Landscape Committee Documents for the JAG Integration Team

3/26/2010

Landscape Committee Documents for the JAG Integration Team

Gathered here are documents produced by or prepared for the Landscape Committee. All of these are in draft form and have not been approved by the JAG. Those concerning policy recommendations reflect the positions of the Landscape Committee. Some documents are informational, provided by JDSF staff.

The documents are listed here by Topic. Some Topics contain multiple documents. Comments about the documents have been inserted when appropriate.

Topic	Documents
Natural/Restoration Forestry	Outline of Restoration Management Silvicultural Guidelines
Research and Natural Forestry	Implications for even-age management
Definitions	Definitions of Older Forest Categories
Landscape and Management Plan	Landscape Committee Allocation Map[1]
Allocation Comparisons	Acreage Comparisons of 2008 MP and LC Allocations Map showing only areas where allocations have changed[2] Rationale for the allocation changes
Growth and Yield Projections	Analysis of growth and yield simulation for Natural Forestry[3]
Existing Seral Stage Distribution	Stand History Map Stand History Table
Recommendations Under Consideration	Pending Landscape Committee Recommendations

[1] Pending areas under consideration for allocation are not shown on the map. These include Volcano, West Chamberlain, and the Woodlands

[2] The round circles on this map are Northern Spotted Owl Activity Center buffers. They were placed on the map in error and should be ignored.

[3] After reviewing the simulation, the Landscape Committee requested a revised simulation that would apply the Option A assumptions for Selection Silviculture stands to Natural Forestry stands.

Natural/Restoration Forestry

Outline of Restoration Management* for Jackson Demonstration State Forest
DRAFT September 18, 2009

Goal: To manage the forestland at JDSF that is not included in Special Concern Areas, research and demonstration projects, or otherwise designated for a special status to develop a stand component of large, old trees that will be used for harvesting valuable timber and maintaining habitat as well as to provide a landscape that the community can feel good about.

Objectives:

Allow and encourage research and demonstration projects throughout the forest, including in areas managed for this goal

Manage for stand components of larger diameter trees that are continuing to gain significant volume given site capacity

Favor redwood where appropriate

Grow a component of trees in each stand toward the maximum size that can feasibly be harvested using the most modern logging equipment and milling capacity as these evolve

Designate an average of two dominant trees per acre across the landscape to be permanently retained to develop old growth characteristics

Use a variety of silvicultural techniques and document stand responses to treatment

Maintain or increase timber harvest revenue over time, assuming reasonably normal economic conditions

Recognize and plan for aesthetic values

* "Restoration Management" is used here to indicate what has also been characterized as "Natural Forestry."

Silviculture Guidelines for Harvests Not Associated with Research and Demonstration

Outside of specific Research and Demonstration projects, preference should be given to uneven-aged management, primarily single tree selection. The goal is to promote the growth of the larger and better phenotypes and maintain or enhance structural diversity at the stand and landscape levels. The emphasis of each harvest entry should be to adjust stocking levels to help move the stand to desired conditions, while giving significant consideration to aesthetic and recreational values.

Silvicultural methods should vary across the landscape depending on existing and desired stand conditions. Depending on the planned reentry period, the percentage of basal area removal should range from 25-40%. Within the 40 year planning horizon, pre-harvest stocking levels and average diameter should be greater at each entry.

Silvicultural treatments should promote adequate regeneration to maintain future harvest. Where stand conditions are such that adequate regeneration can not be achieved by single tree selection, small group openings should be used. Openings should be kept as small as possible, typically not greater than one and a half times tree height in any direction, but not to exceed 2 acres. As the size of the openings increase, individual and/or small clusters of trees should be retained within the openings to provide desired structural characteristics. Treatment methods should vary throughout individual harvest areas, depending on site specific conditions.

Proposed prescriptions should include comments on the proportion of existing volume or basal area to be removed, anticipated timing of the next entry, and, if needed, the extent to which methods are chosen to stimulate regeneration.

Timber harvest plans should include brief comments on the following:

1. Goals

Clear statement of management objectives

How plans for individual harvest areas relate to plans for neighboring areas and conform to overarching management goals

Harvests to be conservative and oriented to keeping future options open

2. Current Stand Conditions

Broad quantitative and qualitative description, including maps, of existing variability and health of vegetation (conifers and hardwoods, diameter and volume distributions) within proposed harvest area

Description of current wildlife habitat

Description of understory, ground cover plants, and other important floral features

3. Desired Future Stand Conditions

Broad quantitative and qualitative description and rationale of desired outcome of harvesting, including desired species mix and size class distributions

Description of desired wildlife, understory, and other flora/fauna conditions

4. Ecological Constraints or Opportunities

Presence of legacy elements, and problematic soil, topographic, or geomorphological features

5. Logging Methods

Anticipated use of cable and tractor systems
Slash disposal

6. Aesthetic Considerations

Special considerations given to aesthetic and recreational values and constraints, including existing or potential trails and over-views

7. Anticipated Timber Yields

By species and size class

8. Cost Analysis

Research and Natural Forestry

Landscape Proposal for Natural Forestry and Implications for Even Age Management

Concern has been expressed by some JAG members and JDSF staff that the Natural/Restoration Forestry recommendation of the Landscape Committee is intended to make single-tree selection the only acceptable silviculture in Jackson Forest.

This concern continues to be expressed despite repeated committee statements, unanimously supported, that Natural Forestry is to be applied **only** to stands not involved in research and demonstration projects or otherwise designated for a special status. To further clarify the committee's position, we support including the following statement in the JAG's recommendations:

> **Even-age management is expected to be a continuing component of operations at Jackson Forest, within the context of a professionally designed, evaluated, and administered research and demonstration program.**

An Example

The Landscape Committee suggests the following as an example of the criteria that could be used to evaluate a proposed research project within the Natural/Restoration Forestry management allocation area, using the category of even-aged management research as an example.

- Any proposed research project should make the case that the benefits flowing from the research outweigh any negative ecological and social costs of the project.
- Considerations for the evaluation of an even-aged management research project would include:
    - What are the purposes of the proposed research project?
    - What benefits might emerge from the project?
    - How will the proposed even-aged management project interact with the overarching forest-wide "Centers of Excellence" research and demonstrations?
    - How would the project affect neighbors, sensitive areas, designated special treatment areas, and recreation use?

- What percentage of what watersheds would be required for the project and what is the anticipated extent of project effects?
- What acreages would receive even-age treatment over what period of time?
- What sub-watershed(s) would be involved?
- Will replications in the watershed, sub-watershed, or elsewhere on the forest be required?
- What is the harvest history of the project area in relation to past even-aged management?
- Do the benefits from the research/demonstration project justify the ecological and other impacts of the project?

The Landscape Committee discussed setting limits on the percentage of a watershed that could be in an even-aged project as well as favoring placing such projects in areas that had received even-age management within the last 20-30 years. We decided to take these matters up for discussion with the Research Committee and the JAG as a whole.

Definitions

Definitions of Old Forest Structure Zones, Late Seral Development Areas and Older Forest Development Areas

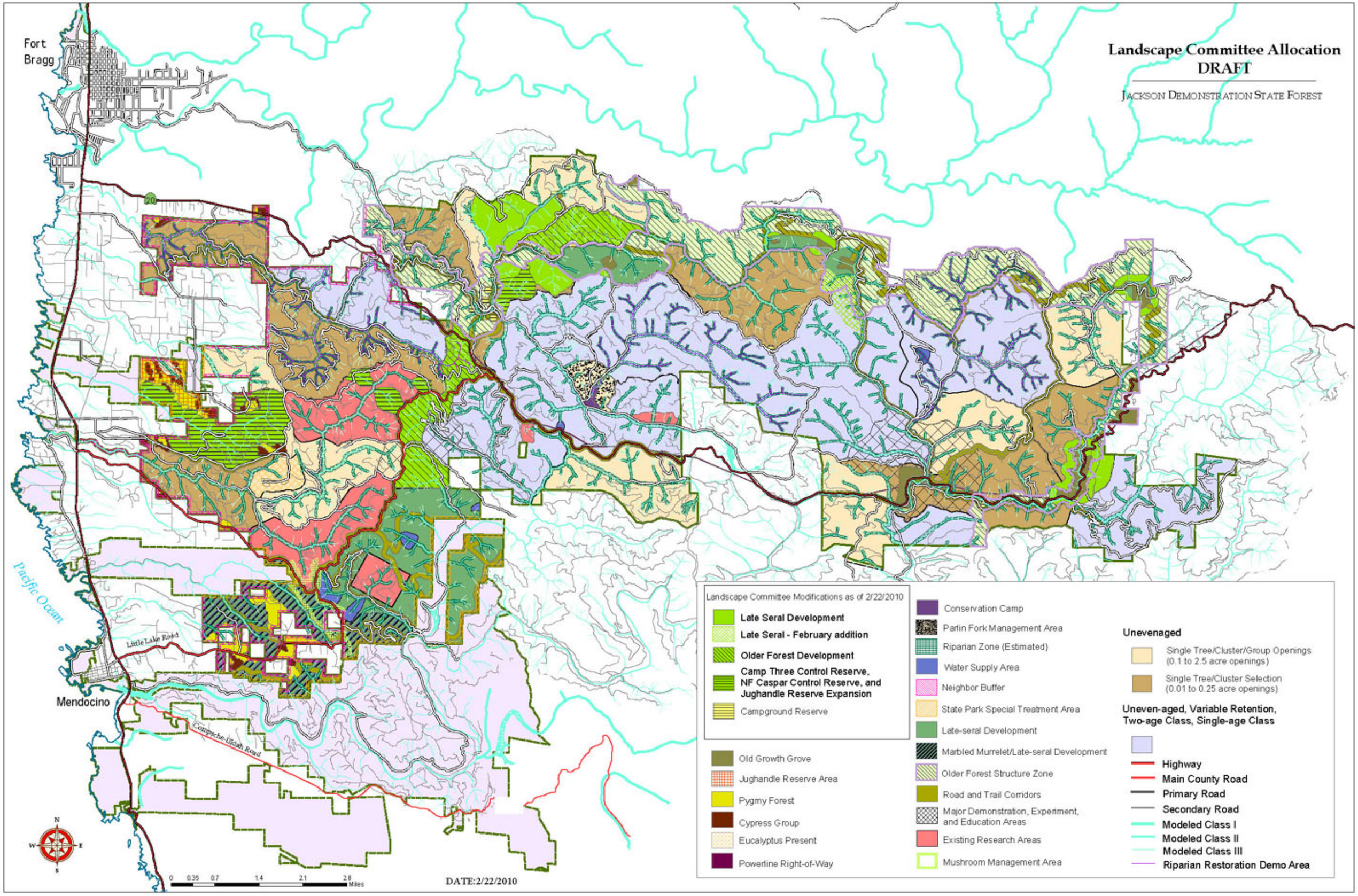
The JDSF Management Plan uses the term “Older Forest Structure Zone” in some places (e.g., p. 70) to encompass all types of older forest, in other places to refer to areas designated for growing trees to older than usual ages before harvesting. This has led to confusion. The Landscape Committee suggests the following definitions and recommends that the Management Plan terminology be made consistent with these definitions.

1. The Older Forest Structure Zone (OFSZ) is composed primarily of reserved Old-Growth Groves, Late Seral Development Areas, and Older Forest Development Areas.
2. In Late Seral Development Areas, the dominant goal is the development of late seral conditions. Biological goals will be paramount. As late seral conditions are achieved, timber production will decline and may eventually cease.
3. Older Forest Development Areas (OFDAs) are intended to provide an intermediate desired condition and management approach between Late Seral Development and Natural Forestry. The weight toward biological characteristics would be higher than in Natural Forestry and lower than in Late Seral Development Areas. They may also serve as transition zones between Late Seral Development and Natural Forestry areas.

   OFDAs would be distinguished from Natural Forestry areas by:

   - Timber production would first increase but then likely stabilize.
   - Some trees would be designated for permanent retention, giving preference to trees exhibiting late seral characteristics. The number designated for permanent retention should not conflict with the goal of maintaining non-declining timber production into the indefinite future.
   - All other trees will be harvested at some point in time.

Landscape and Management Plan Allocation Comparisons


Landscape Committee Allocation
DRAFT
Jackson Demonstration State Forest
Fort Bragg
Pacific Ocean
Mendocino
Little Lake Road
Comptche-Ukiah Road
20
Landscape Committee Modifications as of 2/22/2010
Late Seral Development
Late Seral - February addition
Older Forest Development
Camp Three Control Reserve, NF Caspar Control Reserve, and Jughandle Reserve Expansion
Campground Reserve
Old Growth Grove
Jughandle Reserve Area
Pygmy Forest
Cypress Group
Eucalyptus Present
Powerline Right-of-Way
Conservation Camp
Parlin Fork Management Area
Riparian Zone (Estimated)
Water Supply Area
Neighbor Buffer
State Park Special Treatment Area
Late-seral Development
Marbled Murrelet/Late-seral Development
Older Forest Structure Zone
Road and Trail Corridors
Major Demonstration, Experiment, and Education Areas
Existing Research Areas
Mushroom Management Area
Unevenaged
Single Tree/Cluster/Group Openings (0.1 to 2.5 acre openings)
Single Tree/Cluster Selection (0.01 to 0.25 acre openings)
Uneven-aged, Variable Retention, Two-age Class, Single-age Class
Highway
Main County Road
Primary Road
Secondary Road
Modeled Class I
Modeled Class II
Modeled Class III
Riparian Restoration Demo Area
N
W
E
S
0 0.35 0.7 1.4 2.1 2.8 Miles
DATE:2/22/2010

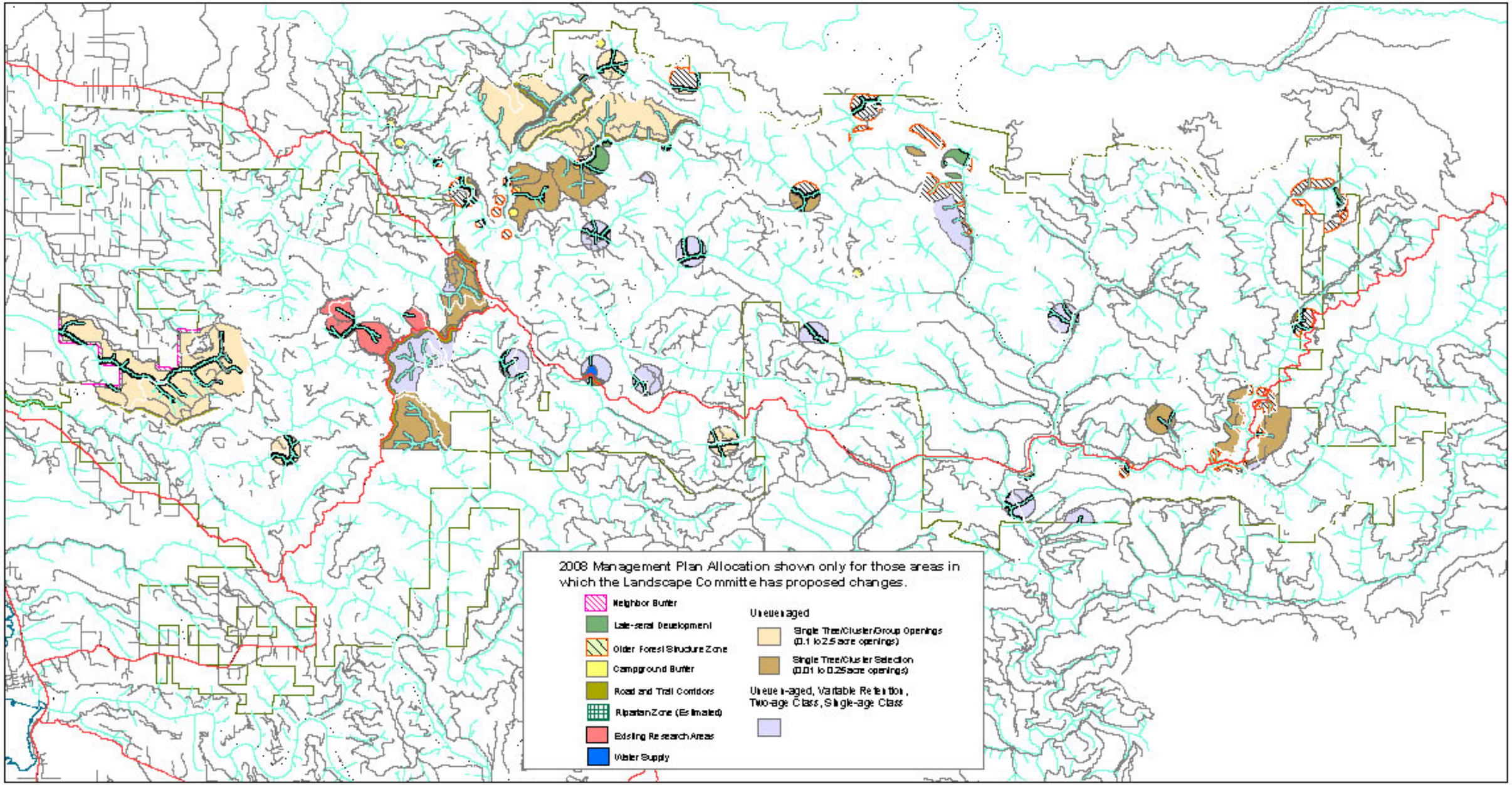
Landscape Committee Note of March 25, 2007: The Landcape Committee did not intend to place buffers around all NSO Activity Centers. It's recommendations concern protecting sites for an extended time period. **The NS0_buffer figures in this chart should be ignored.**

This table shows the Allocation for those areas changed by the Landscape Committee (LC). On the left is the general category assigned by the LC. The next column shows a specific description. The third column lists the original categorization as per the 2008 Management Plan. Please note that this table only lists acreages for those areas where a CHANGE was made, and thus the totals do not add up to forestwide totals.

Sum of Acres			
Special Concern Landscape Committee	LC detailed description	Special Concern 2008 Management Plan	Total
LSD - LC REVISION	Late Seral	OFS ZONE	261.11
		RT CORRIDOR	4.81
		SINGLE TREE/CLUSTER	201.81
		SINGLE TREE/CLUSTER/GROUP	0.00
		UNEVEN/VARIABLE/ 2 OR 1 AGE CL	122.91
		WLPZ	0.00
	Late Seral Total		590.65
	Late Seral - Brandon	CAMPGROUND BUFFER	0.43
		OFS ZONE	0.01
		RT CORRIDOR	69.50
		SINGLE TREE/CLUSTER/GROUP	385.84
	Late Seral - Brandon Total		455.78
	Late Seral - Camp 3	CAMPGROUND BUFFER	2.29
		OFS ZONE	0.02
		RT CORRIDOR	0.18
		SINGLE TREE/CLUSTER	183.82
		UNEVEN/VARIABLE/ 2 OR 1 AGE CL	0.00
	Late Seral - Camp 3 Total		186.31
LSD - LC REVISION Total			1,232.74
NSO_Buffer	NSO_Buffer	H2O SUPPLY	8.92
		LATE SERAL DEVELOPMENT	75.09
		OFS ZONE	197.12
		RESEARCH	33.84
		RT CORRIDOR	28.76
		SINGLE TREE/CLUSTER	113.07
		SINGLE TREE/CLUSTER/GROUP	164.50
		UNEVEN/VARIABLE/ 2 OR 1 AGE CL	431.36
		WLPZ	268.74
	NSO_Buffer Total		1,321.40
NSO_Buffer Total			1,321.40
OFS ZONE-LC	Older Forest Development	CAMPGROUND BUFFER	0.64
		RESEARCH	10.78
		RT CORRIDOR	146.44
		SINGLE TREE/CLUSTER	388.02
		SINGLE TREE/CLUSTER/GROUP	380.48
		UNEVEN/VARIABLE/ 2 OR 1 AGE CL	211.55
	Older Forest Development Total		1,137.91
OFS ZONE-LC Total			1,137.91
Reserve	Camp 3 Control reserve	CAMPGROUND BUFFER	9.47
		OFS ZONE	0.10
		RT CORRIDOR	0.07
		SINGLE TREE/CLUSTER	134.16
		UNEVEN/VARIABLE/ 2 OR 1 AGE CL	3.02
		WLPZ	9.61
	Camp 3 Control reserve Total		156.42
	campground reserve	CAMPGROUND BUFFER	32.21
		LATE SERAL DEVELOPMENT	4.28
		OFS ZONE	42.68
		WLPZ	29.71
	campground reserve Total		108.89
	NF Caspar Reserve	RESEARCH	170.66
		RT CORRIDOR	0.75
		SINGLE TREE/CLUSTER	2.63
		WLPZ	15.63
	NF Caspar Reserve Total		189.67
	Pygmy Recreation area exp	NEIGHBOR BUFFER	58.73
		RESEARCH	0.30
		RT CORRIDOR	39.25
		SINGLE TREE/CLUSTER/GROUP	791.84
		WLPZ	107.75
	Pygmy Recreation area expansion Total		997.87
Reserve Total			1,452.85
Grand Total			5,144.89

Example: 601 LSD in 2008, minus the acres that were changed to NSO buffer and Camp reserve, + the acres changed to LSD = the final acres of LSD for the 2010 Landscape Committee

LSD MP 08	LC changed from LSD NSO buffer	Camp reserve	LC changed to LSD	LSD LC 2010
602	75	4	1,233	1,755
this	minus this			equals this


2008 Management Plan Allocation shown only for those areas in which the Landscape Committe has proposed changes.
Neighbor Buffer
Late-seral Development
Older Forest Structure Zone
Campground Buffer
Road and Trail Corridors
Riparian Zone (Estimated)
Existing Research Areas
Water Supply
Uneven aged
Single Tree/Cluster/Group Openings (0.1 to 2.5 acre openings)
Single Tree/Cluster Selection (0.01 to 0.25 acre openings)
Uneven-aged, Variable Retention, Two-age Class, Single-age Class

Rationale for Landscape Committee Allocation Changes
DRAFT March 26, 2010

The Landscape Committee is recommending several changes to the Landscape Allocation as identified in the existing Management Plan. The most current map expression of these recommendations is dated 2/24/2010. All recommendations involve adding acreage to Older Forest Development Areas* (OFDA), Late-seral Development, or Reserve status.

Several allocations were changed to buffer old growth groves, enhance connectivity between old growth groves, late-seral development, and older forest development areas* or to enhance older forest structure across north/south gradients. Other changes were made because of special stand features, and proximity to parks or special visitor use corridors. The following is a summary of recommended changes *listed from East to West* with rationale briefly indicated:

Recommendations Adopted by Consensus of Landscape Committee

Type & Location	Approx acreage	Rationale
Add LSD around OG at extreme E along Hwy 20		Better buffer for old growth
Change OFSZ to LSD around Dresser Grove OG, top of N. James Cr.		Better buffer for old growth
Change Campground Buffers to Reserves at Big River & Camp 20		Enhance campgrounds
Change OFSZ to LSD in 3 places around OG near Rd 1000		Better buffer for old growth
Change OFSZ to LSD adjacent to Waterfall Grove OG		Better buffer for old growth
Add LSD to south of above, west of W. Chamberlain Cr.		Build on existing residual OG
Add OFDA* to north of NFSF Noyo LSD		Enhance OFDA* E/W connection
Designate Brandon Gulch THP LSD		Adopt legal settlement designation
Designate part of Camp 3 THP LSD		Adopt legal settlement designation

Type & Location	Approx acreage	Rationale
Designate remainder of Camp 3 as Reserve/Control		Adopt legal settlement designation
Change Campground Buffers to Reserves along NFSF Noyo		Enhance campgrounds
Change Campground Buffers to Reserves along SF Noyo		Enhance campgrounds
Add OFDA* between Noyo and Big River drainages		Enhance OFDA* N/S linkage
Designate three N Caspar Controls as Reserves		Protect existing old forest
Designate Rd 500-Jughandle Pine/Cypress near Pygmy as Reserve		Complete ecological staircase

Areas Still Under Consideration (proposals not yet recommended by full Landscape Committee)

Gulch 16/ Trestle area old second growth Fire Reserve	Create reserve to study fire effects Protect easterly old second growth
After operation of current THP, designate Volcano area as LSD	Create uninterrupted block of LSD
Change designation in part of Woodlands STA around Camp	Ensure Woodlands Camp serenity

* The Landscape Committee is recommending a change in allocation terminology from Older Forest Structure Zone (OFSZ) to Older Forest Development Area to better reflect the actual purpose of the designation and to clarify some confusing conflation of terms in the Management Plan. It is unlikely that the map will be revised to reflect this recommendation until after the Integration Team has had the opportunity to review this material.

Growth and Yield Projections

Analysis of Natural Forestry Simulation II

Summary and Conclusions

On February 27, 2010, JDSF staff provided the JAG with a second simulation of growth and yield for Natural Forestry applied to acres not otherwise designated (Natural Forestry Simulation II).

This second simulation showed substantially lower harvest volumes than both the first simulation and the Option A projections for JDSF. They were generally above the 20-21 mbf per year expected in the 2008 JDSF Management Plan, but about 30% lower than in Option A.

The lower harvest volumes projected for Natural Forestry in Simulation II appear to be caused primarily by a relatively low rate of harvest entries. The percent of available acres entered to harvest each year in Natural Forestry Simulation II was about 30% less than in Option A.

Another troubling aspect of the simulation is that the absolute volume growth of Natural Forestry **falls** significantly over a period when the inventory is doubling. This does not seem credible.

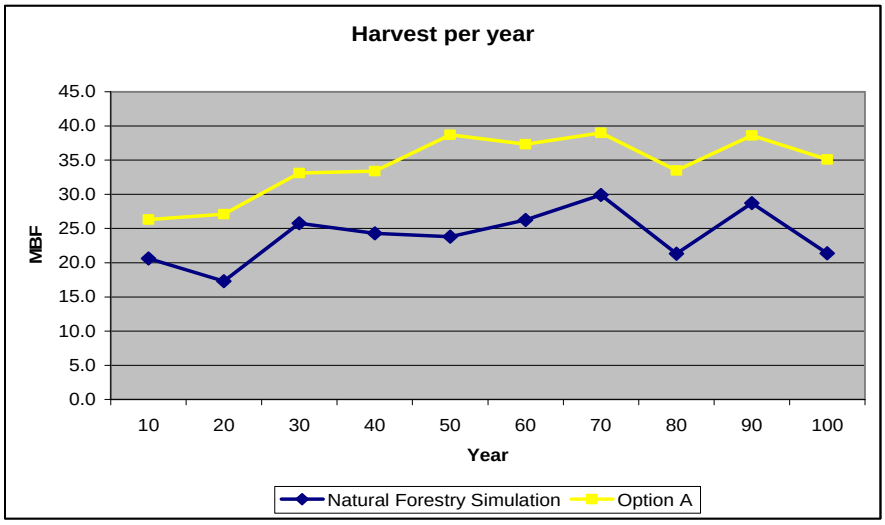
Finally, using board feet as an output measure substantially understates the economic profitability of Natural Forestry and other silvicultures, such as late seral development, that produce a high proportion of larger trees. The stumpage value of a 30” tree is estimated to be 50% greater **per board foot** than a 20” tree.

Analysis

Harvest Rates

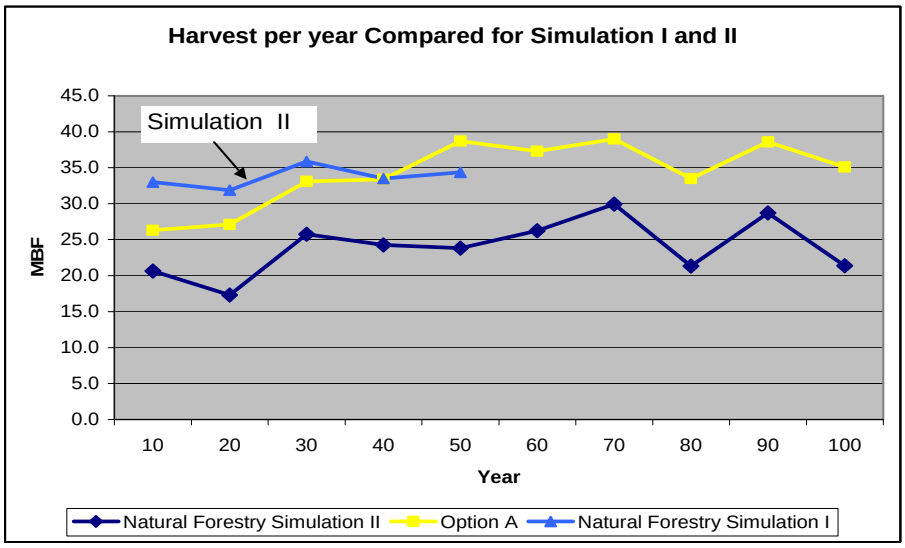
Simulation II showed harvests under Natural Forestry to be significantly less than those projected in the Option A for JDSF, with the gap growing over time during the first 50 years. Generally, the Natural Forestry Simulation projects harvest about 70% of the Option A level.

Chart 1



This result is in sharp contrast to the first simulation (Simulation I), which showed Natural Forestry harvest to generally exceed Option A harvests during the 50 years that were simulated.

Chart 2

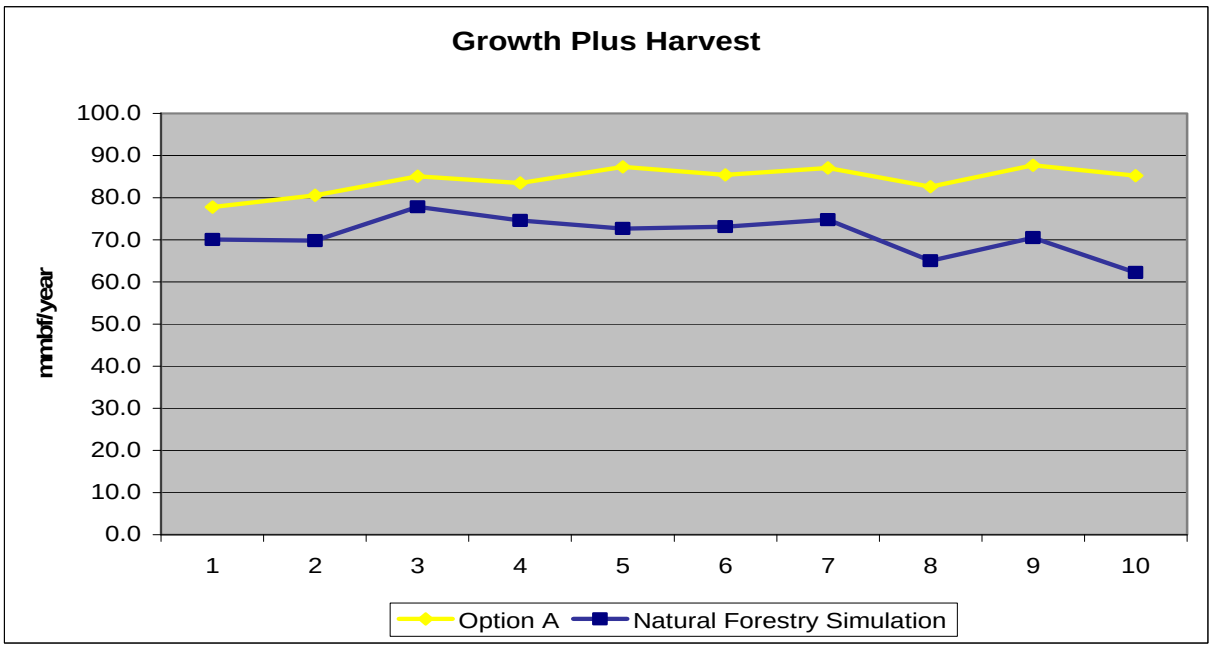


Which simulation is more likely accurate, and why is the second simulation so much lower than Option A? We will try to provide insight into the answers to these questions.

Growth Plus Harvest

What is perhaps more surprising is that growth plus harvest (yield) is significantly lower in Natural Forestry II than in Option A. One would expect that the yield of given land would not vary markedly between the two silvicultural sets.

Chart 3



Looking into the Differences

What accounts for the differences between Option A and Simulation II.

First, I looked at the components of Simulation II to try to throw some light on what, within the simulation, accounted for the differences from the Option A projection.

In the Natural Forestry Simulation, not all acres are "Natural Forestry Acres. Natural Forestry Acres are only those not otherwise designated for a specific purpose, such as Older Forest Zone and Late Seral Development. The remainder, I term (awkwardly) Non Natural-Forestry Acres.

Those acres not in Natural Forestry were grown using the Option A silvicultures applied to those acres. The table below shows the acreage allotments in various categories. Natural Forestry acres are 22,863 out of total acreage of 48,630 (about 43,000 of which are available for harvest).

Table 1

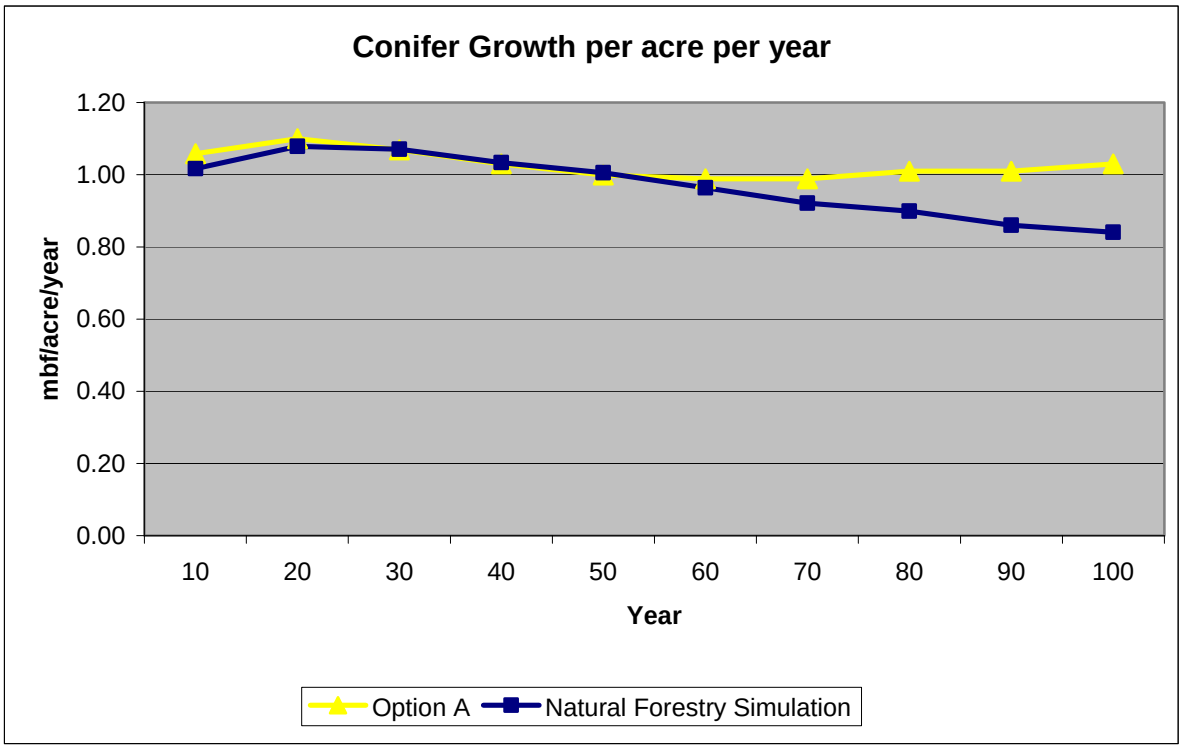
10	NatForestry	22,863
10	Sel1	1,478
10	Sel2	1,109
10	GSel1	396
10	GSel2	399
10	OFSZ	5,398
10	LSD	10,088
10	2Age	159
10	CLCT	88
10	CLCT_Thin	48
10	ST	11
10	ST_Thin	46
10	VR1	161
10	VR1_Thin	165
10	VR2	164
10	VR2_Thin	165
10	No_Harvest	5,892
Subtotal		**48,630**

I looked at growth and harvest of the two types of acreage in some detail (reported in ***Appendix 1***) and concluded that, if anything, the treatment of the Non Natural-Forestry Acres improved the relative performance of the Natural Forestry Simulation. The cause of the lower relative growth for Simulation II is in the modeling of Natural Forestry Acres.

Continuing Decline in Natural Forestry Growth

What is most striking in Chart 5 is the steady decline in the growth increment in the Natural Forestry Simulation beyond year 50, while Option A growth is steady or increasing after year 50.

Chart 4



Growth for the Natural Forestry simulation (dark blue line) starts out for the first 50 years being comparable to Option A, but after year 50, Natural Forestry growth falls below that of Option A, and the gap steadily widens.

Possible Cause: Regeneration Not Included

According to Cal Fire staffer, Helge Eng, Simulation II did not include any regeneration, whereas Option A does include regeneration. The absence of regeneration is a defect in Simulation II. It does not really compare apples with apples.

Including regeneration is obviously important for projecting future growth over hundreds of years, but the absence of regeneration in the current simulation does not seem a critical omission:

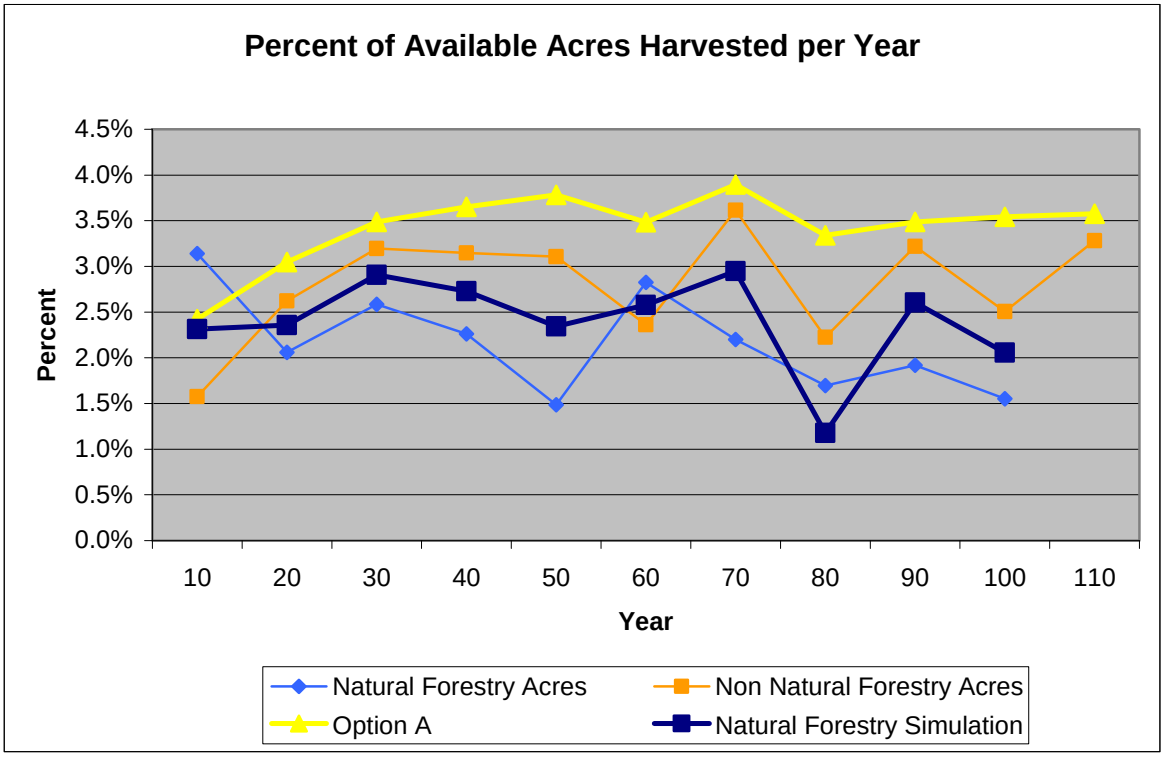
> First, for the first 50years, regeneration should not be a major factor in growth or harvests; thus the absence of regeneration in the model does not explain the lower harvests for Natural Forestry in the JAG planning period of 40 years.
>
> Second, most of the projected lower relative growth of Natural Forestry in later years appears to be due to the relatively higher inventories for Natural Forestry. This is because within the Cryptos model used for the simulation, higher levels of inventory are associated with lower growth rates. See Charts 9 and 10 and the accompanying discussion later in the document.

Why Are Harvests Lower in Simulation II?

In the early years, growth and inventories are about the same in Option A and Simulation II. There has to be another explanation for the relatively low harvests in Simulation II.

The explanatory factor seems to be the relatively low percentages of available acres that are harvested in Simulation II.

Chart 5



The dark blue line in Chart 5 shows that only about 2% of Natural Forestry Acres are harvested per year on average. Option A starts harvesting 2.5% of available acres, andt by year 40, the percentage is up to about 3.6%. It remains at this level to the end of the projection period.

The Non Natural-Forestry Acres are harvested at a rate between the other two, averaging about 3% over 100 years, about 50% more than the rate of Natural Forestry Acres.[1]

Overall, the Natural Forest Simulation harvests about 2.5% of available acres per year, about 30% less than the corresponding rate in Option A.

The lower percentage of acres harvested in Natural Forestry compared to Option A appears to explain most of the difference in projected harvest volumes of the two alternatives. Both the percentage of acres harvested and the harvest volumes in the Natural Forestry simulation are about 30% lower than in Option A.

[1] *Question: What modeling assumptions cause the Non Natural-Forestry Acres to be harvested at a lower percentage rate than the corresponding acres in Option A?*

Lower Harvest Rates Not Intrinsic in Natural Forestry

It appears that the assumptions made for Natural Forestry Simulation II caused the harvest rate to be relatively low compared to Option A. Low harvest rates are not intrinsic in the concept of Natural Forestry.

Craig Blencowe and others practicing the type of forestry on which Natural Forestry is based, typically reenter stands every 10 to 12 years. This is equivalent to harvesting 8-10% of available acres per year, in contrast to the 2.5% of acres harvested annually in the Natural Forestry Simulation. Given the goals for the public forest, reentry periods greater than 10 years may be more appropriate for Jackson Forest, but a reentry period of twenty years is equal to harvesting 5% of acres per year.

In assessing whether the harvest rate of 2.5% is reasonable and appropriate, it is important to keep in mind that Natural Forestry is to be applied to the general matrix acres that have no other special designation, such as old forest, preserves, research areas, or special concern areas. These are acres that should be being managed to meet the timber and revenue goals for the forest (while meeting other goals). Therefore, a higher rate of harvest seems reasonable and appropriate, as long as it would allow the inventory and tree sizes to generally increase over time.

Harvest as a Percentage of Inventory

A look at the projected harvest rates compared to inventories shows that harvest rates could be increased significantly for Natural Forestry without exceeding the Option A rates.

Chart 6 shows from another perspective the substantially lower harvest rate projected for Natural Forestry relative to Option A. The annual harvest rate is generally less than 1% of inventory (8% per decade = 0.8% per year). This is much less than growth (Chart 7).

Chart 6

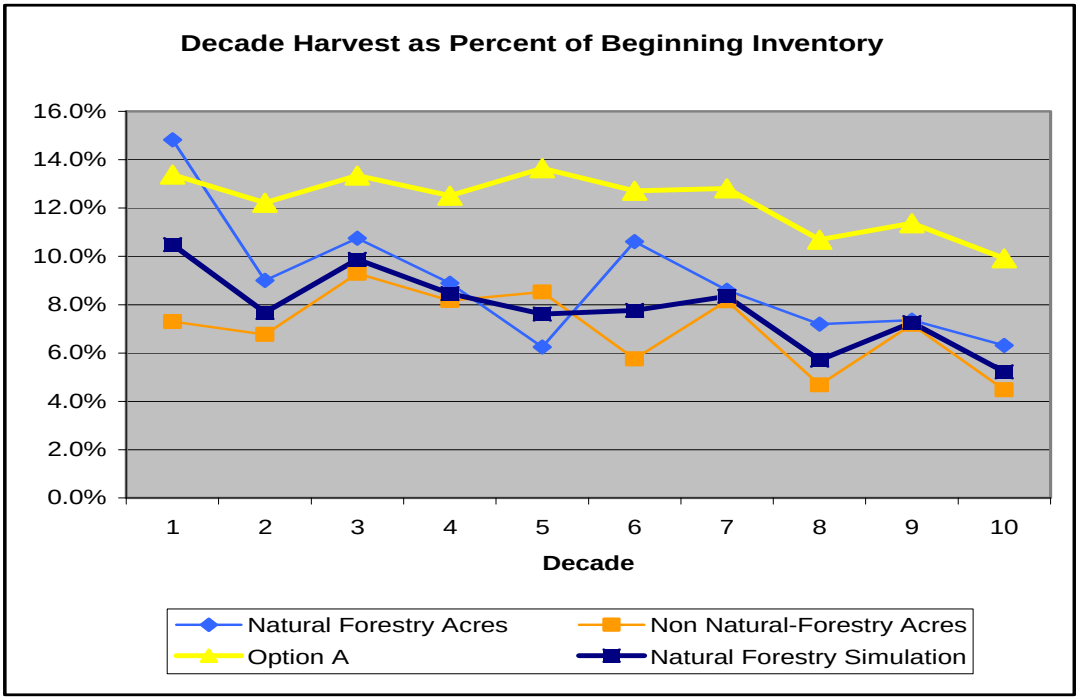
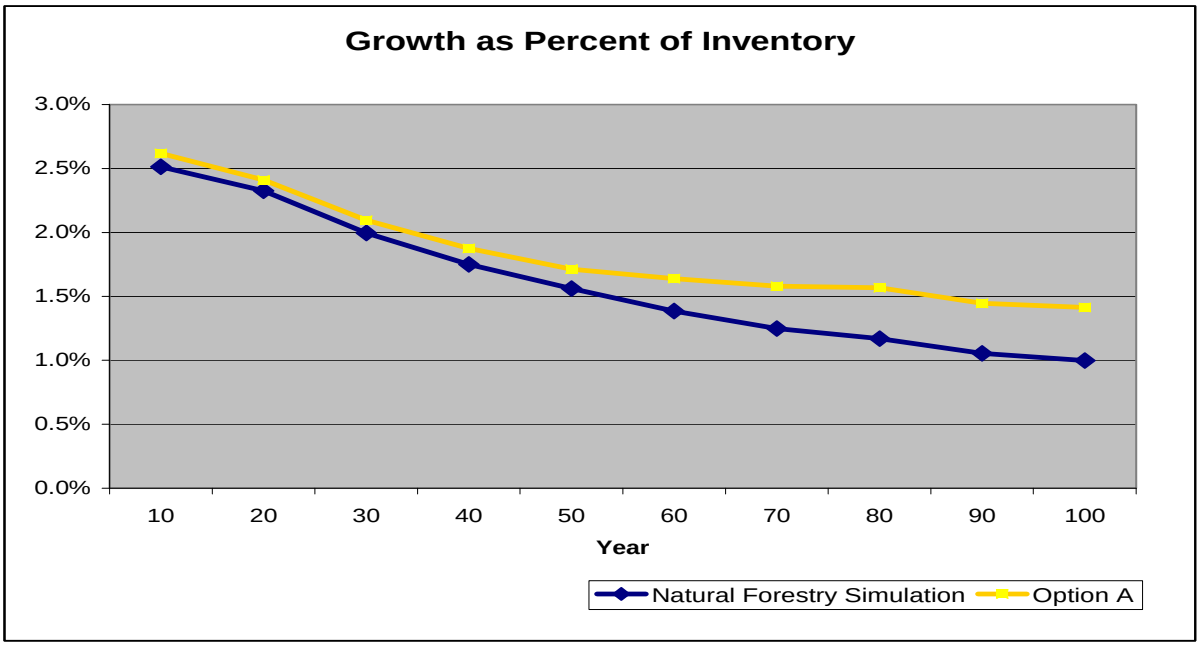


Chart 7



For the first 40 years, Natural Forestry growth/inventory exceeds 1.6% per year, nearly double the harvest rate projected in Simulation II.

Declining Growth Rate over Time

It seems surprising that the projected rates of growth as a percent of inventory fall so rapidly in the period. Perhaps some of the decline of Natural Forestry is due to the lack of regeneration in the Natural Forestry Simulation, but it seems also to reflect the higher inventory levels of Natural Forestry relative to Option A (Chart 8). Apparently in the Cryptos model, growth rates decline as inventories increase (Chart 9).

Chart 8

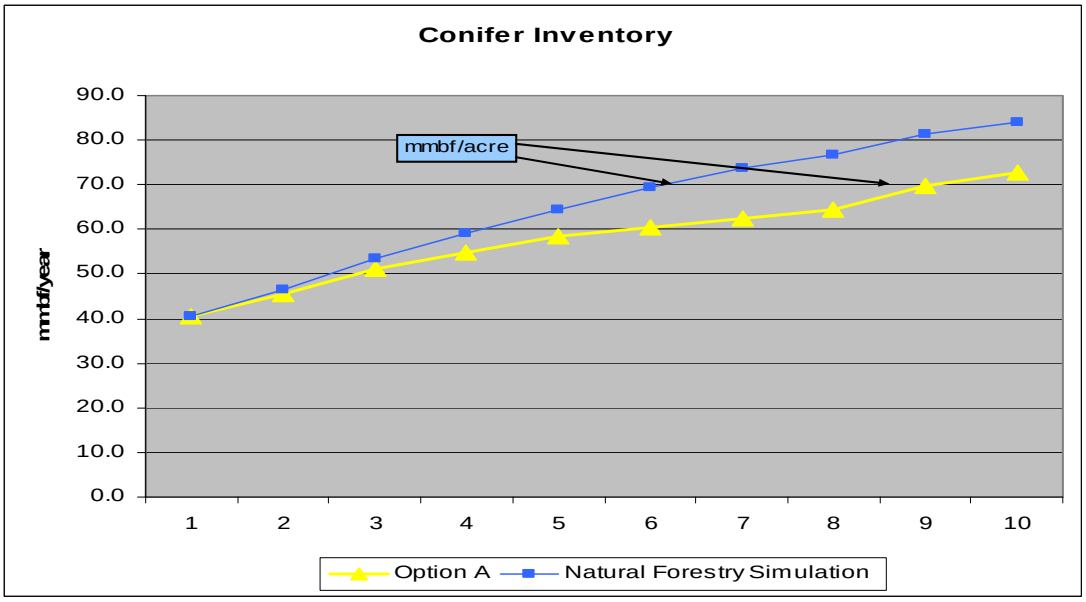
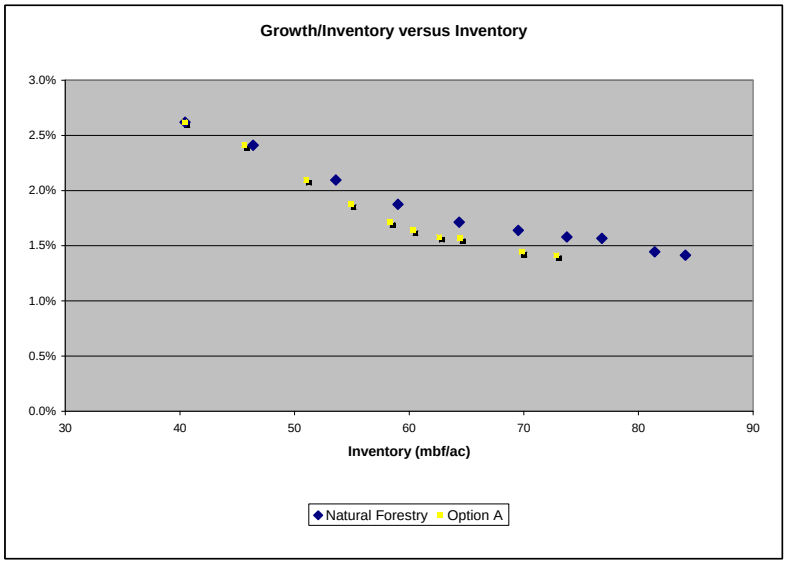


Chart 9



The relation between growth rates and inventory is similar for the Natural Forestry simulation and Option A, with the growth rate being a bit higher for Natural Forestry for a given level of inventory.

Less Absolute Volume Growth at Higher Inventory Levels

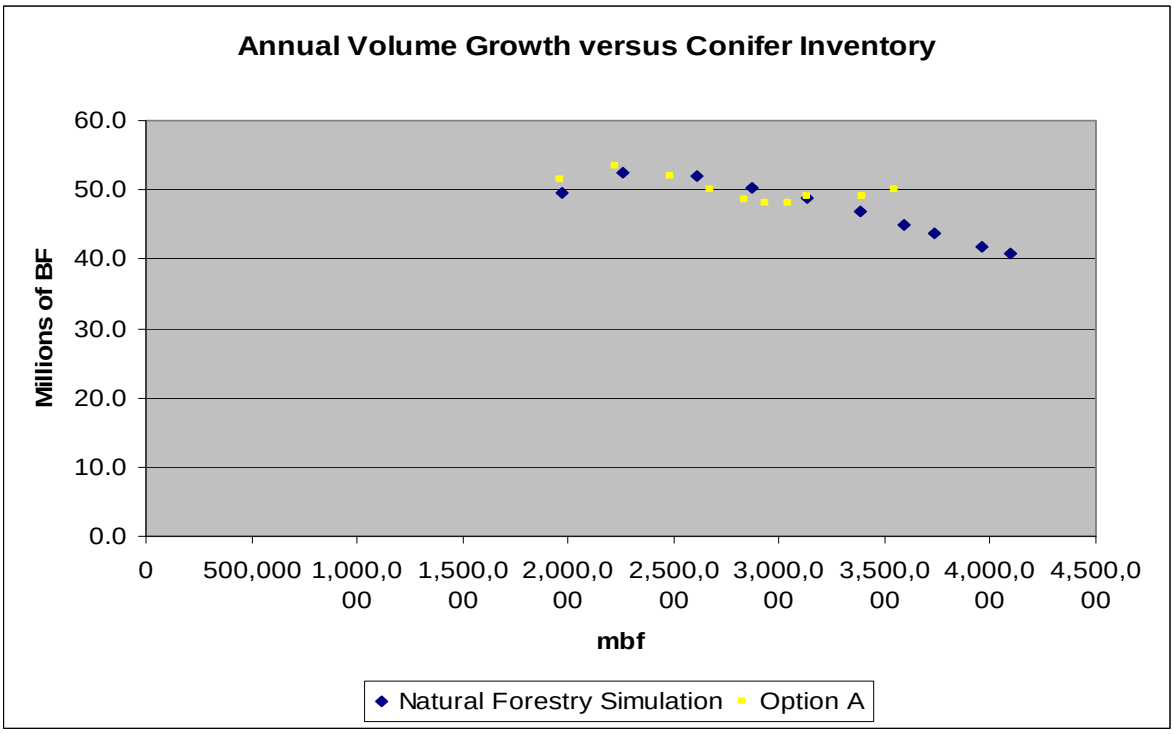
Not only does Natural Forestry growth as a percent of inventory decline at higher inventories, but the **absolute volume** of growth declines. Chart 10 shows that the annual growth was about 52 MBF/year when total forest inventory was 2.2-2.6 billion board feet. When the inventory increased to 4 billion board feet, volume grew only 40 MBF.

A decline in growth as a percent of inventory at higher levels of inventory seems possible, but a fall in the absolute volume does not seem credible. The trees in JDSF will still be relatively young by redwood standards, and they will be given growing space through regular harvests; thus an absolute decline in growth seems implausible.[2]

The behavior of the Cryptos model in this area is deserved.

[2] With the components of the Natural Forestry Simulation, volume growth on Natural Forestry Acres declines as inventories increase, but the decline is much greater for the Non Natural-Forestry Acres. This probably reflects how Cryptos relates volume growth to inventory density. Higher inventories yield lower projected growth levels. Inventory levels increase more dramatically in the Non Natural-Forestry Acres (from 44 mbf/acre to 99 mbf over 100 years) than in the Natural Forestry Acres (from 36 to 76 mbf/acre).

Chart 10



Should Natural Forestry Growth Decline Less as Inventories Increase?

I am not a silviculturalist and no expert on forest growth modeling, but I wonder if Natural Forestry, growth rates would decline as inventories increase as much as predicted by Cryptos? The object of Natural Forestry silviculture is to create growing space for the highest potential trees on every entry. Over time, inventories will grow because trees will be bigger on average, but larger trees will have good growing space; so it seems reasonable that growth will not decline as markedly under Natural Forestry as under silvicultures that harvest uniformly across tree sizes.

Economic Value of Harvests Should Be Modeled

A final thought: The harvest and growth information from Cryptos is presented in board feet; but this is a defective metric for comparing the true economics of Natural Forestry with other silvicultures. The object of Natural Forestry is to have a high proportion of harvest volume in larger trees (30" DBH and larger). According to Craig Blencowe, the stumpage value for a 30" tree is 50% greater **per board foot** than a 20" tree.[3]

Using board feet as an output measure substantially understates the economic profitability of Natural Forestry and other silvicultures, such as late seral development, that produce a high proportion of larger trees.

[3] See last part of video at http://www.youtube.com/watch?v=1E-NCtpwd5I

Appendix 1
Analyzing the Components of Simulation II

In the Natural Forestry Simulation, not all acres are "Natural Forestry Acres. Natural Forestry Acres are only those not otherwise designated for a specific purpose, such as Older Forest Zone and Late Seral Development. The remainder, I term (awkwardly) Non Natural-Forestry Acres.

Those acres not in Natural Forestry were grown using the Option A silvicultures applied to those acres. The table below shows the acreage allotments in various categories. Natural Forestry acres are 22,863 out of total acreage of 48,630 (about 43,000 of which are available for harvest).[4]

Table A-1

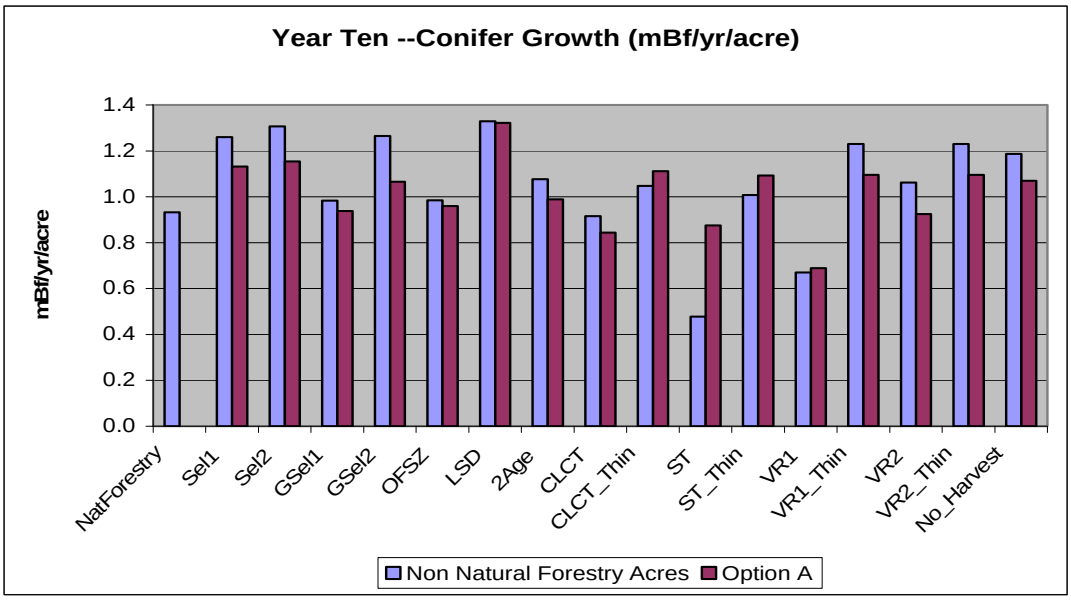
10	NatForestry	22,863
10	Sel1	1,478
10	Sel2	1,109
10	GSel1	396
10	GSel2	399
10	OFSZ	5,398
10	LSD	10,088
10	2Age	159
10	CLCT	88
10	CLCT_Thin	48
10	ST	11
10	ST_Thin	46
10	VR1	161
10	VR1_Thin	165
10	VR2	164
10	VR2_Thin	165
10	No_Harvest	5,892
Subtotal		**48,630**

Growth of Natural Forestry Acres and Non Natural-Forestry Acres

One would expect the growth projections for each of the categories of Non Natural-Forestry Acres to be relatively close to those for Option A (on a per acre basis). This was not the case, though, as shown by the chart below, which compares conifer growth per year per acre at time ten years.

[4] Over ten percent of the acres are "No Harvest". When analyzing yield per acre, the no-harvest acres should be excluded. This was not done in the simulations, and I initially didn't think of doing this. At this point, I don't have time to redo the spreadsheets and charts I have prepared. It should be done in the future.

Chart A-1



For most silvicultures, the growth of Non Natural Forestry Acres under Simulation II was greater than the corresponding figure from the Option A at ten years.

Note that the first column at the far left gives the projected growth for Natural Forestry. Interestingly, this is significantly lower than for Sel1 and Sel2, the silvicultures in Option A most closely related to Natural Forestry.

In later years, the Non Natural-Forestry Acres keep their growth advantage over Natural Forestry Acres, but they lose their advantage relative to Option A, as seen in the chart below

Chart A-1

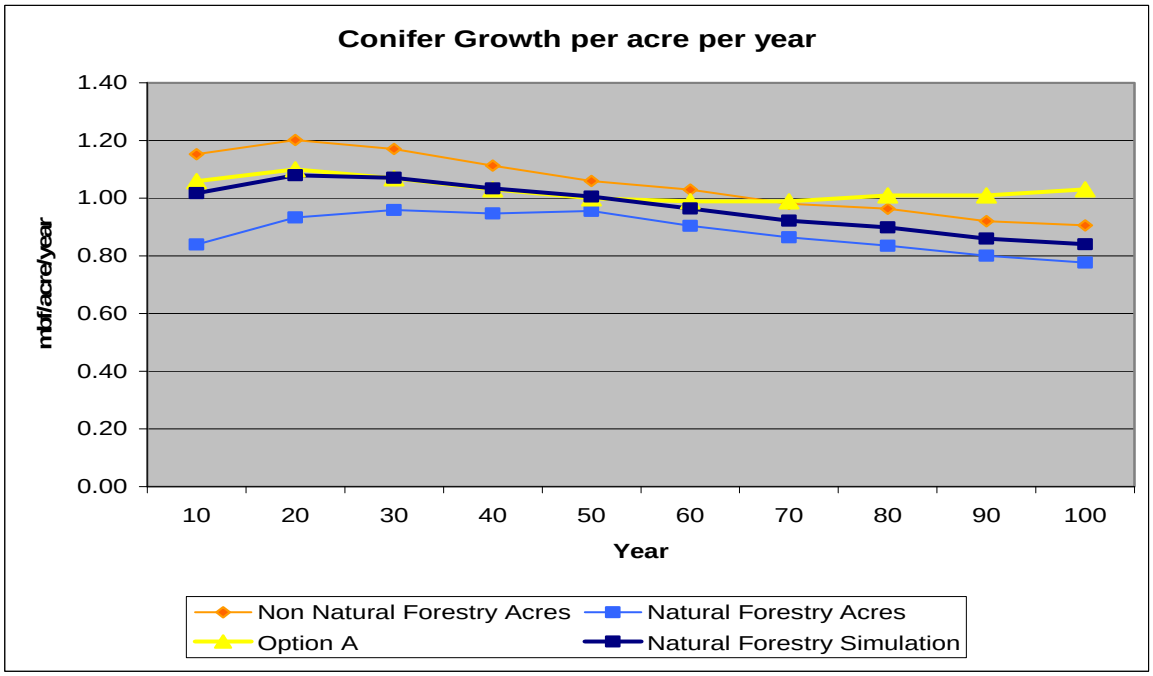


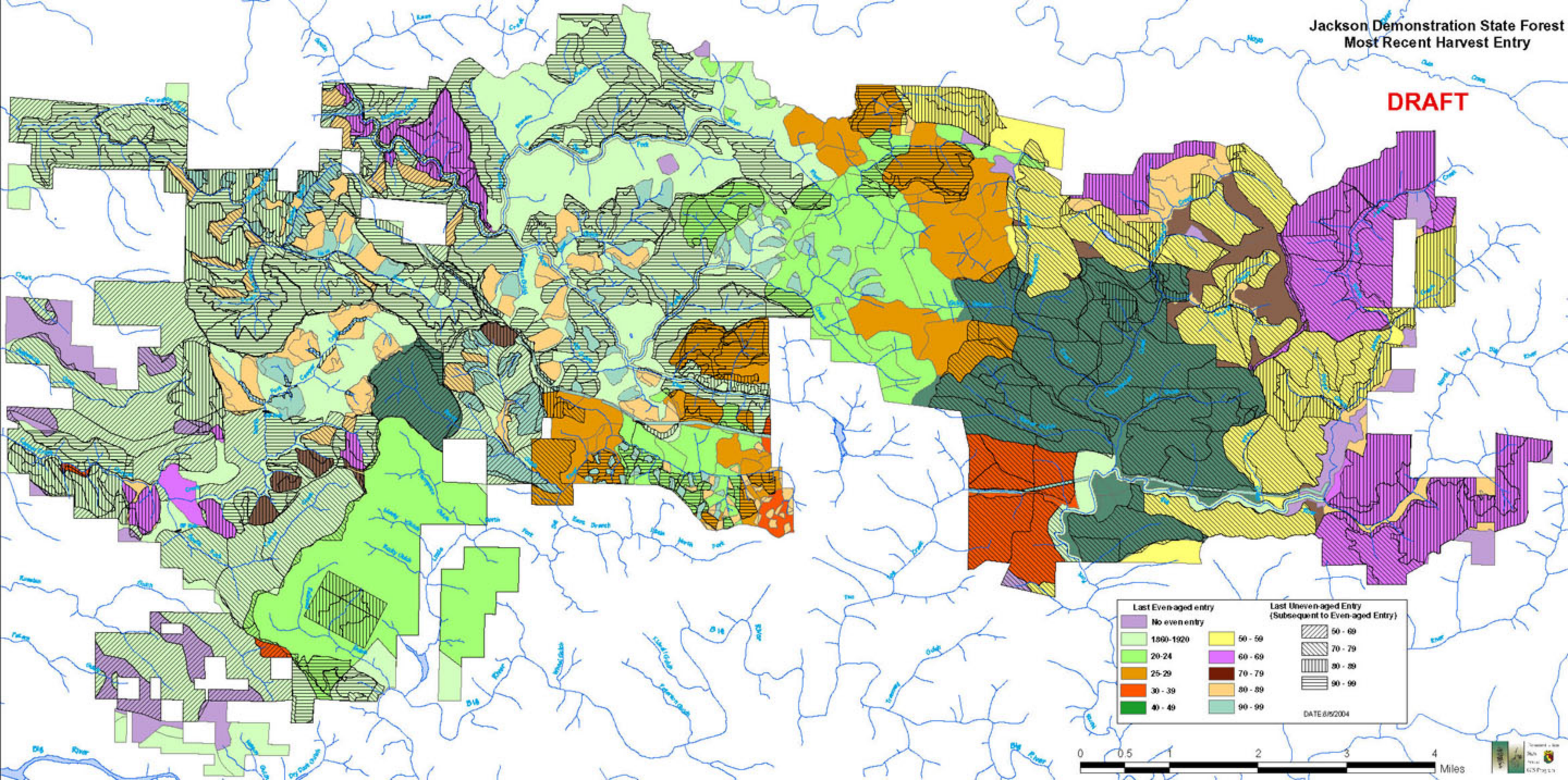
Chart 5 shows clearly that Non Natural-Forestry Acres, those acres that are managed similarly in Simulation II and Option A, help the projected growth in Simulation II relative to Option A. The cause of the lower relative growth for Simulation II is in the modeling of Natural Forestry Acres.[5]

[5] The charts above raise questions that I haven't addressed here, but that deserve answers:

Question: What differences in the assumptions and modeling used in Simulation II and Option A account for the relatively high growth of the Non Natural-Forestry Acres compared to Option A for the first 60 years?

Question: What accounts for the relatively high growth of the Non Natural-Forestry Acres compared to Natural Forestry acres throughout the 100 years?

Existing Seral Stage Distribution


Jackson Demonstration State Forest
Most Recent Harvest Entry
DRAFT
Last Even-aged entry
No even entry
1860-1920
20-24
25-29
30 - 39
40 - 49
50 - 59
60 - 69
70 - 79
80 - 89
90 - 99
Last Uneven-aged Entry
(Subsequent to Even-aged Entry)
50 - 69
70 - 79
80 - 89
90 - 99
DATE 8/5/2004
0
0.5
1
2
3
4
Miles

History of Harvest Entries on JDSF

Prepared by JDSF staff, March 25, 2010.

Last Even-Aged Entry	Subsequent Uneven-Aged Entry	Acres
no entry	1870-1900	19
	50s	111
	60s	445
	70s	93
	80s	16
	90s	4
	none	893
no entry Total		1,581
pre-1900	50s	15
	60s	1,605
	70s	1,638
	80s	1,220
	90s	3,085
	none	1,891
pre-1900 Total		9,454
1900-1920	60s	1,042
	70s	150
	80s	110
	90s	4,172
	none	3,388
1900-1920 Total		8,862
1920s	60s	19
	70s	487
	80s	337
	90s	1,805
	none	6,598
1920s Total		9,245
1930s	60s	28
	70s	933
	80s	16
	90s	8
	none	123
1930s Total		1,109
1940s	60s	448
	70s	3,976
	80s	134
	90s	40
	none	455
1940s Total		5,053
1950s	70s	2,945
	80s	1,228
	90s	16
	none	345
1950s Total		4,533
1960s	70s	1,294
	80s	2,686
	90s	17
	none	154
1960s Total		4,150
1970s	80s	199
	90s	0
	none	617
1970s Total		816
1980s	90s	4
	none	2,271
1980s Total		2,276
1990s	none	1,550
1990s Total		1,550
Grand Total		48,628

source: union_pre20to90 shapefile.

Recommendations Under Consideration

Pending Landscape Committee Recommendations

The Landscape Committee is considering development of recommendations on the following subjects:

1. NSO activity centers
2. Buffers for old growth residuals outside special status areas
3. Woodlands STA
4. Development of a growth/yield model as a project within a Center of Excellence.