Comments on the Draft Management Plan and Draft Environmental Impact Report for Jackson Demonstration State Forest

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1 Qualifications

1.1 Qualifications as an Expert

I am presenting my testimony on economics and estimates of forest inventories and growth as a qualified expert.

I have a Ph.D. in economics from the Massachusetts Institute of Technology. My area of specialization was in mathematical and statistical analysis. I performed quantitative analysis of complex systems for over twenty years for the Rand Corporation, Santa Monica, and as a private consultant to a number of organizations specializing in policy analysis. I have extensive experience in computer-based data analysis and statistical analysis.

Although the inventory estimates in question deal with timber and a forest, the issues involved in determining the accuracy of the estimates are analytical and statistical. No special knowledge of forestry or silviculture, beyond that which I have acquired through reading and discussing the issues with foresters, is required. Conversely, knowledge of forestry is not a qualification for judging the accuracy of the inventory estimates.

2 Estimates of Inventories

2.1 Failure to Provide Information Needed

In the areas of forest inventory, timber growth, and allowable cut, the DFMP fails completely to provide the information needed for informed decisionmaking and public participation.

Estimates of inventories and forest growth are the foundation upon which the DFMP rests. Conclusions of the plan about the impacts of proposed logging plans on forest health and sustainability depend critically upon the estimates of inventory and growth. Decisionmakers can have only as much confidence in the environmental conclusions of the DFMP as they can have in the accuracy of the forest inventory and growth estimates presented to them.

The inventory and growth data presented in the DFMP and DEIR are erroneous, seriously misleading, and wholly inadequate in detail and organization.

The importance of these data are so great and deficiencies in presentation and analysis so great that the DEIR fails to meet the minimum obligations of CEQA to provide a basis for informed decisionmaking and public participation in the development of the Management Plan.

2.1.1 Inadequate Data

At the most basic level, the DFMP and DEIR fail to provide the inventory data needed for informed decisionmaking and public participation. Changes need to be made in the presentation of inventory information in the Final Draft.

Every previous Management Plan, going all the way back to 1964, has presented tables and charts showing inventory estimates (volume and growth) and trends by forest compartment and tree type, distribution of acreage by age-class of trees, stems per acre for each diameter class, amount of inventory in each diameter class, inventory of trees by species, sawtimber growth by merchantability class and diameter class. The DFMP does not present any of these charts and tables, losing the valuable time-series of information and making it impossible for the reader to determine trends in the composition and totals of the forest inventory.

Further, because the new inventory system has about 2500 plots, no one can make any sense out unaggregated plot data. Yet, the only table of inventory presented in the DFMP (Table A5-1, Appendix 5) simply lists the 1997 (sic) inventory data for hundreds upon hundreds of forest areas, identified only by vegetation type and site class.[1] No key is given for the vegetation type, nor are the rows identified by geographical area or watershed. The data are not aggregated into the planning units used in previous management plans and compared to previous results; thus there would be no possibility of determining changes in forest inventory within watersheds even if the data were reliable. To create understanding of the results, data for the individual plots need to be aggregated in various ways and related to the geography and harvesting histories in the forest.

2.2 Probable Serious Errors in Inventory Estimates

2.2.1 New Inventory System Not Accurate and Reliable

There is strong evidence that the new inventory system substantially overestimates the true inventory of Jackson State Forest. An accurate, reliable inventory is absolutely crucial to development of appropriate harvest plans. The new inventory system fails to meet this requirement. Before an acceptable management plan can be developed, the inventory system needs to be corrected and empirically validated.

2.2.2 Failure of CDF to Provide Evidence and Analysis

In 1998, I presented to CDF substantial evidence that their recent estimates of forest inventory and growth were very much greater than the true values.[2] CDF's reply to my evidence was not a convincing rebuttal.[3] At the very least, the evidence presented raised serious questions about the accuracy of the estimates. More recently, I have obtained internal documents from JDSF that 1) support the conclusion that the current inventory system is substantially overestimating inventory and growth, and 2) raise serious questions about the validity of the estimates produced by the current inventory system.[4]

CDF did not present any of this information in the DFMP or DEIR. Further, CDF had the data and capacity to perform additional analyses to resolve uncertainties and provide answers to questions about the accuracy of recent inventory estimates. Its failure to do so and to make the data and analyses available to the decisionmakers and the public is an unacceptable failing of the DFMP and DEIR.

To support the assertion that CDF has failed to provide information and analysis essential to informed decisionmaking and public participation, I have included a sampling of such information as exhibits attached to my comments. In following sections, I discuss and perform limited analyses of this information. Given my limited access to data and resources, the presentation here is indicative but not comprehensive. Much more could and should have been done by CDF before publishing the DFMP.

2.2.3 How Can the New Estimates Be Reconciled With the Old?

JDSF installed a new inventory system (IFI or Intensive Forest Inventory system) in 1989-90 to replace the former CFI (Continuous Forest Inventory) system. The new system estimated 1990 inventories were nearly 50% higher than the 1984 CFI estimate. Its estimate of forest growth was 34 percent greater. Since 1990, all estimates of inventory and growth have been very substantially higher than those produced by the CFI system (and keep growing larger).

The estimates of inventory and growth on which the DFMP is based are enormously higher than the corresponding estimates made over a 25-year period by the previous inventory system. For example, the DFMP states, "…the most reliable evidence of forest growth on JDSF. … [produced an] estimate of annual growth of approximately 65 million board feet, or approximately 1300 board feet per acre per year." These figures **are twice as large** as those produced by the old (CFI) system in 1984, the last year it was used. The 1984 estimate of growth was 655 board feet per acre per year.[5]

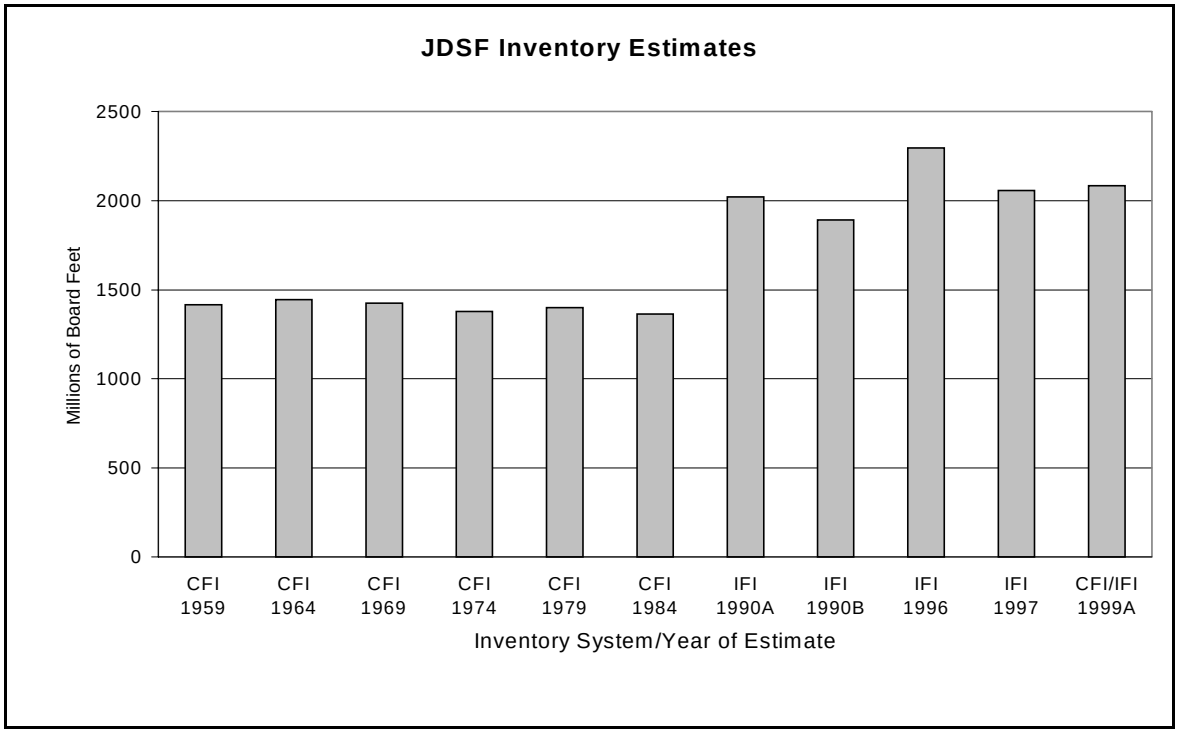
The fundamental question, which is not addressed by the DFMP or the DEIR, is, "How can the vastly higher recent estimates of forest inventory and growth be reconciled with the much lower, stable estimates that were produced over 25 years by the previous inventory system?" The new estimates are so much higher than the old stable ones, from 33 to 100 percent higher, as to raise an immediate doubt about their validity.

2.2.4 CFI Estimates Were Self-Consistent

As Figure 1 shows, during the 25-year period in which the former (CFI) inventory system was in place (1959– 84), the measured inventory was about the same at the end as at the beginning[6]. During this same period, JDSF policy was *always* to attempt to cut all incremental growth. If this policy had exactly succeeded, inventories would have remained exactly constant. Thus, the growth, harvest, and inventory numbers were generally *self-consistent.*

If anything, the CFI inventory system appears to have overestimated growth in the last twenty years, because inventories declined by 78 million board feet between 1964 and 1984. This decline of almost 4 million board feet per year would not have occurred if the estimated growth, which determined harvest levels, had not been higher than actual growth.

Figure 2-1



2.3 Are the New Estimates Credible?

Various estimates of inventory and growth have been made with the new (IFI) inventory system since it was installed in 1989-90. A number of the inventory estimates are plotted in Figure 1.

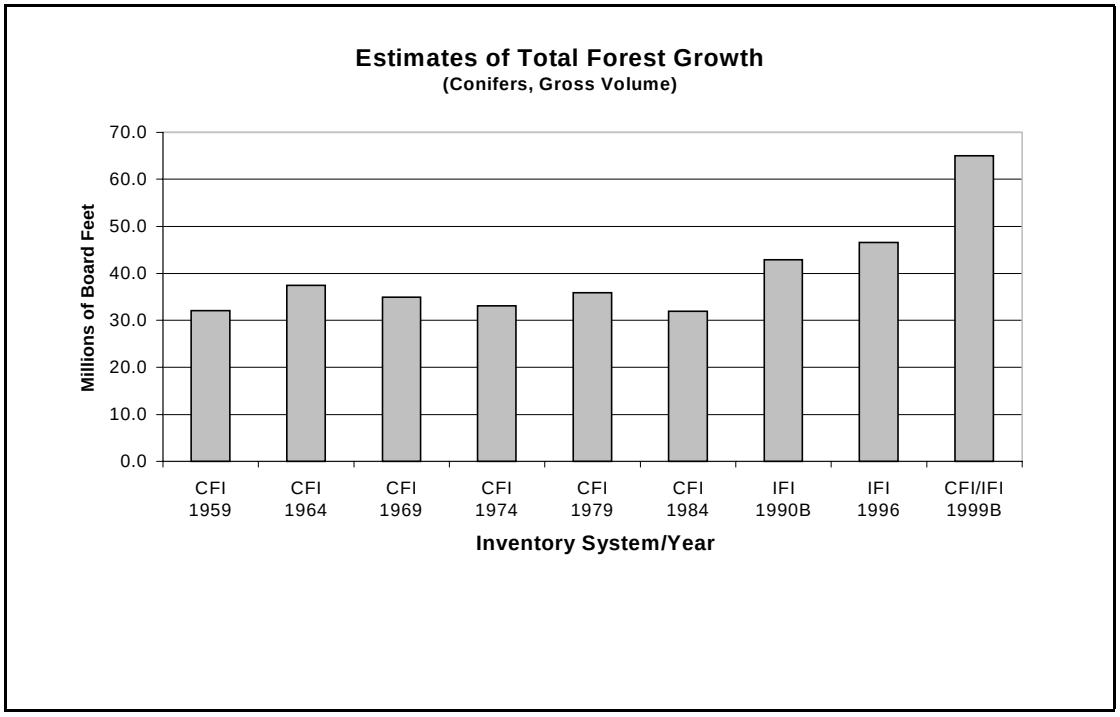
The first inventory estimate with the new system was for 1990. It is sharply higher that the previous estimate. Harvest levels from 1984 to 1990 were set at the estimated growth for that period, as was the long-standing JDSF policy. Thus at most a minor part of the estimated increase of 48 percent between 1984 and 1990 could possibly reflect actual forest growth. Rather, the higher estimated inventory is a product of the new inventory system.

If the new system estimates are accurate, the old system produced substantial underestimates of the true inventory. Is this credible? To answer this, one needs to look at forest growth and harvests, because these are the determinants of changes in forest inventories.

2.3.1 Forest Growth Estimates

Figure 2 shows various estimates of forest growth. As was true for inventory estimates, the growth estimates of the new system are also much higher than those of the old system. Are the higher growth rates estimated by the new system consistent with the trends of inventories over time? The answer is, "No."

Figure 2-2



2.3.2 Simulated Inventory Projections

The inconsistency is seen most dramatically by assuming the DFMP estimate of forest growth of 65 million board feet per year (before harvests) is accurate and that this has been the real rate of growth since 1959, rather than the much lower rates estimated by the old inventory system. Estimated inventory growth during any given period equals forest growth (65 million board feet per year) minus actual harvests.

Figure 2-3

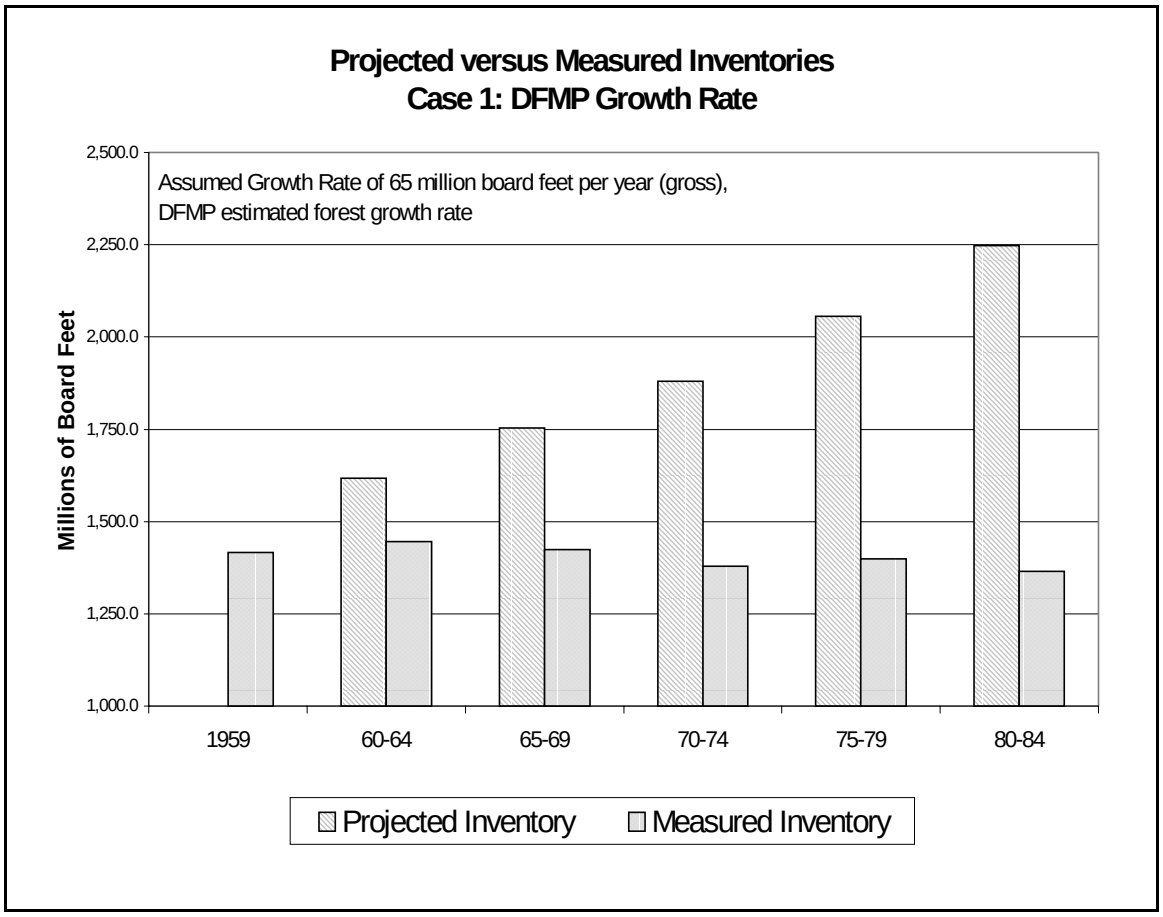


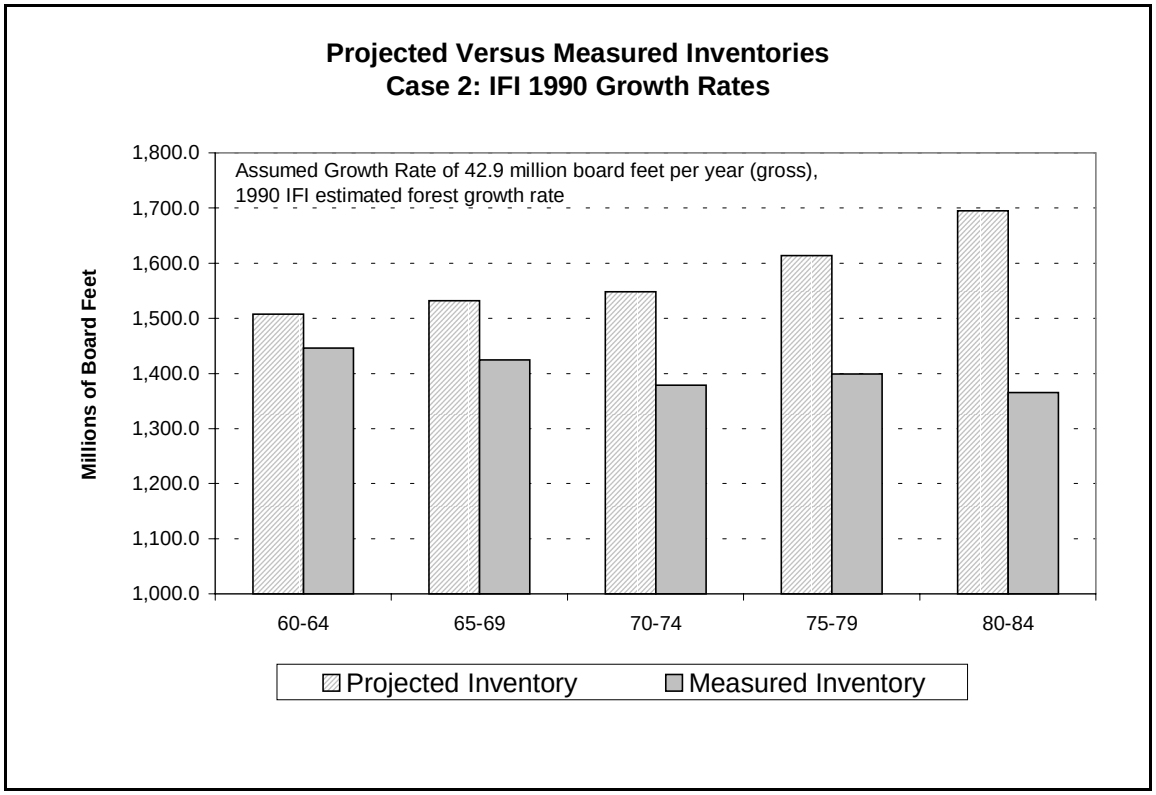
Figure 3 shows the projected inventories assuming the DFMP growth rate applied from 1959 through 1984. Projected inventories increase from 1417 in 1959 to 2248 in 1984, an increase of 831 million board feet. During this same period the measured inventories *decreased* by 52 million board feet versus those measured by the CFI inventory system.

It is inconceivable that a consistently applied inventory measurement system, applied to the same plots for 25 years, could show a decrease in inventories if inventories were actually increasing as projected in Figure 3. By the end of the period, the CFI system would be underestimating the "true" inventory by forty percent! This is just not credible.

Even the growth rate derived from the 1990 IFI inventory (42.9 million board feet per year) implies significant inventory growth between 1954 and 1984, as shown in Figure 4.

Projected inventories still grow by 267 million board feet while measured inventories were decreasing by 51 million board feet.

Figure 2-4



2.3.3 Fundamental Difficulty in Justifying Higher Growth Rates

The decline of inventories between 1959 and 1984 presents a fundamental hurdle that assertions of higher growth must overcome. This is a difficult hurdle, because even if actual inventories were higher, and the CFI levels needed to be adjusted upward to correct this bias, measured inventories would still have declined. Each measured inventory would be adjusted upward by the correction factor, so there would be no change in the pattern of decline.

The only way that true inventories could have increased while measured inventories declined would be if the measurement error of the system increased over time. For example, if the system were accurate in 1959 but underestimated inventories by 330 million board feet in 1984, the 1990 IFI growth rate could be supported. But, what could account for such a large growth in underestimation over the period? And how could it completely miss measuring the much higher rate of growth?

2.3.4 The CDF Argument for Increasing Underestimation Fails Empirically

In attempting to justify the higher growth rates, CDF came up with an ingenious explanation that could, theoretically, account for an increasing error in the old system over time. CDF's argument is, in summary:[7]

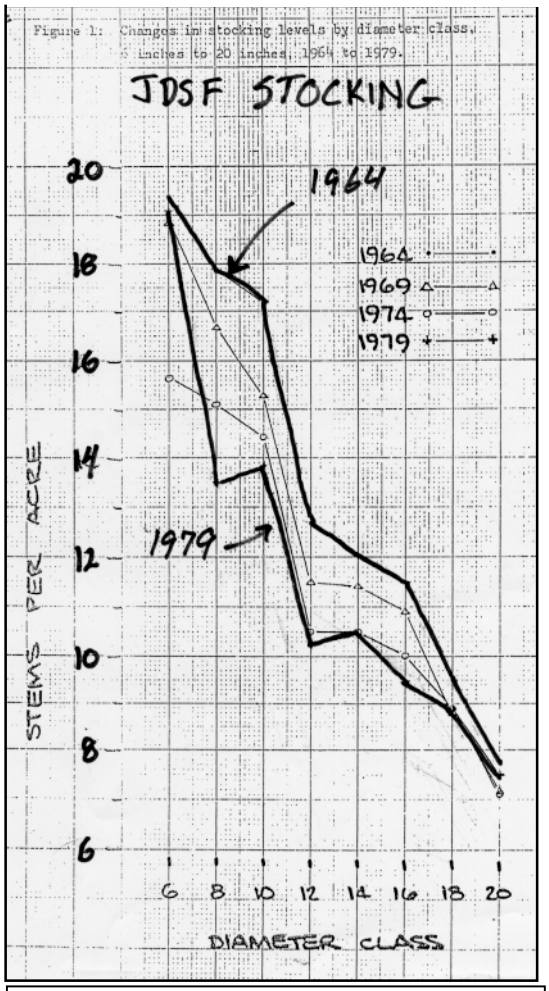
1. The CFI system estimated tree volume solely by measuring tree diameters, using relations between tree diameter and volume developed empirically at the start of the system (late 1950's).
2. If the average tree height for a given diameter increased over time, the CFI system would not capture this height increase and, therefore, would increasingly over time underestimate the true tree volume.
3. Tree heights for a given diameter will be greater in stands of greater tree density (more stems and/or volume per acre), because in denser stands, trees will put on more height growth than diameter growth.
4. Finally, CDF conjectures that forest stands in the west and central parts of the forest were growing denser. "The likely result is that as the young growth stands grew older and denser during this forty year period with an increasing amount of inter-tree competition, diameter growth decreased relatively disproportionate to height growth, changing the relationship of the diameter-height ratio of individual trees."

Although the first three points may be a correct *theoretical* analysis, its application to JDSF depends upon the *empirical* conjecture in point 4. This conjecture is refuted by JDSF's inventory data. Measured tree density increased somewhat between 1959 and 1964, but **from 1964 through at least 1979, stand density in JDSF was constantly diminishing.**

The decrease in density is striking for trees of DBH (diameter at breast height) less than or equal to 20 inches (Figure 5). For every tree-diameter class, there were fewer trees per acre in 1979 than in 1964. The differences are not so dramatic for larger tree diameters, but careful inspection of the original of Figure 6 shows that in 1964 there were at least as many trees in every size-class below 44 inches as there were in 1979. Note: JDSF has never published the results of its 1984 CFI inventory, but since the measured inventory declined significantly between 1979 and 1984, almost certainly stand density decreased further in that period.

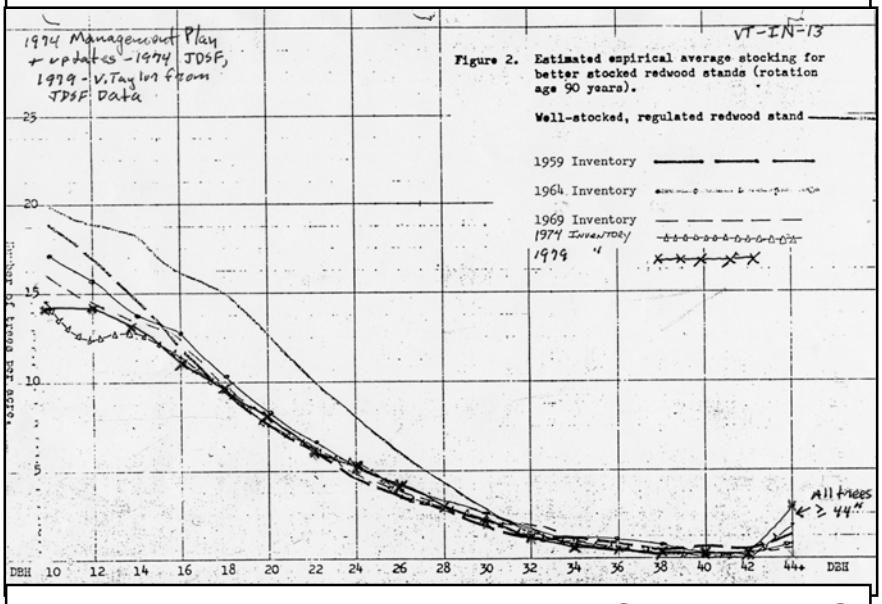
When empirical data are applied to the CDF theory, it works in the opposite direction that CDF conjectured. To the extent that stand-density changes were affecting the

Figure 2-5



Source: VT-IN-12

Figure 2-6



Source: VT-IN-13

accuracy of CFI measurements, they should have caused a growing overestimation of inventory, that is, true inventories would be increasingly smaller than those measured.

Taking into account changes in stand density reinforces a conclusion that true growth of the forest has been equal to or less than the CFI growth estimates.

2.3.5 Growing Overestimation of CFI Estimates Consistent with Data

A growing overestimation of inventory is consistent with the downward trend of measured inventories between 1964 and 1984, when the forest policy was to cut all measured incremental growth. Estimated growth was determined by the period differences in measured inventories. If inventories were increasingly overestimated, so was growth; thus harvest levels would be set higher than true growth, and this would cause true inventories to decrease.

2.3.6 Forest Manger Concerned that Growth was Overestimated

Additional evidence that the CFI system has overestimated growth is a 1976 letter from J. E. Sindel, Manager of JDSF, to the Deputy State Forester, quoted here in part:[8]

> After reviewing the 1974 CFI information and comparing growth figures with those of 1969, we find a decrease in average annual growth. This, we believe, is due to increased cutting in our second growth stands.
>
> With this in mind we believe our current annual cut should be held to about 26 million for the next few years. Our reasons are as follows:
>
> 1. Continued cutting of 28 to 30 million feet would decrease out growing stock to an even lower level resulting in a continued decrease in average annual growth….

The 1969 Management Plan was based on the 1964 CFI inventory. Forest growth (net) was estimated to be 34.9 million board feet, and the allowable annual cut was set to this amount. Actual reported harvests from 1970-74 averaged 31.8 million board feet per year. Between 1969 and 1974, the measured inventory decreased from 1464 to 1417 and estimated forest growth (net, all species) from 30.3 to 29.7 million board feet.

The 1974 Management Plan set the allowable cut at 30 million board feet (all species), based on 1969 inventory data. Even though the estimated 1974 growth was not much less (29.7 million board feet), the Forest staff evidently felt that actual growth was less than the estimate, as the letter quoted above states the staff's belief that cutting 28-30 million board feet per year would "decrease our growing stock to an even lower level."

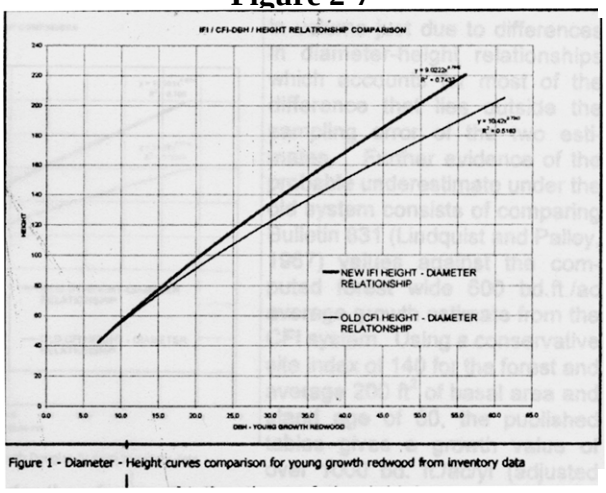
2.3.7 The New Empirical Relations between Diameter and Volume

In 1984, JDSF undertook an empirical ("Fall and Buck") study to update the relationship between tree diameter and volume. The intent was to incorporate the revised estimation parameters in the CFI system and to use them in estimating timber yields of Timber Harvest Plans.

These new diameter volume relations support the view that the CFI system underestimated inventories, but the magnitude of the implied underestimate is small, perhaps 10%.

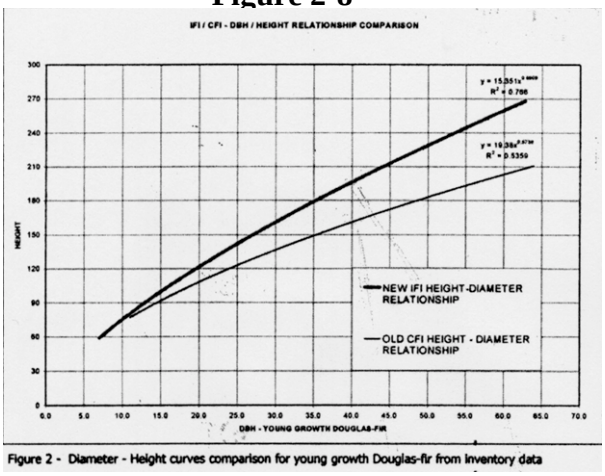
This estimate is derived as follows. A comparison between the new and old relations was published by CDF.[9] Two figures are provided, one for redwood and one for Douglas Fir, showing volumes as a function of diameter.

Figure 2-7



Source: VT-IN-11

Figure 2-8



Source: VT-IN-11

In the range where most merchantable trees lie (12' to 30" diameter), the new volumes appear to average about 7% higher for redwood and 15% higher for Douglas Fir. As shown in Table 2-1, these differences translate into an average increase in inventory estimate due to the new equations of approximately 10%.

Table 2-1

Effect of New Volume Equations on Inventory Estimates

Type of Tree	Percent of Merchantable Timber (Approximate)	New Equation Volume Relative to Old	Adjusted Forest Volume (Percent) (Column 2 *times* Column 3)
Redwood	67	1.07	71.7
Fir	33	1.15	38.0
Total	100		**109.7**

2.3.8 New Data Eliminates Increase in New Volume Equations

A 1992 memo by John Griffen, senior forester at JDSF and at the time in charge of all timber sales, shows that further data eliminated most if not all of the increase in estimated inventory predicted by the new volume equations:[10]

> There is still some question about the reliability of our volume equations. When we abandoned the equations used in the old CFI in favor of those used in the new system we estimated a difference of 10-20% (the new ones estimating higher volumes). This seemed OK at first because the sales that we cruised with the new equations cut out pretty well. Then we started experiencing under-runs and incorporated form ratio into the volume equations to try to fix it. This mitigated the under-runs, but in the process we found that the equations with form ratio estimated volume at about 10% less that the equations without.

I estimate above that the new volume equations raise inventory estimates by 10%. Introducing form factor reduces them by 10%; thus after all of the changes, we are left with the CFI estimates unchanged.

2.4 DFMP Erroneous and Misleading Growth Estimate

The DFMP cites as "the most reliable evidence of forest growth on JDSF. … an unconstrained [before harvests] estimate of annual growth of approximately 65 million board feet, or approximately 1300 board feet per acre per year."[11]

The DFMP states that the cited timber growth estimate was actual measured growth: "The plot system was measured in 1989 and again in 1999. The difference between the measurements, accounting for harvest, produced [the figure cited]."[12]

2.4.1 Computer Projection, Not Measured Growth

<u>The assertion that the DFMP growth figure is based on measurement is erroneous and very seriously misleading.</u> An internal document from JDSF files show that the cited growth estimate was developed from a computer-based model that *projected* the growth, rather than from actual measured differences in tree volumes between the two dates.

> This model [CRYPTOS] allows the user to grow a stand … for one or more five year increments…. In this case, each stand was simply grown for 5 years and the mortality

> function in the model was allowed to operate. The default values in the model were used – that is, no growth calibration factors were added to the run. [13]

Note that default values were used. No actual growth data were used to calibrate the model. These calculations are highly dependent on the values of parameters used in the model, and these parameters were not based on empirical data from JDSF.

2.4.2 Data Collection Problems and Probable Bias

Even the data collected in JDSF and used in the model is of questionable reliability: "Site information was acquired by choosing site trees [sometimes a single tree per plot] in or near each inventory plot. Using the height and DBH (diameter at breast height) information from these site trees allowed calculation of the site index for each species. This is an important growth model component in CRYPTOS."[14] Thus, the site trees selected were critical to the growth estimates.

A letter to JDSF from a consultant on the project lists numerous problems and concerns about the reliability of the data being used as the basis for calculating forest growth, including a concern about the selection and measurements of site trees.[15] The letter makes clear that the site tree selection process was not random but based on subjective judgment. After the data collection on site trees was underway, the consulting firm became concerned:

> As of 7-9-99 HJW provided explicit instructions for all crews to ONLY use the existing site tree if it indeed is a representation of the Site quality for the plot. If the existing Site tree(s) is/are not suitable, a good open grown tree within 300 feet of the plot center shall be selected as the Site Tree, but only if the tree is the best representation of the height and diameter for trees on the plot.[16]

The possibility of significant bias is evident, given the desire of CDF to show high growth rates. If the Site Indices for the plots are biased upward, so will be the calculated growth rates.

2.4.3 DFMP Misleads Further

The results of the computer runs are then presented:

> …the total forest growth per year is calculated by multiplying the 1312 bf/acre value by the 48,652 acres generated from GIS computations. The result of this calculation is 63,851,437 board feet growth per year for all species. Conifers contribute 58,356,176 board feet of this and hardwoods 5,493,880 board feet[17]

Obviously, this computer projection is the source of the estimates highlighted in the DFMP. But even beyond implying that these figures were empirical measurements rather than creations of a computer program, the DFMP further misled readers. In citing these results in the DFMP, the forest total is rounded upward to 65 million board feet. The figures are for all-species, not solely for conifers, the class of trees appropriate when discussing the potential growth available for commercial harvest. Even if CDF wanted to use these calculated estimates, it should have presented those for conifers only – 58.4 million board feet instead of 65 million board feet.

In summary, CDF presented a computer projection as a measured estimate, failed to present information on data collection problems and the likelihood of subjective bias, and cited the results of the computer projection in ways that exaggerated the already high estimate of growth.

2.5 Evidence that CDF Does Not Believe IFI System Reliable

Although the IFI system was installed in 1989-90, JDSF has never used the system either to determine the acceptable level of harvest or as a tool in developing timber harvest plans. There is substantial direct and inferential evidence that CDF did not have confidence in the reliability of the system.

2.5.1 Failure To Revise the Allowable Cut

Board of Forestry policies on State Forests says, "Allowable cut levels must be derived from pertinent current inventory and growth data." (Section 0351.4 C.) The Management Plan states specifically, "In 1985 and again in 1990, this allowable cut level will be recalculated based on new inventory and growth information…"[18]

Throughout the 1990's, JDSF set its allowable cut (harvest) at the level determined in the 1983 Management Plan, updated for the results the 1984 (CFI) inventory. But, it never revised the allowable cut after either the 1990 inventory or the 1995 partial remeasurement conducted with the IFI system.

Why did CDF ignore Board policy and its own 1983 Management Plan? Why did it not revise the allowable cut in the early 1990's after the initial IFI results became available?

Starting in 1992, CDF started using about $8 million annually of Jackson State revenues to fund its own internal operations. It was anxious to get as much revenue as possible from Jackson State. The IFI estimate of growth was one-third higher than the prior CFI estimate, thus the revised allowable cut would have been significantly higher, too.

Throughout its history, JDSF has aimed to cut all of the estimated growth. For many years in the 1990's, CDF exceeded the limits set by the CFI allowable cut, despite repeated internal warnings that this would violate JDSF and Board of Forestry policies.[19] In the latter part of the 1990's, CDF even began using the superseded, higher allowable cut of the 1983 Management Plan in its internal discussions of allowable cut, but it still did not propose to revise the cut using the 1990 inventory results.

Given CDF's demonstrated desire to log JDSF at levels higher than allowed by the 1984 inventory, its failure to make the legally mandated revision in allowable cut strongly infers that CDF did not have confidence in the validity of the 1990 or 1995 IFI estimates.

2.5.2 Direct Evidence

Internal JDSF memos support the indirect evidence that CDF lacks confidence in the IFI system.

2.5.2.1 Concerns of John Griffen

John Griffen is a senior forester at JDSF. He began working for JDSF in 1977. He became a supervisor in 1979 and in 1984 became supervisor of the timber sales program, which is by far the most important and largest activity of JDSF. He oversaw the preparation of the 1983 Management Plan, and was in charge of inventory and allowable cut calculations made with the 1984 CFI estimates. In sum, he is experienced and knowledgeable about the condition of the forest and the CFI system.

In internal JDSF memos, Mr. Griffen has several times expressed his personal lack of faith in the reliability of the IFI system and suggested additional analysis. For example, in a 1992 memo, he says:

> So far we can only guess at why the new inventory and growth figures are so much higher than the old.
>
> There is still some question about the reliability of our volume equations… It should be noted that since we have been using the old CFI and setting annual harvest equal to growth, the inventory of the growing stock has remained remarkably constant.
>
> Further analysis would look at basal area and diameter distribution to see if we might just be measuring the same trees with a shorter yardstick…
>
> To answer some of the questions raised above we might want to look further at our volume equations. We still have a lot of data from the 1984 fall-buck-scale study that might be enlightening, and we could compile additional data by doing some intensive woods scaling on each timber sale…[20]

Mr. Griffen also performed a calculation to determine his own personal confidence in the IFI.[21] Starting with an initial confidence level of 95%, he considers 10 steps in the history of the system, adjusting his confidence for each development. He ends up with a 65% confidence level. He follows the analysis with:

> Things to do to boost confidence:
> - Precisely locate plots on type map and confirm strata they're in
> - Spend more time regressing diameter-height relationship
> - Analyze check cruise data … develop correction factor for cruises

In a December 1993 memo, Mr. Griffen says:

> …A new calculation of annual cut based solely on growth as indicated by the new inventory has already yielded a figure of something like 42 mmbf. (Of course, this is a based on numbers that I have expressed little faith in.) A lot of work refining the inventory numbers will likely only yield us a somewhat different number that we still won't feel comfortable with. (Emphasis added.)[22]

In the same memo, Mr. Griffen also discusses the problems with keeping the new inventory system current. He pencilled in some updates in Jan 1995, implying that his 1993 concerns had still not been addressed:

> One thing to consider is some kind of remeasurement plan. The plot data is now 4 to 6 years old, and the calculated whole-forest numbers that were brought forward to a common date of 12/31/90 are 4 years old. The original plan allowed for remeasuring one tenth of the plots every year so that no data would be older than ten years, and so the expense could be parceled out into (affordable?) annual amounts instead of trying to

> come up with the whole thing once every 10 years. If we go with the one tenth per year plan, we should have started this year [1993].[23]

He also discusses an important problem that has not been resolved to this day:

> Then there's the question about adequacy of the current inventory system... [The need for more complex forest planning is] an argument for increasing the sophistication of the design. On the other hand, without a forester with enough time to actually manage the inventory, what we have now is too complex to very useful. The stratified sample design, the mixture of permanent and temporary plots, and the provision for partial replacement of permanents at the time of remeasurement are all complications that require time, effort, familiarity and expertise to deal with. We might want to recognize our limited resources and consider actually simplifying the system before we get much into remeasuring things.[24]

2.5.2.2 1995 Inventory "Validation"

Evidently concerns about the 1990 IFI measurements were sufficiently widespread that CDF planned a major project in 1995 to validate or revise its findings. Attached to my comments are 10 pages of typed and handwritten notes concerning this project (Exhibit VT-IN-19). The details are too complex to summarize here, but it is apparent that this was a major project that would require a substantial commitment of resources.

An introductory paragraph of "IFI Meeting Notes – 1/24/95" on the validation project is extremely telling:

> The first phase is actually validating (re-doing) the original inventory which was to calculate the forest inventory as of December 1990. Important in this process is the documentation of what and how things were done and what assumptions were made during the process.[25]

Five years later, CDF is planning to completely re-do the 1990 inventory, only this time actually trying to keep track of what was done. Evidently, record keeping during the initial inventory was so inadequate that it was impossible to reconstruct what was done.

2.5.2.3 Was the Validation Study Completed?

CDF has never made public the results of the 1995 validation project. Dharma Cloud Foundation, of which I am a trustee, made a Public Record Act request to CDF in May 2001. Included in the request were:

> All records that relate to estimates of timber inventory and timber growth in JDSF produced since 1985, including all interim estimates that might later have been revised.[26]

No papers on the results of this validation project were found in the files provided by CDF in response to this request.

CDF should be required to provide a detailed description of the results and of problems encountered in conducting the validation study before the EIR is certified.

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[1] To my knowledge, no comprehensive inventory was performed in 1997; thus the numbers listed are probably primarily based on the 1989-90 inventory projected to 1997.

[2] Letter to Marc Jameson, Forest Manager, JDSF, from Vince Taylor, April 22, 1998, Exhibit VT-IN-1, and letter to Richard Wilson, Director, California Department of Forestry, from Vince Taylor, April 22, 1998, Exhibit VT-IN-2.
[3] Letter to Vince Taylor from Richard Wilson, Director, California Department of Forestry, February 11, 1999, Exhibit VT-IN-3.
[4] Attached as Exhibits to my comments and discussed below.
[5] *The New Inventory, What It Tells Us So Far*, typed with hand-written additions, no author, JDSF files, 1993. Gross volume figure for 1984, the appropriate comparison with the DFMP estimate of 1300 board feet per acre per year. Exhibit VT-IN-5.
[6] Estimates and sources for Figures 1 to 4 are in Appendix A of this chapter.
[7] "JDSF Forest Inventory – Transitioning from the Old to the New," Norm Henry, Division Chief, JDSF, in *Jackson Demonstration State Forest Newsletter*, Spring/Summer 1999, Exhibit VT-IN-11.
[8] Letter from J. E. Sindel, State Forest Manager, to George Grogan, Deputy Forest Manager, on Resource Management, Jackson State Forest, Allowable Cut, June 25, 1976. Exhibit VT-IN-13
[9] "JDSF Forest Inventory," *op. cit.*
[10] Memo from John [Griffen] to Forest [Tilley, Manager], April 28, 1992. VT-IN-15, pp.1-2.
[11] DFMP, *op. cit.*, p. 48.
[12] *Ibid.*
[13] *NOTES ON AND RESULTS FROM FOREST GROWTH CALCULATIONS*, no author, from JDSF files, 11/30/00.
[14] *Ibid.* Emphasis added.
[15] Letter from Bonnie Churchill, Hammon, Jensen, Wallen, & Associates, to Norm Henry, JDSF, August 3, 1999. Exhibit VT-IN-7.
[16] *Ibid.*
[17] *Ibid.*
[18] JDSF Management Plan, 1983, p. 73. Interestingly, in light of the discussion of this section, the quoted text continues, "but it would not be expected to change more than 10% at either time."
[19] Vince Taylor, *Jackson State Forest Logging in Excess of Allowable Cuts*, Unpublished paper, July 15, 2002. Exhibit VT-IN-16.
[20] Op. cit., VT-IN-15
[21] *Confidence in the New Inventory*, no author listed but in John Griffen's handwriting, undated. Exhibit VT-IN-17.
[22] Memo to Hal [Slack, Forest Manager] from John [Griffen], *Re: Reorganization*, December 1, 1993. Exhibit VT-IN-18.
[23] *Ibid.*
[24] *Ibid.*
[25] "IFI Meeting Notes – 1/24/95," no author, typewritten. Included in Exhibit VT-IN-19.
[26] Letter to Andrea Tuttle, Director, CDF, from Vince Taylor, Trustee, Dharma Cloud Foundation, May 22, 2001. Exhibit VT-IN-20.

Appendix 2.A: Inventory Systems and Measurements

This Appendix provides information on the JDSF inventory systems and measurements. It provides supporting data and sources for the figures presented in the chapter.

B.6 Inventory Estimates Adjusted for Comparability

All total forest inventory and growth numbers presented here are adjusted to 48,650 acres to make them as comparable as possible. Acreage considered in different estimates made by JDSF range between approximately 44,000 and 49,000. Recent estimates generally are based on an acreage of 48,650 acres; thus the figures cited herein are 2.8% higher than values published by CDF.

To the extent possible or noted otherwise, only conifers (merchantable trees) are included in the estimates.

Numerous differing IFI estimates for the same year were obtained from JDSF files. There is no indication on the estimates of which ones CDF considered most accurate. The one's cited here are representative.

B.7 The CFI Inventory System

From 1959 through 1984, JDSF used the Continuous Forest Inventory (CFI) system to estimate inventories and growth. Estimates were based on periodic measurements made in 141 one-half acre plots. This system yielded estimates that were roughly *self-consistent*, that is, the period to period changes in measured inventories were roughly equal to the starting inventory *plus* estimated growth *minus* harvests.

The last CFI inventory was made in 1984. Total forest inventory was estimated to be 1446 million board feet. [1] Growth (before harvests) was estimated to be 655 board feet per acre per year (gross). For 48,650 acres, the estimated gross growth was 31.9 million board feet.

B.8 The IFI System

The Intensive Forest Inventory system was introduced in 1989. Its estimates are based on a combination of 308 permanent and 2054 temporary one-fifth acre plots. One-hundred forty-one of the permanent plots were placed within the original 141 CFI plots.

Data for the first IFI estimate were collected in 1989-90. Total forest inventory (gross) was initially estimated to be 2,020 million board feet.[2] A later dated publication gives a 1990 IFI total inventory (gross) of 1,892 million board feet.[3] The later publication gives estimated IFI growth (gross, before harvest) of 882 board feet per acre or total forest growth 42.9 million board feet per year.

An internal memo on "1996 Inventory Stats" gives a total forest inventory of 2,296 million board feet and growth of 957 board feet per acre.[4] The memo does not indicate whether these are net or gross or include or exclude non-conifers. Based on other estimates, one would think that these are gross and include hardwoods. However, the memo says, "Based on these figures, the total forest growth based allowable cut would be

46.6 MMBF [million board feet]…." Allowable cuts have been given in past management plans in terms of net volumes of conifers (and further reduced by 4% for breakage), suggesting that the presented estimates were net volumes of conifers.

The DFMP provides what it terms a "1997 IFI Inventory" estimate (gross) of 2,057million board feet.[5] This is virtually identical to the initial 1990 estimate. No corresponding estimate of growth is provided.

Although the CFI plots were remeasured in 1999 and total forest inventory estimates using the new IFI models were made by CDF, these estimates are not presented in the DFMP. An internal JDSF memo presents an estimate of total inventory (gross) of 2,084 million board feet.[6] This internal memo contains the notation "Void;" thus, there were likely changes made in the estimate after this memo was written. This estimate was, however, the only estimate of the 1999 inventory produced in response to a Public Record Act request made on May 22, 2001 for all records related to inventory estimates.

B.9 Compilation of Inventory and Growth Estimates

Table 1 presents a compilation of estimates of forest inventory and growth made under the CFI and IFI systems. The data in this table was used to construct the figures on inventory estimates in the body of the chapter.

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[1] *The New Inventory, What It Tells Us So Far,* op. cit., Exhibit VT-IN-5.
[2] *Inventory Comparison,* draft, no author, JDSF files, 11/1/90. The reported figure was 1,833,650 board feet on 44,151 acres. This has been adjusted to 48,650 acres. Exhibit VT-IN-4
[3] *The New Inventory, op. cit.*
[4] *1996 Inventory Stats,* memo to Marc Jameson from Norm Henry, undated, VT-IN-9. The table is introduced with, "The latest forest inventory /growth figures resulting from the new plot installation and deletion other old plots…."
[5] DFMP, Appendix 5, pp. 156-8. Although the DFMP does not tell how the 1997 inventory was measured, my recollection is that only a subset of plots were measured at that time, and the remainder of the forest was "grown" from 1990 data using a computer model; thus the reliability of this estimate depends heavily upon the accuracy of the growth projections of the computer model. To my knowledge, CDF has never performed any empirical data collection and analysis to calibrate the computer model; thus there is no way of knowing the accuracy of the 1997 estimate relative to the 1990 estimate.
[6] *JDSF Adjusted inventory estimate – CRYPTOS,* handwritten, from Norm [Henry] to Marc [Jameson], 5/1/00, Exhibit VT-IN-8. The figures are for conifers only. The copy of the memo in my possession is copied onto a larger paper and contains the notation "Void". Thus, there were likely changes made in the estimate after this memo was written.

Table 2-2

Various Estimates of Forest Inventory and Growth, Jackson State Forest								
(Conifers, Gross Volumes)								
Year	1959	1964	1969	1974	1979	1984	1990A	19
Inventory System	CFI	CFI	CFI	CFI	CFI	CFI	IFI	
Adjusted Total Forest Inventory (1)	1417	1446	1424	1379	1399	1365	2021	1
Adjusted Total Forest Growth per year (1)	32.1	37.5	34.9	33.1	35.8	31.9		4
Total Forest Inventory per Acre						28062	41532	38
Forest Growth per Acre						655.0		8
Forest Acres in Inventory Measure	50000	50000	50000	50000	50000	48750	44151	48
Unadjusted Forest Inventory	1456	1486	1464	1417	1438	1368	1834	1
Unadjusted Total Forest Growth per year	33000	38500	35900	34000	36800	32000		
Harvest Periods		60-64	65-69	70-74	75-79	80-84	85-90	
Years in Period		5	5	5	5	5	6.0	
Estimated Growth in Period (Gross)(2)		160.5	187.3	174.7	165.4	179.0	191.6	
Harvests in period (Gross) (3)		124	189	199	149	133	204	
Calculated Change in Inventory (Growth - Harvests)		36.5	-1.9	-24.0	16.4	46.0	-12.6	
Change in Estimated Inventory (End - Begin Inventory)		29.2	-21.4	-45.7	20.4	-34.0	655.4	
Notes								
Total inventories and growth are in millions of board feet								

Growth per acre is in board feet								
(1) Adjusted to a nominal forest acreage of:	48,650.0							
(2) Harvests are from various JDSF reports								
(3) Various JDSF reports of harvests. Reported harvests are net at mill. Adjusted by author to gross equivalent, based on conversations								
Sources:								
1959-79, various JDSF Mangement Plans								
1984 - VT-IN-4 and VT-IN-5								
1990A - VT-IN-4								
1990B - VT-IN5								
1996- VT-IN-9; all-species or conifers,								
gross or net, not indicated								
1997 - DFMP, Appendix 5								
1999A - VT-IN-8								
1990B - DFMP, p.48, VT-IN-6 (acreage)								

3 Timber Harvest Policies

3.1 Proposed Timber Harvest Plans Not Best Current Practices

3.1.1 IFI Data Not Used in Preparation of THPs

A major purpose of installing the new IFI inventory system installed in 1989-90 was to obtain geographically fine-structured data to improve timber harvest planning. Meeting current environmental protection standards, as well as managing for maximum sustained production, as required by law and policy, requires use of fine-structured data.

The DFMP provides no indication that the design of the long-term silvicultural plan for the forest or of the proposed near-term timber harvest plans (THPs) relied in any way upon the detailed inventory data of the IFI.

The 5-year schedule of Timber Harvest Plans (THPs) in the DFMP primarily consists of large plans designed to produce 6 to 10 million board feet each.[1] These large plans are within one geographical area and have one silvicultural prescription.

The areas covered by uniform silvicultural prescriptions and harvest methods are so large as to create a presumption that fine-scale inventory data were not used. If fine-scale data were used, the DFMP needs to provide information that allows the reader to understand how they were used to develop the plan. If they were not, the plan did not use best current science and should be rejected.

3.1.2 Timber Management Concerns of John Griffen

In 1992, John Griffen, senior JDSF staff, and supervisor of timber sales at that time, wrote a lengthy memo listing his concerns with current and future forest management in JDSF.[2] Mr. Griffen's memo should be required reading for Director of CDF and every member of the Board of Forestry before they pass judgment on the DFMP and EIR.

Every serious problem Mr. Griffen exposes in his 1992 memo continues to this day, often intensified. The DFMP fails even to acknowledge their existence.

Mr. Griffen expresses concern about

> the unreliability of the new inventory system (previously discussed),
>
> need for and lack of GIS (Geographic Information System) capability,
>
> lack of internal support for implementing a sophisticated timber harvest scheduling system (Rich Barber's project),
>
> the lack of resources to do long-term timber harvest scheduling ("Depending on the level of accuracy and detail required, the task may be virtually impossible or merely overwhelming."),
>
> needs of the timber sale program ("It's a given that getting the timber sales out will continue to be the number one priority.") will make it impossible for the Operations Officer (John Griffen) to continue involvement with inventory and long term planning.

A number of his concerns are especially pertinent to judging the adequacy of the DFMP. These are discussed in more detail below, with interspersed comments.

2.9.1.1 Griffen: Allowable Cut Determination

The plan has been to use data from our new intensive inventory to come up with a more sophisticated answer to the question of how much to cut than the simple answer of cut equal growth. That was the premise planning premise behind Rich Barber's first harvest scheduling project in 1988.

Comment: Never implemented.

But there are a whole host of options in harvest scheduling, things like even flow, non-declining even flow, area control, volume control, economic optimization, and sequential look aheads.

Comment: None of which were considered in development of the DFMP THPs.

Maybe the overriding factor is, or will soon be, the Department's need for revenue, and we should be concerned about providing some target increment for FRIF.

Comment: This was when CDF began funding $8 million of department operations from FRIF, the depository of Jackson State timber sales. The dominance of revenue over all else is widely known and accepted within JDSF and CDF. I was told this myself in 1995 by Ross Johnson, Deputy Director of CDF then and now. The continued importance of JDSF revenue to CDF was emphasized again in an internal memo in 1999:[3]

> Ross [Johnson] has made it clear that if your forest has a target annual harvest or every other year harvest level we all need to make sure that we hit these target sale volumes. … <u>This is most important for JDSF because of the revenues generated are most critical to the CDF programs</u>. (Emphasis added.)]

2.9.1.2 Griffen: Timber Sales Operations

We've been behind on getting the sales out since at least Fairbank Drive 1986. …

What it comes down to is that if the sale staff works on nothing but preparing and administering sales then we can probably get out three major sales a year. … The sacrifice will be in terms of:

training on how to follow the new rules
professional development training
culvert maintenance
plantation maintenance
revisting old sales to learn whatever
small-scale D&E, like looking at regen in Pleiades
road maintenance inspections
stopping to check wood cutters
writing newsletter articles
filling out stand record cards
looking at each other's sales

looking at off-Forest operations
frequent truck washing
adding to the JDSF Handbook
et cetera

Comment: After this memo, staff at JDSF was cut further, and emphasis on revenue generation increased, with directives from Sacramento to increase sales in 1996 and 1997 to more than 40 million board feet (compared to the "allowable cut" target of 28.5 million board feet). Everything listed by Mr. Griffen indeed was sacrificed, to the detriment of the health of the forest.

2.9.1.3 Griffen: The Problem of Big Sales

Mr. Griffen's analysis and data indict the proposed THPs of the DFMP, which do not reflect either of his recommended solutions for avoiding poor forest management.

> As we move into the Noyo drainage with it's more variable stand distribution, and as we try to implement more innovative silviculture, and as we need to cover more acres to get the same volume from uneven-aged systems, and as we strive to harvest in only the most suitable stands, and as we find the volumes per acre nearer to 50 mbf [sic, million board feet] than the 80 to 100 mbf we grew accustomed to in Caspar and Hare Creeks, we find that it's getting harder each year to find contiguous blocks of timber that will yield the 8-12 million feet we want from each sale. The more we force ourselves to cut in units of 10 mmbf [million board feet], the more we'll be forcing ourselves to cut stands that shouldn't be cut.
>
> Two solutions present themselves. One is to lower the target sale size to say 5 mmbf and have six of them… This of course would double the number of sale reports, contracts, THP's, … Since we would only get farther behind in sale output, this solution would not be acceptable.
>
> The second solution is to design sales that include cutting units from scattered parts of the Forest, rather than having them all be in the same general area… <u>The harvest scheduling system will someday suggest which stand types should be cut in each planning period (5 to 10 years), with the likely outcome being widely scattered, rather smallish stands being targeted.</u>

Comment: Although, Mr. Griffen wrote these comments in 1992, they are if anything more applicable today than then:

- The Noyo drainage (the north-central area of the forest that contains the large stands of unentered, mature second growth) continues to be a major focus for planned logging.
- Logging is planned for areas, such as Mitchell Creek and Caspar Creek, where the inventories are much lower than in the Noyo and the forest stands in need of even more tailored treatment.
- The JDSF staff is stretched at least as thin as in 1992. The staff does not include professionals with the skills, such as biology, biometrics, and numerical and graphical data management, essential to applying best forest and environmental protection practices.

2.9.1.4 Griffen: Clearcutting versus Uneven-Age Management

In 1987, … it was felt that the predominant management system in the redwood region would be even-aged, and that the State Forest should mirror that trend. As a result, about 75% of the Forest was assigned to even-aged management… Since then it has become apparent that uneven-aged management more closely fits the desires of the Forest's owners and better serves the needs of the demonstration program's primary clientele group. We have now reassigned management systems with the ratio reversed, 75% uneven-aged and 25% even-aged.

(This will have significant impacts both on potential harvest yields and on our ability to efficiently sell it… It is also recognized that it takes more time per mbf to prepare a partial cut than a clearcut.)

Comment: The DFMP heavily emphasizes clearcuts. Including clearcuts, euphemistically called "group selection, the DFMP proposes clearcuts for two-thirds of the forest areas eligible for such harvesting, a total of half the forest. This is contrary to the needs and desires of the Forests owners – the people of California – and the demonstration program's primary clientele group, acknowledged in the DFMP to be small landowners.

If CDF were truly concerned about forest ecology, the DFMP would have planned few if any clearcuts. The reversal of course to emphasize even-age management is based not on modern science. Mr. Griffen gives the probable explanation: selective forestry would negatively impact profits and put too great demands on inadequate staff.

2.9.1.5 Griffen: Vision

… Judging from the expressed desire of CDF administration [Sacramento headquarters], the primary purpose of Jackson State Forest is the generation of revenue for FRIF.

… we are operating in the dark, or at least in a thick fog, with no clear direction, purpose or goal… and without any particular interest or support from the Department. This will continue to fuel the frustration and disappointment of the forestry staff who are trying to practice good forestry but who are appreciated only when they practice profitable forestry.

Comment: Amen.

3.1.3 DFMP Failure

Mr. Griffen not only expressed concerns based on deep knowledge, but pointed out many of the steps need to management of JDSF. CDF has taken almost none these, with the result that the basic information and staff capability required to implement a modern, ecologically sensitive management plan do not exist. The DFMP and DEIR fully reflect the absence of knowledge and capability. It is filled with high-sounding rhetoric. But, the timber harvest plans proposed follow the long-standing policy of large timber sales designed to maximize profits, with ecological considerations reduced to the minimum forced by Forest Practice Rules.

3.2 Maximum Sustained Production

3.2.1 The DFMP Fails to Implement Maximum Sustained Production

State law requires that JDSF by managed for "maximum sustained production" of high-quality timber. The policies of the Board of Forestry provide explicit guidance on implementing this requirement of law.

The timber plans of the DFMP are not designed to achieve maximum sustained yield. The DFMP as written is in violation of the law.

3.2.2 Code and Regulations

The Public Resources Code (PRC) pertaining to State Forests says:

> The management of state forests … shall conform to regulations prepared by the director [of the Department of Forestry] and approved by the board [Board of Forestry]. These regulations shall be in conformity with forest management practices designed to achieve maximum sustained production of high-quality forest products while giving consideration to recreation, watershed, wildlife, range and forage, fisheries, and aesthetic enjoyment. [PRC §4651] (Emphasis added.)

The Board of Forestry regulation on maximum sustained production says:

> E. State forest timber stands should be harvested on the basis of maximizing mean annual increment of high quality forest products. This should not preclude intermediate cuts designed to increase total yield and reduce losses from mortality.

3.2.3 Maximizing Mean Annual Increment

"Maximizing mean annual increment" is a basic mathematical method for determining the point in time when one should cut a stand of trees in order to achieve the maximum sustained production. It is a well-established concept in forestry.

The "annual increment" is the volume of growth in a given stand in a year. The "mean annual increment" (MAI) is the average of the annual increments since the stand began growing. The average will continue to increase as the stand grows older and bigger. While the mean or average is increasing, the annual increment will lie above the average. At the point where the growth slows to the point where the annual increment falls to the average, the "maximum mean annual increment" (MMAI) will have been reached. If the stand is grown for either a shorter or longer time, its average production will be below this maximum.

In establishing the regulation that state forests maximize mean annual increment, the Board of Forestry faithfully implemented the intent of the PRC section on maximum sustained production. It provides an unambiguous, well understood technical directive.

The age of maximum mean annual increment depends upon the growth characteristics of trees in the stand and the growing conditions. The longer before growth volume starts to decline, the greater will be the age of at which a tree will reach its maximum mean annual increment.

Forest researchers have constructed tables of MMAI. There are different tables for different species, with different values for different growing conditions (site values) for each species.

3.2.4 MMAI and Jackson State Forest Management

The 1983 Management plan discussed the Board Policy on managing for maximum mean annual increment, but as a "suggested" rather than a mandated policy:[4]

> Board of Forestry policy suggests [sic] that State Forest timber be managed to optimize mean annual increment of high quality forest products.

The reason for this misstatement becomes clear in the next sentence:

> Unfortunately, currently available yield tables (Lindquist and Palley, 1963) and growth models (CRYPTOS, (c) Wensel 1982 (Krumland and Wensel 1982)) indicate that board feet mean annual increment of good to high site redwood/Douglas-fir stands does not culminate, at least within a reasonable rotation (175 years). Part of the problem is a lack of data on stand growth past about age 100.

Therefore, if Jackson State were to follow the directive of the Board of Forestry, it would not be harvesting any second growth for many decades. The 1984 Management Plan, therefore, dismissed the "suggested policy" as "unrealistic," and did not further consider maximum sustained yield.

3.2.5 The DFMP and Maximum Sustained Yield.

The DFMP discusses cumulative mean annual increment (CMAI), which is another term for MMAI, in the context of setting rotation ages for harvest. It states:[5]

> Two rotation ages (a term only applicable to even-aged management) based on average site classes: short to medium and medium to long rotations. The western portion of the State Forest generally averages Site II. Short to medium rotation ages on the West End are considered to be 60 to 90 years. Medium to long rotation ages are characterized as 90 to 120 years.

For the eastern portion, it specifies longer rotation ages, but most of the east end is still young and is far from any reasonable "rotation age." It is the west end where most of the revenue-producing harvest plans are scheduled, and thus where the policy adopted will have a significant effect on harvest planning.

Note that the policy appears to apply only to clearcuts (or other pseudonyms), because "rotation age" applies only to clearcuts. The DFMP needs to clarify whether or not it applies to selection harvests.

The policy of the DFMP with respect to MMAI (CMAI) is clearly stated:[6]

> The intent was to find a range of ages that might bracket the age of culmination of mean annual increment (CMAI) <u>within the medium to long rotation alternative</u>. (Emphasis added.)

The DFMP thereby acknowledges that all harvest plans with harvest ages in the short to medium bracket will be in violation of the directive to manage for CMAI.

Further, the DFMP does not provide the data or analysis used to determine the lower end of the CMAI rotation age. A reasonable lower estimate of CMAI for most stands in JDSF may well be much higher than 90 years.

The most recent data on which the DFMP says the projections were made for redwood CMAI is almost 40 years old and only went to 100 years.[7] This is a critical shortcoming, because there is even now little data on second-growth redwoods more than 100 years of age, and there was even less forty years ago. Data past 100 years of age is essential, because the mean annual increment for redwoods on most site classes culminates beyond 100 years.

Given the legal requirement that JDSF be managed for CMAI, a thorough search for data on CMAI in coastal redwood forests should have been conducted and included in the DFMP. If adequate data were not found, the DFMP should have made development of this data a prerequisite for planning specific large THPs. Without this data, timber harvesting cannot conform to state law and Board policy. Development of improved CMAI data would contribute to the research and development mission of Jackson State.

3.2.6 The DFMP, CMAI, and Short-Term Harvest Plans

The DFMP does not specify CMAI as one of its objectives or even one of its considerations in developing its short-term harvest plans.[8] It does not specify how each of the harvest plans contribute to the achievement of MMAI, which is an implicit requirement of the Board policy on MMAI. Therefore, the DFMP violates Board policy and state law.

3.3 Allowable Cut

3.3.1 Allowable Cut Key Component of DFMP

The allowable cut has been historically the most single important component of management plans for Jackson State Forest. It has been used to determine the level of harvests, and timber harvesting has been the dominant activity in Jackson State Forest. Although the DFMP purports to give greater weight in the past to other activities, the contents of the DFMP are heavily oriented toward continuation of large-scale timber harvesting.

The allowable cut constitutes the target for timber sales volumes. It has also acted as a strong constraint on CDF Sacramento, which, as documented herein, values JDSF primarily for the revenue that it can provide for state forestry programs. The allowable cut needs to be clearly defined and set at a level that will not allow forest values to be degraded by timber activities. The DFMP fails to meet this objective and is therefore fatally deficient.

3.3.2 Allowable Cut Must Be Based On Current Inventory Data

Board of Forestry Policy specifies that "Allowable cut levels must be derived from pertinent current inventory and growth data." Implicit in this requirement is that there be reliable, accurate data in which decisionmakers can have confidence.

The DFMP does not derive its allowable cut from "current inventory and growth data." As documented in Section 3 of my comments, this would be impossible, because JDSF does not now have accurate estimates of inventory and growth. The figures cited in the DFMP have been demonstrated to be based on models and data that have not been empirically validated and that are not trusted even by JDSF staff.

Significantly the DFMP does not base its determination of allowable cut on the estimate of growth that it cites as "the most reliable evidence." Rather, it uses computer modeling of growth performed for an Option A document, which has never been approved. The computer modeling uses 1989-90 inventory data, which in no way can be considered current, given the high level of harvesting that was done during the 1990's.

The numbers in the Option A document on which the DFMP is relying for determination of allowable cut are **projections**, not current inventory data as required. The projections depend upon many parameters that have not been empirically validated by data from JDSF and are highly suspect, because they yield estimates that far exceed the consistent estimates produced by the CFI system for 25 years.

The DFMP admits that the Option A projections do not accurately reflect the constraints on harvesting near streams accepted in the DFMP and that there are numerous other uncertainties around harvest constraints that may affect the harvest. The DFMP does not make any effort to quantify these, but simply asserts without foundation that these may "affect harvest levels by as much as 15 to 20 percent in one direction or the other." This is an unsubstantiated assertion. The estimate is made suspect on its face by the phrase "in one direction or other," because none of the listed effects would increase the potential harvest level." Given the importance of the allowable cut figure, supporting data and analysis in meaningful detail are imperative.

3.3.3 Meaningful Detail of the Allowable Cut Calculation Not Provided

The DFMP lists 23 Special Concern Areas in which harvesting will be restricted. The allowable cut determination should specifically address the reduction in harvest potential associated with each of these areas. A methodology for doing this was developed by Ross Johnson, present Deputy Director of CDF, when he was on the staff of JDSF.[9] This was applied by John Griffen to adjust acreage for determination of the allowable cut used in the 1983 Management Plan.[10] Thus, the methodology is known within JDSF and has been applied in the past, but was not applied in the DFMP.

The DFMP or DEIR needs to provide data on the adjustment factor used for each Special Concern Area in order that the public and decisionmakers can judge for themselves the appropriateness and correctness of each adjustment factor.

3.3.4 DFMP Allowable Cut Likely a Substantial Overestimate

I have attempted to make an approximate estimate of an allowable cut based on cutting all allowable incremental growth. This illustrative calculation shows that the allowable cut of the DFMP is very probably substantially greater than true incremental growth that can be harvested within the constraints of law and the DFMP.

Taking into account the restrictions on harvest in Special Concern Areas reduces equivalent acreage to 61% of the unrestricted acreage.[11] The latest estimate of forest acreage, based on GIS data is 48,652 acres, or an equivalent unrestricted acreage of 29,689 acres. Applying the 1984 CFI estimate of net growth of 607 board feet per acre (the last reliable estimate of growth available) to the adjusted acreage yields an allowable cut of 18 million board feet.

The illustrative estimate of allowable cut is only 58 percent of the DFMP allowable cut. The need for more data and analysis in determination of the allowable cut is apparent.

3.3.5 Allowable Cut Should Not Be Based on Incremental Growth

Board of Forestry Policy requires the Forest to be managed for MMAI. Intermediate cuts must contribute to increasing maximum sustainable yield. To fulfill this mandate, the allowable cut must be derived by determining the specific harvests that will contribute to increasing the ultimate MMAI. An allowable cut based on MMAI will be significantly less that incremental growth when, as is the present case, the age of trees in the forest are significantly below the age when MMAI occurs.

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[1] DFMP, p. 56. Three out of the five years have only 4 plans each, and the other two have three large plans and a number of small ones. The allowable cut of the DFMP is 31 million board feet; thus the large plans average close to 8 million board feet each.
[2] VT-IN-15, op. cit.
[3] Email from Jon Rea, CDF Sacramento, to all State Forests and Marc Jameson, Subject: "Sale Volumes, Revenues, Even Flow," February 11, 1999.
[4] 1983 JDSF Management Plan, P. 55.
[5] DFMP, p. 54.
[6] *Ibid.*
[7] *Empirical Yield Tables for Young-Growth Redwood* by Lindquist and Palley (1963), and *Stand and Volume Tables for Douglas Fir in California* by Schumacher (1930).
[8] DFMP, pp. 55-56
[9] *Update of Management Acres on Jackson State Forest,* Ross Johnson, JDSF, 1/23/78, VT-IN-22.
[10] *Considerations for Determination of Allowable Annual Cut,* John Griffen, JDSF, 10/23/79, VT-IN-23.
[11] Vince Taylor, VT-IN-24.

4 Other Comments

4.1 Public Comment and Scoping Sessions

The DFEIR does not include the oral comments presented at its scoping sessions for the DFEIR. The Campaign to Restore Jackson State Redwood Forest made extensive comments that are not included in the section purporting to include public comments, DFEIR Volume 2, Appendix 6.

The cutoff date for publishing comments received on the initial DFMP was more than six months before the publication of the DFEIR. This early, arbitrary cutoff date eliminated many comments from being published that should have and could have been included in the public record.

4.2 Forest Condition Not Improved

4.2.1 Increasing inventories

The DFMP needs to correct the statement on p.1, chapter 1and wherever similar other statements appear:

> Due to the long-standing practice of harvesting less than growth, inventories of standing timber continue to increase.

The correct statement would be: "Due to the long-standing policy of cutting all estimated growth, we believe inventories have been maintained approximately constant, but there is substantial uncertainty about current inventories. Due to our long-standing policy of cutting the oldest trees, almost all old growth and much of the oldest second growth has been cut."

4.2.2 Improving Resource Conditions

The DEIR says in Section VII-1.5,

> Where natural resources are concerned, it is important to recognize that the general goal of the JDSF Management Plan is to achieve net improvements of conditions for all natural resources over time in comparison to existing conditions. *This goal has been ongoing since the property was acquired by the State in the 1940s and 1950s. The site was acquired in a degraded condition, but over time, has notably improved in most of the resource categories.* (Emphasis added.)

The emphasized quotations are erroneous and need to be corrected. CDF has made similar, unsubstantiated statements so many times in press releases that its leadership may believe them. There is no place for such erroneous statements in the DEIR and DFMP. The public record needs to be set straight.

First, it has never been up to this time a goal "to achieve net improvements in conditions for all natural resources over time." This goal was not stated in previous management plans and is contradicted by discussion in previous plans regarding wildlife ("Not much can be done in the wildlife management field until better population figures are available.

There are no known plans for any agency to conduct such studies." 1983 JDSF Management Plan).

Second, abundant evidence contradicts the assertion that natural resources have notably improved:

a. The old-growth components of the forest have been seriously degraded (essentially annihilated) under state management.

b. The miles of road, which are the admitted major cause of stream degradation, have increased substantially.

c. Caspar Creek and Hare Creek were largely recovered from the initial logging when inherited (with inventories in excess of 80,000 bf/acre in the 1970s). These are important native coho watersheds that were well on the way to becoming undisturbed late-seral forest. Both have been heavily logged, with the North Fork of Caspar Creek having over 500 acres clearcut within the last fifteen years.

d. The stocking levels at all sizes of trees steadily decreased from 1964 through the 1984 (the last available reported stocking data by tree size).

e. The best available evidence (CFI inventory reports) is that inventory has been decreasing slowly since the 1960s, while the condition of important watersheds (Chamberlain Creek, South Fork Noyo, Caspar Creek, Hare Creek, and the North Fork of Big River) have all been degraded under state management.

4.3 Resource Specific Analysis – DEIR, Section VII.

Section VII-1.6 **(**pp. 78-9) says:

> Impact assessment and mitigation are stated in general terms where the specific details of a particular activity are not known, and cannot be known at this time. This is particularly true for a Program EIR such as this that must forecast the impacts of actions resulting from policy decisions. Most often, programmatic or policy-level mitigation is provided as part of the EIR. Detailed mitigation may be deferred to a subsequent impact assessment. In these cases, additional CEQA review is required once the activity is fully defined in terms of scope, location, and other factors.

The conclusion of this section is wrong, because its assumption is wrong. It is not true that the Management Plan needs to "forecast impacts from policy decisions" and, therefore, details of a particular activity cannot be known at this time, justifying deferral of detailed analysis and mitigation measures.

BOF policies include the requirements: "B. A rotation age, cutting cycle, and an allowable annual cut will be established for [Jackson State]. Timber harvesting schedules should be projected at least five years into the future. C. Allowable cut levels must be derived from pertinent current inventory and growth data." (BOF Policies, section 0351.4)

These specific requirements have been met in every management plan previous to the current one and are largely met in the current one. The DFMP contains a table showing harvest plans and harvest methods and a map showing the location of these plans. Therefore, the harvesting plans are specifically known for the next five years, and the

silvicultural methods to be used in every area of the forest are specified, together with rotation ages and cutting cycles. Indeed, a number of the harvest plans have already been marked for cutting. Thus, the specific details of activities for the next five years *can be known now*, and the longer-term context in which the next five years of activity will be carried out is also specified now. **Thus, CDF can and should consider in detail the impacts of its five-year timber harvesting plans, individually and cumulatively, in all of the CEQA-required areas.**

4.3.1 Aesthetic Resources

Section VII-2.3.1 says: "Future management of timber harvest within the DFMP places a priority upon aesthetics near homes, recreational facilities, and main travel corridors."

The contents of the DFMP do not conform to this statement.

4.3.1.1 Recreation

There is no recreation plan (RECP) contained within the DFMP. The lack of RECP is contrary to one of the goals (Goal 5) which the DFMP is designed to achieve (DFMP, p. 5):

> 5. Plan for and provide low impact recreational opportunities that are compatible with forest management objectives and healthy ecological processes, and that are consistent with historic recreational use characteristics.

The lack of a RECP causes the DEIR section on aesthetics and recreation to be vague and non-specific(Section 2.3.2, p.87):

> The DFMP generally defers the explicit definition of the Recreation Corridors until a user-survey is conducted as part of the JDSF recreation management program… However, the DFMP does propose a defined corridor width of 300 feet around major campgrounds and identifies that this zone will preclude even-aged silviculture, but does not specify any other particular management prescription for that zone."

The lack of specific plan and resulting vagueness precludes informed comment on the adequacy of the DFMP in protecting aesthetic resources important to recreation uses of the forest. CDF should be required to prepare a specific recreation plan with specific, detailed aesthetic protection measures prior to certification of the EIR.

4.3.1.2 Neighbors

The DEIR says only that CDF has historically "discussed" harvest operations within 200 feet of neighbors. A mitigation that might apply to neighbors is discussed on page 91 of the DEIR, but it is unclear whether or not it does apply. In any event, the mitigation does not guarantee any influence by the affected neighbors nor specify the minimum width of the buffer, which needs to be greater than 200 feet to provide any degree of real protection.. As stated, it would allow "single-tree selection" without any limit on the percentage of trees that could be removed and says nothing about the treatment of slash, preservation of existing recreation trails, or treatment of logging roads.

No mention is made in the EIR of recreation values of forest adjacent to neighborhoods. Therefore, there is no consideration of the tradeoff between recreation values and timber values. There is no consideration of restrictions on harvest to protect existing or potential recreation values. The lack of meaningful detail in discussing recreation in neighborhood forests precludes informed decisionmaking and public participation.

With respect to the DEIR treatment of harvest operations adjoining forest neighbors, informed decisionmaking and public participation are impossible because there is no clear description of proposed administrative procedures for consulting with neighbors, quantitative minimums or ranges for buffer size, types of allowable harvest operations and allowable percentages of single-tree tree removal within buffer zones, or provisions for protecting recreation values.

4.3.1.3 The Mendocino Woodlands Camp and Surrounding Forest

The DFMP has two planned timber harvests adjacent to the Woodlands Camp. These plans are in the so-called 2,550-acre "Special Treatment Area" that surrounds the Camp and is managed by CDF.

Background: The Mendocino Woodlands Area

The Mendocino Woodlands Camp is leased from California State Parks. The Camp is part of the Mendocino Woodlands Recreational Demonstration Area (Woodlands Area), an area of 5,426 acres transferred by the federal government to the state of California in 1947.

Originally, the Woodlands Camp comprised the entire 5,426 acres. The Woodlands Area now consists of three parts: the Woodlands Camp (780 Acres), a Special Treatment Area or STA in Jackson State Forest (2,550 acres), and the remaining part of the transfer, which is managed as a regular part of Jackson State Forest (2,155 acres).

All parts of the Woodlands area are of great ecological importance. With two exceptions, no logging has occurred in this area in eighty years, making it one of the two large areas of undisturbed, mature second growth in Jackson State Forest. These areas of mature second growth have great potential for providing habitat to endangered species, especially the Marbled Murrelet, dependent on old-growth type habitat.

The Woodlands Area was transferred to the state of California explicitly for park, recreation, and conservation purposes. The act of Congress authorizing the transfer stated in part: "Every such deed or lease shall contain the express condition that the grantee or lessee shall use the property exclusively for public park, recreational, and conservation purposes. …" {Act of Congress of June 6, 1942[56 Stats. 326: 16 U.S.C. 459t].} The state expressly agreed to these terms in accepting the transfer. Under any reasonable interpretation of the purposes for which the Woodlands Area must be used, timber operations that do not directly contribute to recreation and conservation are prohibited.

Harvest Plans

The Draft Management Plan specifies two timber harvests within the next five years in the Special Treatment Area of the Woodlands. Both of these timber plans will detract

from the recreational values of the Mendocino Woodlands Camp, which is located within the Woodlands Area.

Railroad Gulch: The largest plan is 270 acres in Railroad Gulch, which borders on the west side of Woodlands Camp and spans one of the recreation trails most used by Woodlands Camp visitors, the Forest History Trail. (See Woodlands Logging Map). To allow logging in this protected area, the state in 1981 designated the 270 acres a Demonstration and Research Project of the University of California. It was logged initially in 1984 under this justification. The planned logging is also being justified as a continuation of this "research project." You may wish to point out that such a use is directly contrary to the clear legislative purposes of the entire Woodlands area.

Even the research justification for the new plan is questionable. The original research design called for a second harvest in 1990, 12 years ago. This harvest was never done, thus the original hypotheses can no longer be tested.

CDF has entered into a Memorandum of Understanding with State Parks that allows it to conduct logging operations within Railroad Gulch right up to the edge of Woodlands Camp (DEIR, p. 85). This is the sole exception to a 200-foot harvest-exclusion buffer from all camp areas administered by State Parks. You may wish to object to the lack of any exclusion buffer between the Woodlands Camp and the planned Railroad Gulch Harvest.

Thompson Gulch: The second harvest plan is in the north end of the Special Treatment Area. (See Woodlands Logging Map.) An old road that is often used for hiking crosses it.

The stated purpose of the harvest plan is to accelerate the development of "late-seral characteristics," which describe the forest structures found in old-growth forests.

There are no specifics given for the Thompson Gulch plan, precluding making an informed judgments about the environmental effects of the plan. Because this plan is stated to be a demonstration and model for future timber operations throughout the Special Treatment Area, and because of the great ecological value of the Special Treatment Area, detailed specifications for the plan need to be a part of the EIR.

With respect to the EIR treatment of harvest operations in the Woodlands Special Treatment area, informed decisionmaking and public participation are impossible because the plans are not described in meaningful detail and there is no consideration given to the recreational and wildlife benefits of undisturbed forest. Moreover, the original deed transfer of this land precludes any timber operations that don't contribute to recreation, park, or conservation use. The Railroad Gulch plan clearly violates this clause.

4.3.1.4 Impacts

Section VII-2.5 lists two aesthetic impacts and mitigations

Impact 1: *Even-aged timber harvest would have a substantial adverse effect on scenic vista.* (Less than Significant with Incorporation Mitigation)

C&Q: The proposed mitigation is to have an RPF evaluate the visibility of even-age harvest plans and “Where appropriate to visually soften and mitigate impacts .. on the integrity of views visible to the general forest visitor…” through a possible combination

of modifications to the THP. (DEIR p. 90.) No quantitative standards are specified for the possible mitigations, precluding informed decisionmaking and public participation.

Impact 2: *Timber harvests and related activities would substantially degrade the existing visual character or quality of the site and its surroundings.* (Less than Significant with Incorporation of Mitigation)

The DFMP prescribes restricted harvesting operations with 23 identified "Special Concern Areas," including Forest Boundary neighbors, but specifies buffer size and allowable operations only for a few of these. The DEIR proposes a **mitigation** similar to that for Impact 1 for "all timber harvest plans conducted within or adjacent to Special Treatment Areas or buffer areas that are identified but not specifically defined in the DFMP…" (DEIR, p. 91) The specific modifications made to a THP is to be determined by a "qualified professional as determined by CDF." No size or range of size or minimum size the buffers are specified in the mitigation. Harvest practices within the mitigation buffers are specified to be a one or a combination of single-tree selection, hazard tree removal, or no harvesting as appropriate. Single-tree selection can occur in a wide range of percentage tree removal. The absence of quantitative minimums and ranges for buffer size and allowable percentages of tree removal for each type of Special Concern Area preclude informed decisionmaking and public participation.

4.4 Recreation

The DFMP fails to accord recreation consideration equal to other specified secondary values of state forests. This is arbitrary and denies the public one of its most desired products of the forest.

Section 4651 of the PRC says that the forest will be managed for production of forest products "while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, and aesthetic enjoyment." Note that recreation is listed as the first of the secondary values of the forest. Yet, the DFMP (p.3) says:

> This plan builds on the 1983 plan by elevating wildlife, watersheds, and ecosystem process to a level of importance equivalent to the timber management and the research, demonstration and education programs.

Recreation is notably absent from the list of elevated values, despite being the first of the legally mandated secondary values.

The DFMP does not contain a recreation plan, nor does it contain adequate current data on recreation use (only the number of camper days) or public desires. The absence of a plan and data make impossible informed decisionmaking and public participation about future recreation uses in JDSF.

4.5 Economics

The DFMP fail to provide a meaningful economic analysis. The estimates of Economic Impacts (DFMP, p. 26) make the elementary error of assuming that people employed processing timber from Jackson State Forest would not find employment elsewhere. Employment opportunities continue to grow in Mendocino County, and any unemployment tends to be short term. Furthermore, a detailed analysis of the

employment contribution of Jackson State Forest shows that about ½ of timber production reduction in Jackson State would be replaced by Mendocino mills from other sources; thus timber employment effects would be much smaller.[1]

Further, the DEIR does not consider at all the economic effects of making Jackson State into an old-growth forest with expanded recreation and wildlife habitat. The economic gains from Mendocino County from such a use of Jackson State may well dwarf the economic benefits from the preferred alternative. The lack of economic analysis of the alternatives in the DEIR precludes informed decisionmaking and public participation.

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[1] Vince Taylor, "Economic Effects of Restoring Jackson State Redwood Forest: Dispelling the Myths, in *Conference on the Restoration of Coast Redwood Forests: Jackson Demonstration State Forest*, published by Dharma Cloud Foundation, November 4, 5, 2000. VT-IN-25.

Exhibits to Accompany Comments of Vince Taylor on the Draft Management Plan and Draft EIR for Jackson Demonstration State Forest

VT-IN-1: Letter to Marc Jameson, Forest Director, JDSF, from Vince Taylor, Dharma Cloud Foundation, April 22, 1998, 7 pages.

VT-IN-2: Letter to Richard Wilson, Director, California Dept. of Forestry, from Vince Taylor, Dharma Cloud Foundation, April 22, 1998. 3 pages.

VT-IN-3: Letter to Vince Taylor, Dharma Cloud Foundation, from Richard Wilson, Director, California Dept. of Forestry, February 11, 1999, 7 pages.

VT-IN-4: *Inventory Comparison*, draft, no author, JDSF files, November 1, 1990, 1 page.

VT-IN-5: *The New Inventory; What it Tells Us So Far*, typed with hand-written additions, no author, JDSF files, 1993, 1 page.

VT-IN-6: *Notes On And Results from Forest Growth Calculations*, no author, JDSF files, November 30, 2000, 2 pages.

VT-IN-7: Memo to Norm Henry, JDSF, from Bonnie Burchill, Hammon, Jensen, Waller, and Associates, Inc, August 3, 1999, 3 pages.

VT-IN-8: *JDSF Adjusted inventory estimate – CRYPTOS*, handwritten, from Norm Henry, JDSF, to Marc Jameson, Forest Director, JDSF, May 1, 2000, 4 pages.

VT-IN-9: *1996 Inventory Stats,* Memo to Marc Jameson, Forest Director, JDSF, from Norm Henry, JDSF, Undated, 1 page.

VT-IN-10: *JDSF CFI Growth Estimate, JDSF Harvest Estimate 1990-1998, 1998-99 CFI Plot Data*, To Marc Jameson, Forest Manager, JDSF, no author, June 22, 2000, 2 pages.

VT-IN-11: "JDSF Forest Inventory – Transitioning from the Old to the New," Norm Henry, Division Chief, JDSF, in *Jackson Demonstration State Forest Newsletter*, Spring/Summer 1999, 3 pages.

VT-IN-12: "Change in Stocking Levels by Diameter Class," *1983 JDSF Management* Plan, Appendix F, Figure 1, emphasis added, 1 page.

VT-IN-13: "Estimated Empirical Average Stocking for Better Rotation," Figure 2, *1974 JDSF Management Plan*, contains plot of stocking data by diameter class for 1959-1969 inventories, updated for 1974 data by JDSF staff and for 1979 data by Vince Taylor, 1 page.

VT-IN-14: Letter from J. E. Sindel, State Forest Manager, JDSF, to George Grogan, Deputy Forest Manager, on Resource Management, California Department of Forestry, *Allowable Cut*, June 25, 1976.

VT-IN-15: Memo to Forest [Tilley, Forest Manager] from John Griffen, JDSF, April 28, 1992, 11 pages.

VT-IN-16: *Jackson State Forest Logging in Excess of Allowable Cuts*, by Vince Taylor, unpublished paper, Dharma Cloud Foundation, July 15, 2002, 7 pages.

VT-IN-17: *Confidence in the New Inventory*, John Griffen, JDSF, Undated, 1 page.

VT-IN-18: Memo to Hal, by John Griffen, JDSF, December 1993, 2 pages.

VT-IN-19: *IFI Meeting Notes*, January 24, 1995, and other notes on 1995 inventory validation project, no author, from JDSF files, 9 pages.

VT-IN-20: Letter to Andrea Tuttle, Director, California Dept. of Forestry, from Vince Taylor, Dharma Cloud Foundation, May 22, 2001, 3 pages.

VT-IN-21: Email from Jon Rea, CDF Sacramento, to all State Forests and Marc Jameson, Subject: "Sale Volumes, Revenues, Even Flow," February 11, 1999.

VT-IN-22: *Update of Management Acres on Jackson State Forest*, Ross Johnson, JDSF, 1/23/78.

VT-IN-23: *Considerations for Determination of Allowable Annual Cut*, John Griffen, JDSF, 10/23/79.

VT-IN-24: *Adjusted Acreage Equivalents for Determination of Allowable Cut*, Vince Taylor, unpublished, undated.

VT-IN-25: Vince Taylor, "Economic Effects of Restoring Jackson State Redwood Forest: Dispelling the Myths, in Conference on the Restoration of Coast Redwood Forests: Jackson Demonstration State Forest, published by Dharma Cloud Foundation, November 4, 5, 2000.

If not attached, Exhibits are available by contacting Vince Taylor, PO Box 1066, Mendocino, CA, 95460, or vtaylor@mcn.org.