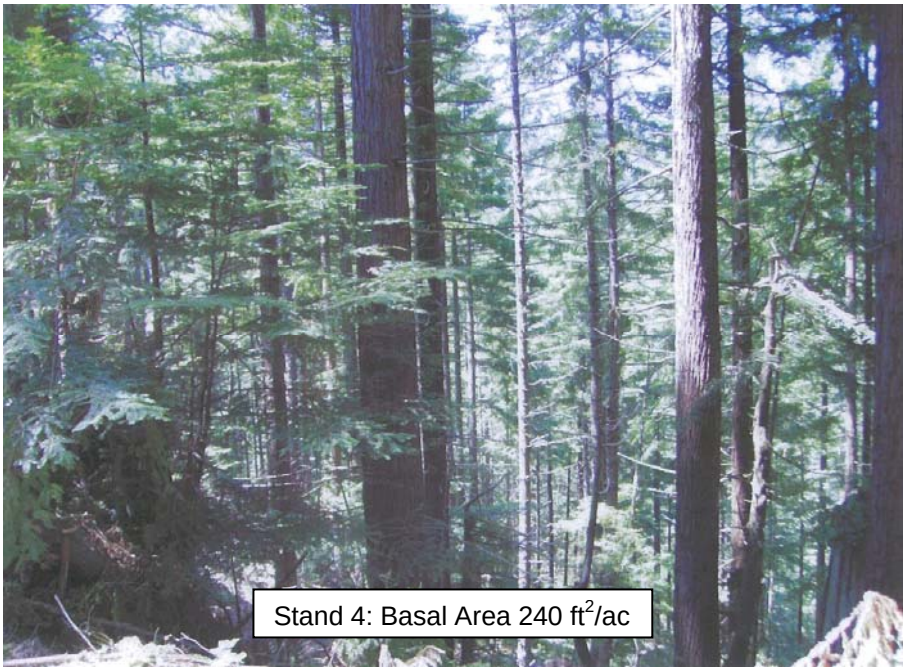
Example of Young Redwood Stands Managed for Enhancing Growth of the Largest Trees

In reviewing literature and experience in accelerating the development of late-seral redwood stands JAG became aware of current treatment of a young redwood forest with a similar management goal. A redwood forest near Rio Dell, Humboldt County, is being managed by J. Able, Consulting, aimed at accelerating the rate of growth of the best and largest trees. JAG was not able to visit this forest, but was pleased to receive permission to incorporate photos of two stands in the Appendix of the Brandon Gulch report. These photos provide visual examples of stand structure after a series of three thinning treatments.

The redwood forest near Rio Dell is growing on land of higher site quality than JDSF, consequently tree stocking would be higher and response to stand treatments would be faster than at JDSF. Stands of higher productivity permitted thinnings at 10-year intervals. Stands 2 and 4 shown below were both 60-years old in 2008. Three thinnings were made in both stands in 1988, 1999, and 2008. The third thinning in June, 2008 removed 30 percent of the basal area leaving the best and largest trees. Photos of both stands were taken after the third thinning in June 2008.

Although no details are available regarding whether any special treatments were made to enhance the development of late-seral structural elements, this forest is an interesting example of a young redwood forest with current management aimed accelerating the growth of largest trees, which is similar to one of the goals of the recommended Brandon Gulch THP prescription.

See caption on following page



Two stands each after three thinnings in a managed redwood forest near Rio Dell, Humboldt Co. Age in 2008 is 60 years. Management goal is to accelerate late-seral stand conditions. Thinned in 1988, 1999, and 2008. Last thinning in June, 2008 removed 25-35 percent standing volume to leave best trees. Photos courtesy J. Able, Consulting, July 2008.

Appendix 7

Report of Meeting of the Recreation Committee of the Jackson Advisory Group, June 28, 2008.

Recreation Committee Meeting Summary

Hikers in Brandon Gulch Jackson Forest

On June 28, 2008, the Recreation Committee of the Jackson Advisory Group (JAG) had its first meeting. In addition to Committee members Peter Braudrick and Vince Taylor, about 30 avid recreationists attended.

A brief introduction stressed that both the new management plan and the charter of the JAG mandate the development of expanded recreation opportunities in Jackson Forest. Now is the time for the community to make known its desires and to help design the recreation plan for the forest. The JAG has through 2010 to develop its recommendations for changes to the management plan. A recreation plan can be a part of the JAG's recommendations. Unlike the past, Cal Fire is receptive to public input, and there will be funding to support recreation.

Five different recreation interests were represented, with many people supporting multiple interests: Hiking, Off Road Vehicles (OHV), Bicycling, Equestrian, and Shooting. It was wonderful to see the respect, empathy, and mutual support expressed by almost everyone in the room. Everyone was excited by the obvious opportunity to see more and better recreation in Jackson Forest.

The meeting broke into sub-groups to come up with points, goals, and priorities. Then each group presented its findings to the meeting as a whole, receiving comments and questions. There were common points among the groups. Almost everyone wanted an inventory and good maps of the present trails. There was a strong desire to expand the trail system. Also, the different groups wanted to be able to find ways to let each group have its favorite recreation without harming others' pleasure in the forest.

The feeling that pervaded the meeting can be summarized in a few words: **Respect, Enthusiasm, Anticipation.**

Each group wrote up a report of the points coming out of its discussion. These are compiled here, together with two additional comments submitted separately.

The meeting was a great beginning. The next step will be a presentation of the results of this meeting to the Jackson Advisory Group at approximately 9:30 a.m., Saturday, July 12, 2008.

Peter Braudrick
Vince Taylor

Recreation Subcommittee
Jackson Advisory Group

Bicyclist Group Report

By Ray Duff

Meeting of the Recreation Committee of the Jackson Advisory Group, June 28, 2008.

Participants: Ray Duff, Rick Riley, Chris Clutton, Jim Moorehead, and Jerry Blok

Results of short-term discussion of needs for bicyclists in Jackson Demonstration State Forest not necessarily in order of importance

1. Staging areas needed for recreation. A place to park, unload and load bicycles, safe to leave vehicles.
2. Longer trails for cyclists Connector trails and loop trails preferred. Dead end trails do not offer as much enjoyment for riders. Trails that loop or connect with other trails to allow longer rides for those who want ten to twenty miles of recreational use trail.
3. Maps are needed showing all trails, include loop trails, roads, staging areas.
4. Connecting trails between watersheds
5. There are problems with homeless and dope growers in State Forest. Cyclists are aware there are people living outdoors in forest and some illegal gardens, these pose special needs and concerns.
6. Signs are needed for trails, posted at trailhead and at intersections along trail
    a. Identified trails are one way travelers do not get lost
    b. Signs advise distance to objective, and rigor of trail.
    c. Signs establish an identity for the trial that can be referred to in logging plans and decommissioning of roads.
7. Multi use trails with rating on use – these can advise on need for closure during seasons. Trail use for some trails might have to be restricted in wet weather for protection of environment, and closed entirely at certain times.
8. Signs to find Jackson State recreation areas from Hwy 20, and at Camp 1, and Red Schoolhouse.
9. Post rules for trail use at trailheads and staging areas include restricted trails; e.g. trails only for hikers, or those trails for multi use, and locations of hazards.
10. Shooters deserve a separate area away from trail users, possibly out of sound distance with location well marked for persons who might happen into the perimeter.
11. Safe access for neighbors of the JDSF. There are property owners who live against or near the Forest. These need an opening to Forest that is safe.
12. Concern for timber operations that would inhibit trail use. Logging plans ought to include alternative recreational directions. If a logging plan includes cutting

near recreational trails, an alternative area for recreation ought to be designated that is user friendly, easily accessible and in condition for use.

13. Roads may need to be decommissioned for environmental necessity, but previous road closures have left few alternatives for established recreational use. Consideration should be given to bridges, other amenities, and mitigations to promote recreational use.

14. Recreational Users of JDSF ought to be notified and allowed comment and input prior to road closures or decommission of roads.

15. A recreational crossing of Highway 20 is needed that avoids need to interface with traffic, possibly a tunnel under the highway. This would need to be a multi user passage.

Equestrian Group Report

By Forrest Tancer

Meeting of the Recreation Committee of the Jackson Advisory Group, June 28, 2008.
Participants: Forrest Tancer, Stacey Bradley, and Lorraine Duff.

1. Designate and develop multi-use trailheads including Camp 1, Schoolhouse, Road 450.
    A. improve parking access
    B. possible manure boxes
    C. toilet facilities
    D. signage designating small and large loops from trailheads

2. Develop horse water on designated trails
3. Develop network of volunteers to maintain designated trails
4. Expand and modernize existing horse camps to accommodate larger trailers etc.
5. Designate some existing camping areas at Camp 1 to allow for horses
6. Create new map of JDSF that identifies hiking, biking, ATV, Equestrian trails and shooting areas.
7. Promote JDSF as a horseback riding destination in Mendocino County

Hiking Group Report

By Nancy Banker

Meeting of the Recreation Committee of the Jackson Advisory Group, June 28, 2008.

Participants: Nancy McCarthy, Agnes Wilson, David Jensen, Jim Moorehead, Linda Perkins, Mary Lou Brewer, Annie LeBus and Nancy Banker

Nancy McCarthy provided background on the work she did 10 years ago to produce 20 hiking maps of trails in JSDF. David advised the group that there are funds available, with a grant application, to secure funds for printing maps. He will help secure the funds.

We agreed that the first steps would include:

1. Inventory the existing trails
2. Survey and mark them
3. Clean up the trails
4. Record the level of difficulty
5. Create maps and publish them
6. Make maps readily available online
7. Request an inventory from the JAG

The group members expressed a desire for:

1. More localized maps (see above) of hiking trails
2. Well marked trails and trail-heads
3. Cabins, way-stations and/or camping areas throughout so that hikers can hike in, camp for the night and continue hiking
4. Connect trails within JSDF to facilitate hiking from one area to another throughout the forest
5. Connect trails to other areas in the county such as private areas that allow public access, other public parks and forests and BLM land (ala the Coast trail)
6. Establish a "Friends of the Jackson State Demonstration Forest" to help with trail building and maintenance
7. Connect with other organizations to assist in trail-building and maintenance such as Americorps. and the local ROP office.
8. Develop theme trails, e.g., birding. botanical trails and historical trails.
9. Develop educational information and materials to help educate the public regarding the trails and the history of JSDF.
10. Create more trails to reduce the establishment of social trails.
11. Participate and support the eradication of invasive, non-native plants
12. Reserve a portion of the forest for the flora and fauna.
13. Create a vita course.
14. Connect with other agencies and organizations to assist with the development of hiking trails and their maintenance, such as the Sierra Club and the Audubon society.

Off Highway Vehicle (OHV) Report

By Ryan Whitaker

Meeting of the Recreation Committee of the Jackson Advisory Group, June 28, 2008.

OHV Group participants: Steve Colombi, Ryan Whitaker, Mark Hontou, Joye Silva & Joyce Blok. The other member who attended the meeting supporting OHV recreation, but left before our discussion, was Steve Dunlap.

OHV (ATV'S, DIRTBIKES, MOTORIZED VEHICLES)

NEEDS:

- Motorized cycle trails for ATV's, dirt bikes, (possibly jeeps)
- Staging area with camping - parking for street vehicles, bathrooms, water, trash/recycling facilities,
- Marked and maintained trails
- Ranger patrol (authority) - regulations according to state rules (sound, spark arrestors, "quiet time" hours, etc.

RESULTS:

- Revenue from campsites
- Gas purchase = % to OHV (more revenue!)
- OHV Registration (green sticker) - protect legal places to ride.
- Safe environment for kids/families to ride (demonstrate legal v's illegal to set good example for our youth)
- Exercise/skills for our children's health.
- Develop an appreciation for our environment by being responsible and legal

APPROPRIATE LOCATION:

- Less impact to residential areas
- Adequate off road space that includes access for all
- Specific areas for NO motorized vehicles
- Will share trails

MOTORIZED VEHICLE TRAIL MAINTENANCE:

- Volunteer groups to organize and maintain trail maintenance
- "Adopt a Trail" campaigns
- Access existing OHV funding for money needs

Shooting Group Report

By Don Hooper

Meeting of the Recreation Committee of the Jackson Advisory Group, June 28, 2008.

Shooting Group participants: Don Hooper and Peter Maitlin (Redwood Practical Shooters), Joan Selchau, Arlene Moorehead

The following points were discussed by the shooting group at the Recreation Committee of the Jackson Advisory Group on June 28, 2008:

- Continued use of Redwood Practical Shooters range on road 450.
- Continued improvement of the site (range).
- Teach the safe handling of defensive firearms
- Teach CCW permit classes with certified instructors
- Work with CDF/JDSF to remedy the situation at the quarry -- alleged unsafe shooting area with increased population in the area. Junk and dumping of garbage in quarry. Shooting allegedly out of control.
- Creation of a full service range (Rifle, pistol, shotgun). 200yds minimum (Supervised, alcohol free and maintained) under the supervision of CDF/JDSF and Redwood Practical Shooters.

Northern California Trail Council (NCTC) Points

Submitted to the Recreation Committee by Cynthia LeDoux, July 3, 2008

There were several important points which should be included along with the points of the group reports of June 28, 2008:

1. Rd. 500 and 600 should be included as a main staging areas/trailheads.
2. Trailhead/Access from Mitchell Creek Rd./ JSDF 511 near Shoreline Arena should be (re)created and opened to equestrians, hikers, and bikers. Develop parking area.
3. Maps should have GPS coordinates(NAD 83/ Waypoints) trailheads should have waypoint markers, and website should have both. This way clear, concise reports can be made to CDF/JSDF, user groups can program their GPS, and use can be assessed and monitored to prioritize maintenance activities.
4. Teaming with the other equestrian non-profit user groups such as the Northern California Trail Council (NCTC) and Shoreline Riders, Inc. (SRI)and the cycle club for trail improvements, patrol purposes, and funding of new water supply facilities such as the partnership happening between JSDF(Horvat) and NCTC (LeDoux) for the new water tank near Indian Springs.
5. JDFS should be one part of the larger Mendocino County Trails System with developed linkages with State Parks' including Jug Handle, Big River, the Woodlands and cooperating private landowners. Keeping a larger vision in mind when considering trail development and/or decommission.
6. The historic and recorded Little Lake-Sherwood Trail should be repaired and maintained as it connects Willits to Mendocino through Parks, JDSF, and County Roads.
7. Investigate the development of easements w/ Campbell, MRC, and The Conservation Fund to maintain existing trails such as the JDSF 330- CMT 1000 (?), TCF to Big River State Park, etc...

   Lastly, defining trailhead vs. staging area is really important as the groups appear to have interchanged the two words.

   These are some of the big points that I can think of off the top of my head. I will give this more thought between now and the 11th.

Cynthia LeDoux
Northern California Trail Council, president
Shoreline Riders, Inc, secretary

Woodlands Outdoor Center Points

Submitted to the Recreation Committee by Don Taylor (Director) and Jeanne Coleman, June 27, 2008

1) No logging in the special treatment area surrounding the Woodlands. (goal: inclusion of the special treatment area into state parks)

2) Provide recreational access in the form or hiking, biking, and horsetrails...connecting the different parks and communities.

3) Provide wildlife corridors...contiguous wildland areas for animals to move and breed.

4) Environmental or backcountry campsites

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Appendix 8

California Wildlife Habitat Relations Assessment of Consequences of Late-Seral Management on JDSF

Summary for JAG Prepared by
Brad Valentine
July, 2008

The California Wildlife Habitat Relationships (CWHR) program[1] is a state-of-the-art information system for California's wildlife. CWHR contains life history, geographic range, habitat relationships, and management information on 692 non-fish vertebrate species. CWHR is a predictive model -- it lists species predicted to occur in a given location under certain habitat conditions. It also predicts the suitability of those conditions for reproduction, cover, and feeding for each modeled species. It breaks down habitat into broad categories, each one further subdivided into stages. Finally, presence or absence of habitat elements help inform suitability of a habitat for modeled species.

For forested habitats, CWHR identifies stages defined by tree size and canopy closure. The stages roughly correlate with succession, although none of the modeled stages explicitly were designed to model "late-seral" as a distinct type. To assess the wildlife community response to managing for late-seral, this exercise differentiated it from an equivalent but non-decadent (younger) conditions by controlling the available elements.

Two runs were performed: 1) a two-condition, species comparison report that yields a list of species predicted to be present in one or both of the two conditions, and 2) a two-condition, habitat value comparison that estimates relative difference in habitat value between the two conditions. A number of options must be selected. The options selected were intended to maximally distinguish between the two forest conditions. The settings for both runs were:

- Location -- Mendocino County
- Habitat –Redwood
- Suitability Level of habitat for reproduction, cover, and feeding -- Low
- Stages -- 5M, 5D, and 6.

Within the runs, late-seral stands were provided all the elements of decadence -- dead vegetation (snags, logs, slash, stumps [defined in CWHR as snags, 3 m tall]) except for duff and litter (woody materials < 25 mm), and live trees with broken tops, loose bark, and cavities. The young stands were modeled as devoid of the dead vegetation deformed tree elements. The model excluded species based on element availability at the "preferred" setting. For the habitat comparisons run, the habitat values were calculated using the arithmetic mean.

[1] http://www.dfg.ca.gov/biogeodata/cwhr/

The "Species Comparison" predicted 167 species to inhabit redwood 5M, 5D and 6[2] stands. Of those, none were found exclusively in the young condition, 44 were found in both conditions, and 123 were found exclusively in the forest condition containing the dead vegetation elements.

The "Habitat Value Comparison" model predicted 60 species to be insensitive[3] to the stand conditions (habitat value difference range from 0-25%), 56 minimally sensitive (habitat value difference 26-50%), 19 species to be moderately sensitive (51-75% habitat value difference), 9 species strongly sensitive (76%-99% habitat value difference), and 23 to be excluded from the young stand. Among the 23 species predicted to find no habitat value in the young stand were Vaux's swift (*Chaetura vauxi)*, spotted owls (*Strix occidentalis*), giant salamanders (*Dicamptodon tenebrosus*). Pacific fisher (*Martes pennanti*) was nearly excluded, with the habitat value predicted to differ by 92%.

This information and numeric values should be viewed as trends and not empirical results. Among the many reasons for this, choices in the modeling run can change the output substantially, species habitat value assignments are expert opinions and are derived from categorical assignments, and the characterization of late-seral from young forests used in this analysis is extreme (e.g., the entire absence vs. presence in adequate amounts of decadence elements).

[2] Size class 5 forests are characterized as single-sized stands with a quadratic mean diameter at breast height > 24 inches. Size class 6 forests are multi-layered stands with > 24 inch trees over a distinct layer of smaller trees, and total canopy > 60%. M denotes moderate canopy (40-59%), while D denotes dense canopy (>60%).

[3] "Sensitivity" categories are for illustrative purposes, biological significance between them is ambiguous.

Appendix 9

Projections of Preliminary Prescriptions for Brandon Gulch Using the CRYPTOS Simulation Model

Prepared for JAG by Linwood Gill
July, 2008

Light

Repeat @ years 15, 30, and 45. Grow to year 60

DBH Classes	Redwood Removal	Doug-fir Removal
12-16"	25%	25%
18-24"	25%	25%
26-34"	20%	20%
36-46"	20%	No Cut
>48"	No Cut	No Cut

Medium

Repeat @ years 20 and 40. Grow to year 60

DBH Classes	Redwood Removal	Doug-fir removal
12-16"	50%	50%
18-24"	40%	33%
26-34"	33%	25%
36-46"	25%	No Cut
>48"	No Cut	No Cut

Heavy

Grow to year 60

DBH Classes	Redwood Removal	Doug-fir Removal
12-26"	50%	50%
18-24"	50%	50%
26-34"	50%	50%
36-46"	33%	No Cut
>48"	No Cut	No Cut

Combination 1

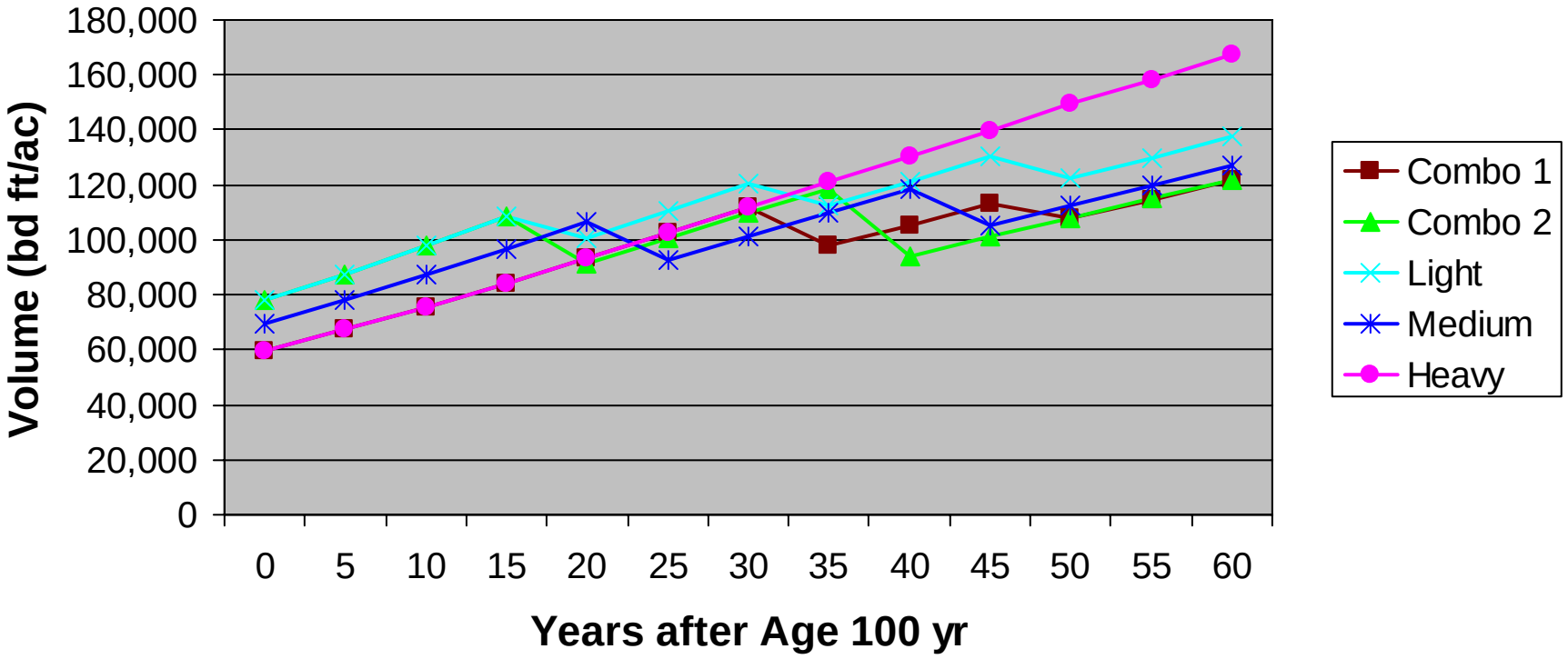
Harvest under the heavy prescription at start
Use Medium prescription at year 30
Use light prescription at year 45
Grow to year 60

Combination 2

Harvest under the light prescription at start
Use Medium prescription at year 15
Use heavy prescription at year 35
Grow to year 60

JDSF Brandon Gulch CRYPTOS Runs

Linwood Gill Prescriptions, 2008



Appendix 10

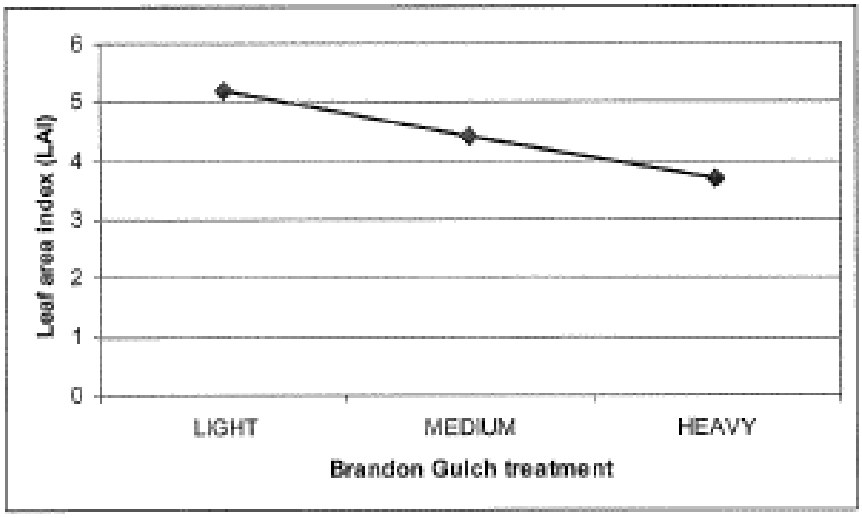
Projections of Leaf Area Index for Brandon Gulch Preliminary Prescriptions Using the MASAM Simulation Model

LAI and Regeneration for Brandon Gulch

Kevin O'Hara

Over the past several years we have developed a leaf area allocation model for redwood based primarily on data from JDSF. It is useful to represent stocking in terms of leaf area because of the direct relationship between light interception and amount of leaf area. The growth of understory trees, which is a function of light availability, can then be projected from leaf area. This tool therefore has utility in assessment of multiaged stand stocking regimes.

Adjusting the model to pretreatment conditions for Brandon Gulch, the model indicates that LAI (leaf area index) is about 8.1 where 12 is probably a maximum on the best sites. This difference is caused in part by the variation in site quality over the unit and also because trees less than 11 inches were excluded in the CRYPTOS data. The reductions proposed in the "heavy", "medium", and "light" treatments result in leaf areas in figure below. These are also based on averages for the entire unit.



Our previous work looked at stump sprout regeneration and found that cutting treatments needed to be heavy to maintain stump sprouts as viable future canopy trees. That is not necessarily our objective with these "old forest" treatments at JDSF, but this has not been explicitly discussed. Looking at the two graphs below, you see the nonlinear relationship between LAI and PACL (percent above canopy light). LAIs between 3.0 and 5.5 project to have average light levels of 30% or greater. The second graph shows sprout height after 5 years at different percent light levels. The 30% level corresponds to an average 5-year height of over 4 meters or nearly a meter of height growth per year.

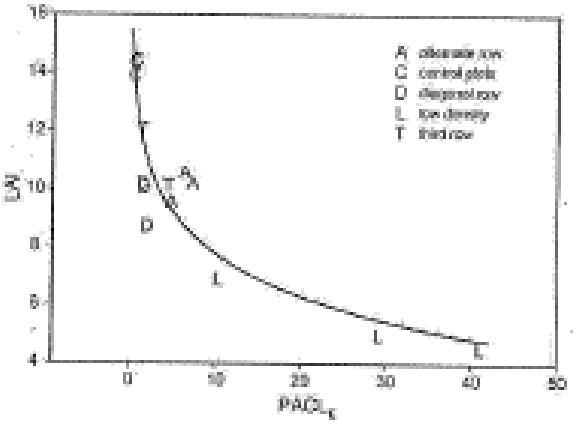


Fig. 3. Leaf area index (LAI) in relation to mean percent above-canopy light ($PACL_E$) per plot. $PACL_E$ was transformed with a natural logarithmic function after being multiplied by 10. Model shown was LAI = 17.36 − 2.09 ln($PACL_E$ × 10) (r^2 = 0.83, SEE 1.3 m).

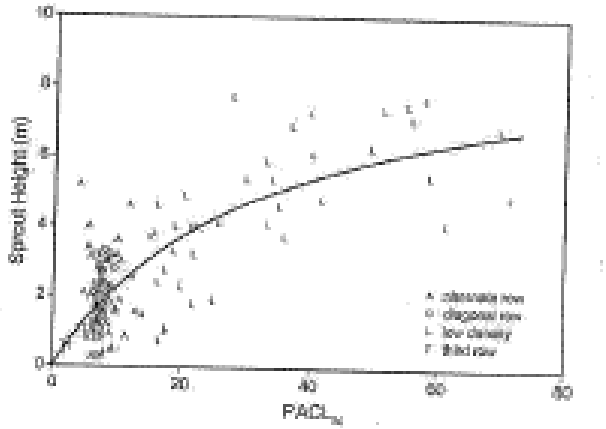


Fig. 7. Height of dominant sprout per clump in relation to percent above-canopy light ($PACL_{84}$) for all treatments. Model shown is $H = (0.297 \times L)/(1 + 0.030 \times L)$ where H = sprout height in m and $L = PACL_{84}$.

However, the percent light levels shown in these graphs are based on average light levels over the five-year growth period whereas the light levels derived from the CRYPTOS data are immediately after treatment. Immediately after these Brandon Gulch treatments are implemented, we can expect to see crown reclosure and the light environments will deteriorate over time. My opinion is that these three treatments will stimulate a stump sprout response, but that sprouts will become suppressed by 10 years post-treatment. Exceptions will be those sprouts in openings or with above average light environments. The site quality variation on these units is also quite large and would cause a range of responses. These results are probably most applicable to the higher quality sites.

I did not do a similar analysis for Camp 3 because I expect the gross averaging of these different analyses would produce similar results.

References

Berrill, J.-P., and K.L. O'Hara. 2007. Patterns of leaf area and growth efficiency in young even-aged and multiaged coast redwood stands. Canadian Journal of Forest Research 37(3):617-626.

Berrill, J.-P., and K.L. O'Hara. 2008. Simulating multiaged coast redwood stand development: interactions between regeneration, structure and productivity. Western Journal of Applied Forestry (in press).

O'Hara, K.L., P.T. Stancioiu, and M.A. Spencer. 2007. Understory stump sprout development under variable canopy density and leaf area in coast redwood. Forest Ecology and Management 244: 76-85.

Additional Remarks by Kevin O'Hara
July, 2008

Leaf area index (LAI) is a an index that represents the average sum of projected leaf area surfaces per unit of ground area. A LAI of 1.0, for example, indicates an average of one layer of foliage over an area. LAI therefore provides a measure of growing space occupancy with greater values indicating greater competition for resources and greater light interception. Following a stand replacement disturbance, LAI builds quickly in a stand until it reaches a plateau. Barring further disturbance, LAI would maintain this plateau level over time. This level is related to site resources with better sites supporting higher LAI than poorer sites. Redwood stands vary up to a LAI of 14 (O'Hara et al. 2007). Since understory redwood seedlings and sprouts grow more quickly in better light environments, LAI can provide a measure of light interception and understory tree growth.

At Brandon Gulch, LAIs are highly variable because of variation in site quality, species composition, disturbance history, and human modifications over time. There are probably few places where it approaches 14. Nevertheless, we can expect that any reduction in basal area will have a proportional reduction in LAI and an increase in understory light levels. For example, if pretreatment LAI is 10 and is reduced by 30%, we would expect LAI to be about 7. This might translate to a corresponding increase in light; however, a treatment that removed smaller trees to achieve this basal area reduction would probably result in a smaller increase in understory light than a treatment that removed large trees. After treatment, LAI would increase again towards the plateau. Based on data from a very high site, LAI would probably have to be maintained at less than 7 to maintain a vigorous regeneration cohort (O'Hara et al. 2007). The results of the proposed treatments at Brandon Gulch would therefore probably stimulate a sprout response, but the vigor of these sprouts would not be strong. Because poorer sites have lower LAI plateaus than better sites, greater light penetration would occur on poor sites and regeneration would probably be expected to be more vigorous on these sites given an equal percent canopy removal.

O'Hara , K.L., P.T. Stancioiu, and M.A. Spencer. 2007. Understory stump sprout development under variable canopy density and leaf area in coast redwood. Forest Ecology and Management 244: 76-85.