IV.9 Individual DEIR Mailed Comments P-184 to P-185

This section presents responses to individual public comments (i.e., not form letter or form letter based) received the U.S. mail or other non-electronic delivery services. The responses immediately follow each letter and are organized in the same order as the comments in each letter. Several of the letters included attachments. Attachments were not included herein if our response did not directly reference the attachment.

Campaign to Restore Jackson State Redwood Forest
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P184

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February 27, 2006

Mr. George Gentry, Executive Officer
State Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, Ca 94244-2460
Fax: (916) 653-0989

Subject: Comments on the Jackson State Forest Draft EIR

Dear Mr. Gentry:

2 copies

The enclosed submission (on CD in PDF format) completes my comments on the Draft EIR. My enclosed comments refer to the 2002 JDSF Final EIR and my comments on the 2002 JDSF Draft EIR, both of which were submitted separately. All my submissions should be considered as a whole.

A I want to report for the record the reactions to this DEIR that I have heard from the experienced expert reviewers who cooperated with Dharma Cloud Foundation to comment on the DEIR: Peter Baye, Richard Grassetti, Jim Strittholt, and Kathy Bailey. All found the length and disorganization constituted formidable obstacles to conducting a review. Several of them said words to the effect of "commenting on this EIR was the worst reviewing experience I have ever had." One very senior reviewer wrote to me: "This has been one of the most painful reviews I have ever done in my entire career. I feel like I have to wrap my head in duck tape after each day to keep it from exploding." I, myself, found the length and complexity of the current DEIR such that I could not bring myself to read it completely, whereas I read the 2002 DEIR thoroughly.

B The barely surmountable difficulties faced by experienced expert reviewers argues that the JDSF DEIR fails at the most basic level to meet the CEQA requirement to provide information that is accessible and digestible by the public and decisionmakers. Furthermore, the cost of printed copies (approximately $130) discouraged most people from obtaining them; but a printed copy is essential for making a comprehensive review. So, members of the general public were effectively prevented from making their own comprehensive reviews.

C Given the massiveness of the document, the summaries are critically important for the public and decisionmakers. The summaries, though, are so superficial and the environmental impacts considered in such broad groupings that the summaries are useless for understanding the differences in the impacts of the alternatives.

D I know that CDF labored mightily to create a comprehensive EIR. Unfortunately, the resulting document put in too much on the one hand, and did too little organizing and analysis on the other.

Sincerely,

Vince Taylor

Vince Taylor, PhD

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

Vince Taylor

February 27, 2006

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1 Introductory Note

These comments are supplemented by comments that I made on the 2002 Draft EIR for Jackson State Forest and by the Final EIR for Jackson State Forest issued in 2002. These materials are an integral part of my present comments. Copies of these materials have been submitted under separate cover.

2 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 economics 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.

01 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.

3 The EIR Fails To Consider The Use Of Revenue Generated By The Forest

02 A fatal flaw in the EIR is the lack of any consideration of the use of revenue generated in different alternatives.

One aspect of the project (for all except Alternative A) is the generation of revenue from timber harvesting and other forest activities. This revenue goes into the Forest Resources Improvement Fund (FRIF). CDF controls the allocation of FRIF funds. Legislative approval of CDF budget allocations of FRIF has historically been pro forma. The use of
03 the revenue generated by the project is under control of the agency that manages the project; thus the revenue generated by the project is as much a part of the project as the timber harvesting activities that generate the revenue.

04 How the revenue generated is spent will have a very marked effect on the net environmental impact of the project. Yet, the EIR completely ignores exploring alternatives for the use of the funds. This prevents the decisionmakers, who could direct CDF to spend the funds generated in certain ways, from having the information necessary for informed decisionmaking, and it prevents the EIR from adequately considering alternatives that would reduce the environmental impacts of the project.

This is not an abstract problem. For example, the alternative that comes closest to what I would like to see for the forest is Alternative E, which is termed "Exclusive Late Seral
05 Development." In my proposals for management of the forest, I have emphasized late seral development, but I've also recommended that funds generated by timber activities be spent only within the forest on:

1) repairing and decommissioning roads (to reduce stream sedimentation), and other environmental restoration projects,
2) research on issues related to restoration of forest health and demonstration of timber practices compatible with restoring and maintaining healthy forest ecology, and that a portion of the forest be devoted to conducting scientific experiments on a broad range of forestry questions, including even-age management research on a small scale,
3) expanding recreation opportunities, and
4) adequately operating and maintain the forest.

06 If the alternatives analysis had integrated the spending aspects of my forest recommendations, including limiting timber harvesting to the amount needed to fund the programs conducted in the forest, a much different alternatives comparison would have resulted. Call the alternative with my funding/research aspects included "Alternative E-X" (the "X" alluding to eXpenditures). If this were to be developed as a management plan, actual levels of revenue and expenditure by purpose would be specified in the alternative, together with quantitative measures of environmental benefits.

Under Alternative E-X:

1) All of the important aspects of the stated mission for the forest would be fulfilled.

2) The major cause of stream degradation, sub-standard roads, would be aggressively remedied.
3) Research activities would be guaranteed funding.
4) Forest operation and maintenance would be guaranteed adequate funding.
07 5) Timber harvesting, with its potentially negative environmental impacts, would be limited to the amount needed to finance forest activities and programs.

08 In contrast, under Alternative C-1, the EIR's "proposed project:

1) There is no consideration of how funds generated will be spent. The project provides **no guarantee that any of the funds generated by the forest will be spent within the forest.**
2) Although the current, inadequate operating budget is likely to be maintained, that is not guaranteed.
3) Even in the critical area of road repair and decommissioning, the plan has no fixed schedule. All that is scheduled is 5 years for a "road inventory," with no commitment to fixing problems on any time schedule or at any expenditure rate.
4) Research activities are not funded by forest revenues; thus the level of research is unspecified and not amenable to evaluation.
5) Timber activities would be many times (perhaps 5 or more times) larger than needed to pay for the forest budget, with commensurate negative environmental impacts.

09 A valid CEQA alternatives analysis would find Alternative E-X to be environmentally superior to Alternative C, no matter what mitigations are proposed, along every axis of measurement.

10 The BOF has the authority to control the expenditure of funds generated within a state forest, because CDF operates under its oversight. It has historically ceded this authority, without review, to CDF. This does not excuse the Board from its statutory obligation to consider all aspects of projects on state forests, including the generation and use of
11 revenue. Because the present EIR does not present the Board with information needed to decide on the environmental effects of alternative revenue expenditures, it fails to meet CEQA at a fundamental level.

3 Alternatives Analysis Fails to Report Significantly Different Impacts

12 The alternatives analysis in the present EIR are so poorly constructed, though, that even if the EIR had considered Alternative E-X, it would probably have concluded that there were no significant differences between Alternative E-X and Alternative C-2.

Consider: in the Executive Summary, the first impact treated in Table 1.2 is "Even-aged timber harvests would have a substantial adverse effect on scenic vistas." Table 1.2 says that this impact in C-2, which uses even-age management on 29% of the forest area, will have the same "less than significant" impact as Alternative E, which has NO even-age management.

13 This example illustrates a fundamental flaw that pervades the Alternatives analysis summarized in Table 1.2. Charitably, the EIR uses impact categories that are so gross in scale that they lump significantly different impacts into the same category, denying
14 decisionmakers important information. Less charitably but more likely, it appears that the constructors of the EIR made subjective judgments, unsupported by any quantitative measures, about the environmental impacts of the alternatives, always concluding that CDF's preferred alternative, C-2, had less-than significant environmental impacts.

15 To continue the example, Alternative E should be credited, at the least, with "no impact," and more reasonably, "beneficial" impact, because it would allow past even-age operations to heal. The type of bias shown in the cited example pervades the EIR summary tables, creating the illusion that there is little difference in the environmental impacts of the alternatives. That the environmental impacts of C-2 and E are
16 indistinguishable is prima facie false. The EIR fails to provide the information required for informed decisionmaking.

4 Inventory Data Deficiencies

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

18 The deficiencies in the data and its presentation and analysis cause the DEIR to fail to meet the minimum obligations under CEQA to provide a basis for informed decisionmaking and public participation in the development of the Management Plan.

The DEIR is deficient in the following ways:

19 1. The lack of inventory data at the planning watershed level;
20 2. The lack of any measurements of **inventory growth** since the new inventory system was introduced in 1989. All growth estimates used in the EIR and DFMP are derived from mathematical models, using parameter values that are not derived from actual measurements of timber growth in JDSF;
21 3. The inventory **data** on which the EIR relies is out of date;
22 4. The inventory **estimates** on which the EIR relies are inconsistent with 25 years of prior estimates and significantly in error. These deficiencies and their implications are
23 considered in a Section 6. The errors in the recent inventory estimates are so large that the estimates cannot serve as a basis for policy or analysis. The forest has no valid current inventory, making it impossible create a valid management plan or
24 perform a valid CEQA analysis.

25 Because it relied on erroneously high values for inventory and forest growth rate, the DFMP set harvest rates that would exceed forest growth rates. The DFMP does not, therefore, meet the Forest Practice Rules requirement for maximum sustained production.

4.1 Inventory Data Are Deficient Under CEQA

A cumulative impacts analysis is one of the cornerstones of the EIR project analysis required under CEQA. For the JDSF EIR, the project is a Draft Forest Management Plan (DFMP) that envisions large-scale harvesting of timber across the landscape of Jackson
26 State Forest. Accurate and adequate data on current timber inventories and growth, as well as data on past harvests, is the essential foundation for a valid analysis of the cumulative impacts of future harvesting activities:

27 • Sound analysis of cumulative environmental impacts requires that the analyses be done by management compartment (unit). Because of the variability of terrain, trees, streams, botanicals, and wildlife within a single watershed, management units are generally sub-watershed units. The impacts of the timber harvests in the DFMP will
28 occur in the sub-watersheds, and those combined sub-watershed impacts will constitute cumulative impacts. For example, impacts of timber harvest in the DFMP on spotted owls, marbled murrelets, or water quality all occur at the sub-waterhed
29 level. The project's impacts on these environmental values cannot be known without baseline timber stand data within individual watershed planning units. The local impacts must then be combined to get the overall plan impact. The DFMP and DEIR provide inventory and growth data only for the forest as a whole, thereby precluding determining the DFMP's local and overall impacts.

30 • The DFMP projects timber harvests, timber growth, and timber inventories one-hundred years in the future. Initial errors in inventory and growth rates translate into a multiple of these errors in the projected values, as compound growth rates expand their magnitude. The cumulative impacts of proposed harvest plans would be much different if actual initial inventories and growth differed from those used in the
31 analysis. Informed decisionmaking requires current data and confidence in the accuracy of the initial estimates.

Following sections detail the legally fatal deficiencies in the presentation of data in the DEIR and DFMP.

4.2 Failure To Provide Forest Stand Characteristics By Management Unit

32 The DFMP and EIR fail to present timber stand characteristics by management unit. This failure would make the DFMP ineligible for approval under the California Forest Practice Rules (FPRs) for Non-Industrial Timber Management Plans (CCR 1090.5).

33 Legally adequate environmental evaluation of Jackson Forest certainly should meet or exceed the standards for Non-Industrial Timber Management Plans (NTMPs). The Board of Forestry set these standards to ensure that it was provided the information required to
34 determine whether a plan would conform to the rules of the Board. The requested information relates to evaluating the environmental impact of the NTMP to determine if it conforms to Board rules. If this information is necessary for an NTMP, it is necessary for a legally sufficient EIR.

Forest Practice Rules, Section 1090.5, states the rationale for the information required to be included in an NTMP:

> The plan shall serve three functions: **1)** to provide information the Director needs to determine whether the proposed NTMP conforms to the rules of the Board; **2)** to provide information and direction for timber management so it complies with the rules of the Board and the management objectives of the landowner; and **3)** to disclose the potential effects of timber management to the public. **For the plan to serve these functions, it shall, as a minimum, contain the following information:**

Among the information required in the plan are:

> **(g)** A description <u>by management unit(s)</u> of the timber stand characteristics including species composition, age classes, projected growth, present stocking level, present volume per acre, size class distribution, stand management history, and potential pest or protection problems. The description shall provide the basis for the information provided.
>
> **(h)** A description <u>by management unit(s)</u> of the proposed management objectives, including a discussion of projected timber volumes and sizes available for timber harvesting.
>
> **(i)** A description <u>by management unit(s)</u> of proposed activities to achieve the management objectives. This must include: 1) projected frequencies of harvest, 2) silvicultural prescriptions for harvesting, 3) type of yarding systems to be used for each area; 4) anticipated interim management activities which may result in rule compliance questions (i.e. erosion control maintenance).

[Emphasis added]

The emphasized text shows that all information on forest stand characteristics and management activities are required to be by management unit in an NTMP.

The DFMP (Chapter 3, pp. 49 to 55) discusses the establishment of management units within JDSF, with uniform silvicultural methods to be applied within each management unit. There are 25 management units enumerated in the DFMP.

35 **It seems incredible, but the DFMP and DEIR for Jackson Forest contain no forest stand information by management unit.** The only information on timber stand characteristics in the DFMP is presented in Appendix V. Estimated volumes of timber are given only for two species classes (conifers and hardwoods) and two geographical
36 regions (east and west ends of the forest). No information is provided on age or size distributions, even for the forest as a whole.

37 Registered Professional Forester, Roger Sternberg, in commenting on the 2002 DEIR for JDSF, identified the lack of detailed information by management unit. He noted the requirement for this information in NTMPs and said, "... [T]his is basic information needed by present and future forest managers to guide their actions and for the public to understand how the Plan is going to be implemented."[1] Mr. Sternberg's complete letter is attached (Attachment VT-1)

38 The lack of this information is particularly egregious because CDF and the Board of Forestry, have had over three years to correct the deficiency identified by Mr. Sternberg, but they have done absolutely nothing. The current DEIR contains no additional data on forest stand characteristics by management unit. The DFMP is unchanged for 2002.

Perhaps CDF deceived itself into believing such information is not required by its response to Mr. Sternberg: "The level of detail presented in the DEIR, as well as the DFMP and Alternative "A" [Option A?], is appropriate for the program level DEIR... Providing the level of detail requested is not reasonable given the size of JDSF and the
39 policy level direction provided in the DFMP."[2] But, the level of detail in question is what is needed for adequate ecological management of the forest and to perform an adequate cumulative environmental impacts analysis for the management plan.

The lack of forest stand information by management unit is in itself enough to reject the DEIR for failing to meet the CEQA requirement to provide the information needed for informed decisionmaking.

4.3 Failure to Relate Timber Management Activities to Planning Watersheds

40 The DFMP and DEIR fail to show how projected harvest activities in management units would cumulatively impact the biological values in planning watersheds.

41 4.3.1 Failure To Provide Stand Characteristics By Planning Watershed

The DEIR and DFMP fail to provide detailed timber stand data by planning watershed. The DEIR's analysis of cumulative biological effects is done within a framework of

planning watersheds. For example, the discussion of *Aquatic Resources* in Chapter VII.6.1 is conducted in terms of planning watersheds, identifying 17 planning watersheds in JDSF. Chapter VII.10, *Hydrology and Water Quality,* states that a cumulative watershed effects assessment area has been delineated for this EIR that contains 32 planning watersheds, 17 of which contain some part of JDSF. Chapter VIII, *Cumulative Effects,* presents information on past and planned timber harvesting activities by planning watershed. See for example, Tables VIII.3, VIII.4, VIII.9, and VIII.10.

42 The initial description of the forest characteristics by planning watershed is an essential foundation for a cumulative impacts analysis of the proposed management plan. This is true for all biological impacts, but especially so for habitat impacts. The impact of a given harvest plan on habitat depends upon the stand structure, tree ages, and density. The absence of this description makes a meaningful analysis impossible.

4.3.2 Failure To Relate Management Units To Planning Watersheds

43 If an initial description of forest stands by planning watershed were provided, the impact of proposed harvest activities within each planning watershed would the next step in a cumulative impacts analysis. Unfortunately, planning watersheds do not coincide with the DFMP's management units. An examination of Figure 7 in the DFMP, *Timber Management Areas*, shows that some management units span several watersheds, while
44 some watersheds are spanned by several management units. Because the DEIR does not show the relationship between management units and planning watersheds, the impacts of harvesting activities in management units cannot be allocated to the appropriate planning watersheds, and sub-watershed-specific impacts that contribute to overall cumulative impacts of the plan cannot be determined. This failure to address the Plan's proposed timber harvest at a sub-waterhsed level results in an inadequate impact assessment – an
45 assessment so coarse that it fails to identify most of the project's actual impacts. Because the plan includes numerous specific THPs, as identified in the EIR's cumulative impacts assessment, the baseline conditions in each of those THP areas must be described in order for an adequate assessment of the project's impacts can be prepared.

4.4 Failure To Provide Information Provided In Prior Management Plans

46 The forest stand information in the current DFMP does not provide even the degree of detail given in past management plans. Every previous JDSF management plan, going all the way back to 1964, presented tables and charts showing inventory estimates (volume and growth) and trends by forest compartment (not necessarily management units) 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.

47 Although the detail of past information might not suffice for a valid Plan and cumulative impacts analysis, continuing these series in the current DFMP would have allowed the public and decisionmakers to see trends in the composition and totals of the forest inventory. Their absence prevents informed decisionmaking.

4.5 Inventory Data Are Out Of Date

48 The timber stand information in the DEIR is not only fatally deficient in detail, but is also out of date. The starting point for analyzing environmental effects of timber harvesting in the EIR must be current timber inventory data.

Even for the much more limited task of setting the "allowable cut", Board of Forestry policies require that for state forests: "Allowable cut levels must be derived from pertinent current inventory and growth data."[3] [Emphasis added.]

49 The DFMP and DEIR are based on forest inventory data that is now 16+ years old. The inventory data reported in the DFMP and in the DEIR was derived primarily from the initial, 1989 plot measurements made under a new "Intensive Forest Inventory" (IFI) system. Under no reasonable interpretation could this inventory data be considered "current."

50 The DFMP inventory data is outdated according to the design of the system under which it was collected. The design of the IFI system called for measuring 10% of the plots each year; thus no plot data would be more than 10 years old, and the average inventory data would be 5 years old.[4] Thus, by the IFI's design criteria, the 1989 inventory plot data are at least 7 years out of date and on average they are 12 years outdated. (CDF did install and measure some new plots in 1997, but these amounted to less than 20% of total plots. See discussion later in this section).

51 Allowing inventory data to age to 17 years without remeasurements is also outside of the normal standards followed by industrial timber companies. The two largest timber companies in Mendocino County, Mendocino Redwood Company and Campbell Management Company, both work on their inventory measurement continuously. The Campbell company measure 10% of their inventory plots each year, and the Mendocino Redwood Company measures some plots each year and redoes the assignment of vegetation strata in their plots every 10 years .[5]

I forewarned the Board of Forestry about the inadequacy of the inventory data and the need to base the EIR on an updated inventory at the scoping hearings for the EIR held in March, 2004. I followed this up with a detailed letter on March 18, 2004. I concluded my letter by saying, "Accurate inventory estimates are a prerequisite for legally adequate consideration of cumulative impacts. Delaying the preparation of a new inventory will merely delay the time at which a legally adequate EIR can be prepared."[6]

52 According to information provided by CDF, a new set of inventory measurements was made in 2004-2005. None of these data are reported in the DEIR. Reliance for project description on 16+ year-old inventory data is especially unacceptable when current data was available or would have been available very soon.

4.5.1 Deficiencies In 1997 Inventory Remeasurements

Recognizing the impact of logging on inventory composition, CDF reviewed the set of inventory plots in 1996. They deleted over 548 of the original 2054 plots established in 1989, primarily because the plots had been logged and "therefore no longer represented

the new conditions," but also because some plots could not be located (DEIR, Appendix 7A, p. 4).

To address the loss of data samples, CDF installed and measured 390 new plots in 1997. **The surviving 1,506 plots established in 1989 were not remeasured in 1997.**[7]

53 Although CDF refers to the "1997 update of the inventory," it is important to understand that this "update" had 1997 plot data only on the 390, non-randomly placed new sample plots. The remaining plots were "grown" from 1989 to 1997 using standard industry computer growth models.

Thus; the so-called "1997 IFI inventory" is in actuality no such thing. It is primarily a computer projection of 1989 data forward to 1997. The parameters used in the computer projection have never been validated against measured growth data for JDSF collected since 1989 (see below); thus it is impossible to know the degree of accuracy of the projections..

54 Furthermore, the non-random deletion and replacement of plots destroyed the statistical usefulness of the overall plots for estimating total forest inventory. If the original plots were a representative sample initially, they no longer were after the plot replacement. Thus, any estimates of forest inventory based on the modified set of plots could not be analyzed for statistical reliability.

4.6 Forest Growth Rates Not Reliable

55 CDF has never published any data for a re-measurement of the 308 "permanent plots" in the IFI system that were among the total of 2054 plots set up in 1989. These permanent plots were intended to provide statistically reliable estimates of forest growth rates (as contrasted with the detailed "vegetation" strata to be provided by the larger sample of

56 replaceable plots). Thus, the new IFI inventory system has not provided any estimates of forest growth based on actual measurements of trees.[8]

57 Therefore, all "growth estimates" in the Draft Forest Management Plan (DFMP) and EIR are based on computer forest-growth models whose results have never been calibrated against actual JDSF inventory growth data collected since 1989. Such non-validated, parameter-driven estimates could be significantly in error. Because no data are available for calibration, there is no way that decisionmakers can estimate the reliability or the extent of possible errors in the growth estimates.

58 The lack of reliable, measured growth estimates makes future projections highly uncertain. The DFMP looks at forest conditions 100 years in the future. An overestimate of the annual growth rate by one percentage point would lead to overestimating ending forest inventories by 170%. Future inventories might actually be lower when the (erroneous) projected inventories show an increase. Accurate and reliable growth rates are essential for determining Long Term Sustained Yields.

4.7 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."[9]

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]."[10]

59 As shown in the next section, the statement made above is erroneous. The most likely possibility is that the figure of 65 million board feet did not come from actual measurements, but from a computer growth model, uncalibrated with JDSF data.

60 Alternatively, the figure was derived incorrectly, by adding harvest volume to calculated growth.

61 Stating that the estimate reflects actual measurements is an especially egregious misstatement, because it lends unjustified credence to a growth estimate that is hugely greater than any other estimate of Jackson Forest growth made by CDF over the years. From 1956 through 1984, gross conifer volume was estimated to grow about 33-35 million board feet per year.[11] Growth was estimated at 42.9 million board feet in 1993, based on the analysis of 1989 inventory system and data. Its import is further heightened by its placement at the beginning of the section in the DFMP on *Growth and Harvest* (DFMP, p. 48).

62 Although the DFMP does not rely on the 65 million board foot figure for setting future harvest plans, it adds credence to the statement in the DFMP that it used a "conservative estimate of growth" as the starting basis for determining the annual harvest.

63 The starting figure used in the DFMP is an annual harvest of 39 million board feet to achieve long term sustained yield. This does seem greatly less than the 65 million board feet cited previously. It is not conservative, however, when compared to the IFI growth estimate of 42 million board feet per year (gross), because harvest are presented on a net basis, and net volume is about 10% lower than gross volume; thus the 42.9 million board foot gross estimate would, in itself, just support an annual harvest of 39 million board feet – there would be no "conservative" margin in the harvest amount.

The DFMP recognizes that an initial growth figure needs to be adjusted downward by various other factors before determining an annual harvest that will not cause declining inventories within the areas of the forest where harvesting is permitted. More will be said about this later in the comments.

64 The point to be made here is the careless way in which CDF presented an erroneous and outrageously exaggerated figure as a confirmed, measured, actual figure. Given this, how can any of the data presented in the DFMP be considered reliable? Without reliable data, supportable estimates of environmental impact are impossible.

4.7.1 Not Measured Growth Or an Erroneously Calculated Value

The assertion that the DFMP growth figure of 65 million board feet per year is based on measurement is erroneous and very seriously misleading. The figure could have been derived from one of two analyses, one a computer projection and the other involving a major error in elementary algebra.

65 1. An internal document from JDSF files show that the cited growth estimate could have been 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. [12]

66 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.

67 In its response to comments on the 2002 DEIR, CDF denied that its estimate came from a computer model.[13] It reiterated that it was derived from measurements. If so, the details of the calculations leading to this result should be included in the EIR, to allow the public to determine the validity of this incredible estimate.

68 2. A second internal (draft) document from JDSF files suggests how, if the cited estimate was based on actual measurements, it was calculated erroneously.[14] The document describes the methodology used to calculate the growth in inventory between 1988 and 1998. It calculates the inventories in the CFI sample of plots for 1988 and 1998 excluding any trees that were harvested in the period. It provides summary tables for estimated harvests in the period and estimated volume growth excluding harvested trees.

69 The table of estimated growth gives the figure of 45,490,671 board feet as "Gross Annual Total Forest Growth (trees present during both inventories plus ingrowth during the period)." A previous table estimated average annual harvest in the period 1989-98 to be 25 million board feet.[15] The table calculates the "Total" growth by **adding** the harvest rate to the growth rate, obtaining a value of 70 million board feet. This is an elementary error in logic and or algebra.

70 Harvests subtract from **inventory** not add to growth. By the logic used by CDF, the bigger the harvests, the bigger the forest growth. But this is absurd. The unharvested trees will grow at the same rate (all else being equal), regardless of the harvest. The bigger the harvest, the fewer unharvested trees left to grow, and the smaller will be the forest growth.

71 The estimated forest growth, before allowing for harvests, equals the first figure given, 45+ million board feet per year. Estimated forest growth, allowing for harvests, is calculated by **subtracting** the harvest rate.

There are serious questions about the reliability of the estimate of 45+ million board feet. They relate to the questionable nature of the inventory estimates from which it was derived. These questions are addressed at a later point.

The table that I have is marked "Draft." It's growth estimate of 70 million board feet is somewhat higher than the cited figure of 65 million board feet but almost

72 certainly explains how the latter figure was obtained. I request that the summary tables for the analysis that yielded the cited figure be included in the Final EIR.

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[1] Roger Sternberg, letter to Chris Rowney commenting on the 2002 DEIR for JDSF, July 16, 2002, p. 2. Sternberg's letter in its entirety is attached as VT-1A
[2] *Letter RS-249,* "Response to Comment 249.1," *Final Environmental Impact Report for Jackson Demonstration State Forest,* September 2002, p. IV-297.
[3] *Policies of the Board of Forestry and Fire Protection,* Section 0351.4 A.
[4] John Griffen, internal JDSF memo to Hal Slack, December 1, 1993: "The original plan allowed for remeasuring one tenth of the plots every year so that no data would be older than ten years..."
[5] Paul Ederer (Campbell) verbal communication, summer 2005, confirmed by email, February 22, 2003; John Nickerson (Mendocino Redwood Company), verbal communication, June 10, 2005.
[6] Letter to George Gentry from Vince Taylor, March 14, 2004, attached at VT-3.
[7] The only remeasurements made since 1989 was of the approximately 140 plots corresponding to the earlier CFI inventory plots. The CFI system was to be replaced by the IFI system because the CFI system was deemed inadequate for providing the level of detail needed for watershed planning.
[8] It seems incomprehensible that at least this small subset of plots was not remeasured prior to preparing the EIR; but if so, the results have never been published.
[9] *DFMP, op. cit.,* p. 48.
[10] *Ibid.*
[11] Exhibit VT-IN-5, in Vince Taylor, *Comments on the Draft Management Plan and Draft Environmental Impact Report for Jackson Demonstration State Forest,* July 18, 2002 (hereafter, *Taylor Comment 2000*).
[12] *NOTES ON AND RESULTS FROM FOREST GROWTH CALCULATIONS,* no author, from JDSF files, 11/30/2000, reproduced as Exhibit VT-IN-6 in *Taylor Comment 2002.*
[13] Final Environmental Impact Report, op. cit., p. IV-269.
[14] The document is headed by a sheet with the title *SUMMARIES TO BE CALCULATED – MARC'S REQUEST.* The summary table is dated 6/22/00 and is marked Draft. It is attached as VT-2
[15] This estimate is substantially less than the harvests reported by JDSF for this period, which averaged 32 million board feet (gross). The discrepancy between actual reported harvests and those estimated from sampled inventory data is evidence that the inventory data is unreliable and untrustworthy.

5 Erroneous and Unreliable Inventory Estimates

73 The inventory and growth estimates used in the DEIR are seriously in error. Irrefutable evidence shows that the DFMP and DEIR cited inventory and forest growth values are substantial overestimates.

74 The overestimates of inventory and growth, coupled with inadequate consideration of constraints on harvesting within areas of the forest, lead to the DFMP proposing harvest levels that may well exceed the constrained growth of the forest. The possibility of these overestimates is sufficiently high that the DEIR should have considered their implications for environmental impacts. By failing to consider the possibility that the DFMP could lead to declining inventories, forest density, and tree ages on a substantial portion of the forest, the DEIR fails to adequately describe the environmental impacts of the Plan.

This section provides evidence that the estimates of inventory and growth in the DFMP are seriously overstated. Section 7 analyzes the setting of the harvest level (allowable cut) in JDSF and shows that the harvest level in the DFMP likely exceeds the growth that is available for harvesting.

5.1 Serious Errors in Inventory Estimates

75 In my comments on the 2002 DEIR for Jackson State Forest, I provided substantial evidence that estimates of inventory in Jackson Forest based on the 1988-89 plot measurement and IFI estimating equations are very much greater than the true values.[16]

My 2002 comments are included as part of these comments. Here I will emphasize the main points of 2002 comments, add to them where I have more information or clarifications, and, where appropriate, respond to CDF's responses to my comments in the 2002 Final EIR. In all other respects, the 2002 comments are an intrinsic part of these comments.

Since 2002, I have performed additional analyses that demonstrate, beyond any doubt, that the IFI inventory and growth estimates are seriously in error. These analyses are presented later in this section.

76 **The inventory estimation errors are so great that the description of the setting of the project used in the DFMP and DEIR is fatally deficient. The errors are responsible for setting harvest levels that seem likely to significantly degrade the areas of the forest where timber harvesting is not prohibited or restricted. The environmental consequences of such harvesting more than forest growth are nowhere considered in the DEIR. The overharvesting also violates the Forest Practice Rules for Long Term Sustained Yield; thus the DFMP is legally invalid.**

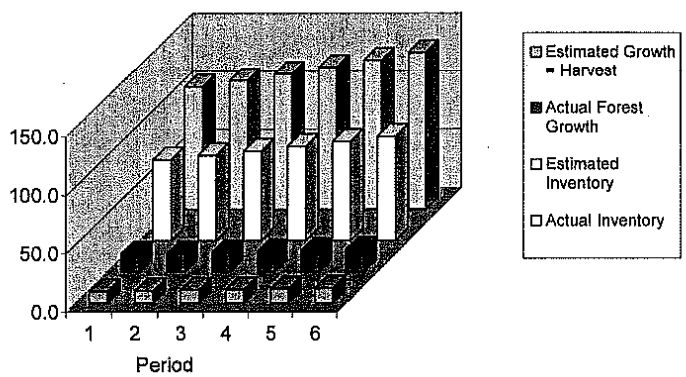
Background: JDSF installed a new inventory system (IFI or Intensive Forest Inventory system) in 1989-90 to replace the former CFI (Continuous Forest Inventory) system. The new system estimated 1990 inventories approximately 50% higher than the 1984 CFI estimate. The corresponding estimate of forest growth was 34 percent greater.

5.2 IFI Estimates Incompatible with Self-Consistent CFI Estimates

CDF has made various attempts to justify the higher estimates as more accurate than the previous, 1984 estimate. None of these attempts succeed in answering a fundamental challenge to the credibility of the new estimates: "How can the vastly higher recent
77 estimates of forest inventory and growth be reconciled with the much lower, stable, **self-consistent** estimates that were produced over 25 years by the previous inventory system?"

- The previous CFI inventory system was in operation for 25 years, with remeasurements made every 5 years.
- During this entire period, JDSF policy was to cut in a 5-year period all of the growth estimated for that period, based on measured inventory and growth rates.
- 78 If harvest amounts equal growth amounts, the inventory will remain constant. This was roughly the case in JDSF from 1959-1984. Thus, the CFI growth, harvest, and inventory numbers were generally ***self-consistent***[17].
- 79 The first IFI inventory estimate, made just 5 years after the last CFI inventory, was 50% higher than the last CFI estimate, and the estimated forest growth rate was approximately the same as the CFI growth rate. But forest growth greater than the CFI estimate is **inconsistent** with the estimated constant inventory over time between 1959-1984.
- 80 If actual growth had been higher than estimated growth during the CFI period, only part of the growth would have been cut, and so inventories would have increased significantly from period to period. This result is shown graphically in Figure 6.1.

Figure 6.1: Forest Growth When Actual Inventories and Growth 50% Greater than Estimated -- Harvest Equals Estimated Growth



Even though in this illustrative projection, the policy is to cut estimated growth, estimated inventories keep growing because actual growth is greater than the cut.

Estimated inventories keep growing because they are the same percentage of the growing inventory level. This example uses numbers that approximate the percentage difference between the IFI and CFI inventory estimates.

81 As long as actual inventories are greater than estimated inventories, estimated inventories will increase over time when harvest is set equal to estimated growth. But, **in JDSF estimated inventories actually declined from 1969 to 1984, by 4 million board feet per year, or more than 10% of the average annual harvest. This fact supports an argument that CFI inventory and growth estimates were higher than actual forest values. There is no credible way that this decline in inventories could have occurred if actual growth and inventory values during this period were those estimated by the IFI system.**

5.3 CDF Responses Do Not Refute My Analysis

In the 2002 Final Draft EIR, CDF responded to my analysis, but never addressed it directly; thus the conclusion was uncontested. Instead, CDF made numerous irrelevant assertions, none of which are germane to the analytical point made in the previous section. Below are quoted excerpts from their responses, followed by my comment

- *This comment, and other related comments...presents no analysis of the actual inventory data... This speculative line of theorizing about likely problems with JDSF's inventories are groundless. They are also wholly irrelevant because the inventory data are hard facts, not subjective opinions.*[18]

82 In this and other comments, CDF makes irrelevant and erroneous assertions. It does not argue that my analysis contains any errors in logic or computation.

83 The comparison of the CFI and IFI results is not speculative theorizing, but logical analysis of the data.

84 What the analysis shows is that the two sets of estimates cannot both be correct, and that the 25 year history of the CFI estimates supports the accuracy of CFI estimates. The IFI estimates have no history to support their validity. Only one set of whole-forest inventory measurements has been done under the IFI system. It's self-consistency over time has not been evaluated. Nor, has CDF ever published any
85 information that evaluates its accuracy by looking at actual and predicted harvest data. That the IFI estimates are wrong is consistent with the entire history of JDSF inventory measurements.

What is obviously the case is that the "inventory estimates" are not "hard facts." Rather they are derived through a very complex process of measurement, recording, transcription, statistical methodology, and data processing. There is room for error in many of these steps, and the results are very dependent on the estimation model and
86 the statistical estimation of the parameters. Apparently, somewhere in the IFI process, errors of data processing or statistical analysis occurred, causing inventories to be overestimated.

- *The most recent 1999 CFI remeasurement supports the IFI inventory results.*

Several points are to be made:

87 1. The analysis of the 1999 CFI remeasurement has never been published; so it is impossible for the public and decisionmakers to know to what extent it validates the 1989 IFI estimates. The assertion made by CDF is unsupported.

88 2. Information supplied to me by CDF shows that the same volume estimating equations were used on the 1989 IFI and 1999 CFI inventory data, but different parameter values were used in the equation. These different parameters produce significantly different estimates of volume: the volume estimates, *from the same set of tree measurements*, differ by 16 percentage points. The 1984 CFI estimates used an entirely different set of estimating equations, and these in turn produce volume estimates that are about 16% lower than the lower IFI equation estimates.[19] See later discussion.

89 3. With so much variation between the variously derived statistical estimating equations, little confidence can be placed in the correctness of any one of the statistical results. One needs to look at the **self-consistency** of harvest, growth, and inventory measurements over time. Only the earlier CFI estimates pass this test.

4. In any event, the analysis presented later in this section shows beyond a doubt that the IFI estimates are seriously in error.

90 • *They[the IFI and CFI inventory estimates] are not directly comparable... It would be unreasonable to expect them to give the exact same results.*

The IFI and the CFI estimates attempting to measure exactly the same thing: the inventory of the forest, albeit five years apart in time. They are comparable.

I am not asserting that the two estimates should be exactly the same. That would indeed be unreasonable.

• *The underlying premise that a lack of close correspondence in estimates between previous generations of CFI data and recent IFI data in and of itself is indicative of an error in the IFI, CFI or both, is intrinsically invalid.*

91 CDF is attacking a straw man. This is not my premise. Rather, the data show that the CFI growth, inventory, and harvest estimates were internally **self-consistent** over 25 years, and I have further demonstrated that this result could not have occurred if the CFI significantly underestimated inventory and growth. This is an analytical result based on CDF's own data.

In none of their responses to my comments does CDF provide any refutation of my analysis showing that the CFI estimates are, if anything, overestimates of the actual inventory and growth and, therefore, that the much larger IFI estimates must be erroneous.

5.4 None of the Difference in CFI and IFI Estimates Is Due to Statistical Errors

The publication that CDF cites as the one that "resolves the issues" I have raised,[20] proposes two explanatory factors for the difference between the CFI and IFI volume estimates: 1) statistical error, and 2) changes over time in the relation between tree

diameter (which is measured during inventories) and tree volume (which is for the most part calculated as a function of tree diameter).[21]

Mr. Henry states that about 15 percentage points of the 40+ percent difference in the estimates is due to revised diameter-volume relations. He relies on possible sampling errors to "explain" the unexplained 25 percent difference between the 1984 and 1990 inventory estimates. He uses the statistical concepts of sampling errors and confidence levels to argue that the unexplained difference of 25 percent is within normally accepted
92 statistical probabilities. Essentially, this is an argument that the much smaller CFI sample was unrepresentative of the forest, but that the much larger IFI sample was statistically much more reliable.

However, there is no need for statistical arguments about possible sampling error. The 2050 IFI sample plots included all of the CFI sample plots; thus rather than resorting to statistical arguments, one need only to compare the results calculated for the CFI subset with those for all of the IFI plots using the same diameter-volume relations. This will provide a direct, unequivocal answer to question of whether sample differences account for the discrepancy in estimates.

This calculation was performed at my request by Norm Hill of CDF in 1998. Mr. Hill found that the estimated inventory calculated using only the CFI subset of plots was nearly identical to that estimated using all of the IFI plots.[22] ***This demonstrates that there***
93 ***was no significant difference between the CFI and the IFI plots in terms of total forest inventory.***

Sample differences do not account for any of the difference between the.CFI and IFI estimates. The entire 40-50% difference (depending upon the IFI estimate being considered) requires another explanation.

5.5 Data Refute CDF Explanation for Increasing Volume-Diameter Ratio

The only other explanation for the difference in estimates proposed by CDF was a trend toward increasing volume-height relations over time. Mr. Henry showed plots that purported to compare the diameter-height relations used by the IFI and CFI systems to estimate timber volumes. He presents an analysis of data that found a 14% increase in volume growth in a small sample of plots "just due to differences in diameter
94 relationships..." This still leaves 25-35 percentage points of the increase unexplained. I will have more to say about this later, but the underlying explanation for 14% of the difference is not supported by the data.

In my 2002 comments, I showed that the data published by CDF over 25 years contradicted CDF's "explanation" of why the volume of wood for a given diameter of tree should be greater in 1989 than in 1959.[23]

95 In its responses, CDF failed to address the empirical data and its implications, but instead said that the data concerned only "one of several factors" affecting the diameter-height (and therefore diameter-volume) relationships. But, in the publication that CDF cites as the one that "resolves the issues" I have raised[24], the only factor given as an explanation for an increase in height relative to diameter over time is the increase density of tree stands "as the young forest aged:"

> *Height growth appears to not be greatly affected within a wide range of stand densities for most species. Diameter growth, on the other hand, is relatively sensitive to changes in stand density. As stands become more dense, diameter growth per tree is reduced. The likely result is that as the young growth stands grew older and denser during this forty year period... diameter growth decreased relatively disproportionate to height growth...*[25]

96 The data presented showed that, rather than increasing, stand density steadily and significantly **decreased** throughout the period. CDF did not dispute the data. Thus, they present no grounds to dispute my conclusion:

> To the extent that stand-density changes were affecting the accuracy of CFI measurements, they should have caused a growing overestimation of inventory...[26]

97 CDF's tree-stand-density theory supports the view that the CFI system **overestimated rather than underestimated** inventory and growth in the later years. Rather than supporting CDF's position, it works against it.

5.6 Empirical Analysis of the 1984, 1989, and 1999 Volume Estimating Equations.

98 None of the explanations that CDF has given for the difference in the 1984 and 1989 inventory estimates are supportable by data or logic. After the 2002 Final EIR was published, with no meaningful refutation of my arguments, I was left not knowing what could have accounted for the difference. Certainly, sampling errors were not responsible. Although, according to CDF, 14 percentage points of the difference could be explained by newly estimated height-diameter relations, the decreasing density of forest stands
99 made this explanation suspect. According to CDF's reasoning, decreasing stand density should have lowered height and volume relative to tree diameter, the opposite of what CDF said was the case.

99a Because CDF was unable to provide an explanation, I decided to analyze the 1984 and 1989 inventory data and estimating equations myself. CDF agreed to provide me with electronic files containing the inventory data for the 1984 CFI inventory and for the IFI-CFI plots[27] measured in 1989 and 1999. The basic data provided were for tree diameters by specie, and the plots were assigned a site index class. CDF also provided the estimating equations used to derive volume from tree diameter. Each of the three inventories (1984, 1989, 1999) used a different estimating equation.

With the help of a programmer, volume estimates were made by specie for the 1984 and 1989 inventory using each of the three different estimating equations.[28] The inventory data analyzed for 1984 is the entire CFI inventory sample. The data analyzed for 1989 is the subset of the IFI inventory plots that were located within the earlier-established CFI plots.

5.7 Comparisons of Three Estimating Equations Applied to 1989 Data

Table 5.1 shows the results of applying three different volume-estimating equations to 1989 inventory data. The three estimating equations were the three different equations applied to the 1984, 1989, and 1999 inventory data.

Some observations about the data in Table 5.1:

100 • The three volume estimates are derived from the same set of data (1989 inventory). The differences entirely reflect the differences in the volume-estimating equations . It is important to keep this in mind. In the table and the following discussion, the different years mentioned don't refer to different years of data but to year in which a given estimating equation was used to analyze inventory data, e.g., the 1989 equations were used in estimating inventory from sample data for the 1989 inventory. Here we apply all three equations to one year of data in order to isolate the effect of the differences in the estimating equations.

- The estimated whole-forest conifer volume using the 1989 estimating equation (2.0 billion board feet) is in the middle of the range of estimates put forth for this value by
101 CDF. This gives some comfort that the data sample and data processing reasonably reproduce the data and analysis used originally by CDF.
- The comparative estimates for minor conifers are not reliable. The species codes used for the 1989 and 1999 inventories differed from those used for the 1984 inventory. There was not available a cross-reference table; thus 1984 equations could not be accurately applied to the 1989 data, and vice versa. As these were a relatively small component of the total, the problems in this category were accepted without being resolved. Nothing should be inferred from the difference in the estimates for minor conifers. Therefore, totals excluding minor conifers are used to compare the volume estimates produced by the three different estimating equations.

102 • The volume estimating equations have a much bigger influence on the volume estimates than Mr. Henry said and that CDF cited as correct (14%). The 1989 estimating equations, which are the equations used in making the 1989 inventory estimates, produce a whole-forest conifer volume estimate that is 31.6% greater than the one produced using the 1984 equations.

103 1. The results using the 1989 and 1999 estimating equations differ substantially– yielding respectively estimates that are 131.3% and 116.6% of the 1984-equation estimate. It is important to note is that these significantly different volume-estimating equations were derived only 10 years apart. Changes in forest stand age and structure could not explain this difference. The difference must reflect differences in statistical estimations of parameters. But, no reliance can be put on a methodology that yields such significant differences as these.

Table 5.1 Summary 1989 IFI-CFI Plot Data, gross volume estimates with estimating equations from '84, '89, and '99

		Volume Estimates from 1989 Inventory Data		
		1989 Equations	1984 Equations	1999 Equations
Young Growth Redwood	***Plot Total YG RW (1/5 acre/plot)***	707,166	532,089	603,716
	Total/acre	25,438	19,140	21,716
	Forest totals (48,682 acres)	**1,238,353,698**	**931,768,384**	**1,057,197,189**
	Ratio of volume to 84 equation volume	132.9%	100.0%	113.5%
Young Growth Douglas Fir	***Plot Total YG DF (1/5 acre/plot)***	325,478	256,617	305,041
	Totals per acre	11,708	9,231	10,973
	Forest totals (48,682 acres)	**569,961,133**	**449,375,977**	**534,173,139**
	Ratio of volume to 84 equation volume	126.8%	100.0%	118.9%
YG RW & DF Subtotals				
	Plot totals (1/5 acre/plot)	1,032,644	788,707	908,757
	Total/acre	37,145	28,371	32,689
	Forest totals (48,682 acres)	**1,808,314,832**	**1,381,144,361**	**1,591,370,328**
	Ratio of volume to 84 equation volume	130.9%	100.0%	115.2%
Old Growth Redwood and Douglas Fir	Plot totals (1/5 acre)	90,430	64,570	86,036
	Total/acre	3,253	2,323	3,095
	Forest totals (48,682 acres)	**158,357,187**	**113,071,212**	**150,662,577**
	Ratio of volume to 84 equation volume	140.1%	100.0%	133.2%
Minor Conifers	Plot totals (1/5 acre/plot)	36,374	10,001	15,140
	Total/acre	1,308	360	545
	Total forest (48,682 acres)	**63,696,632**	**17,513,174**	**26,512,340**
	Ratio of volume to 84 equation volume	363.7%	100.0%	151.4%

AllConifers[1]			
Plot totals (1/5 acre/plot)	1,159,448	863,277	1,009,933
Total/acre	41,707	31,053	36,329
Forest Total (48,682 acres)	**2,030,368,651**	**1,511,728,748**	**1,768,545,245**
Ratio of volume to 84 equation volume	134.3%	100.0%	117.0%
All Except Minor Conifers			
Forest Total (48,682 acres)	**1,966,672,019**	**1,494,215,573**	**1,742,032,906**
Ratio of volume to 84 equation volume	131.6%	100.0%	116.6%

1. The Minor Conifer Volume comparisons are not reliable.

2. The volume estimating equations are those used by CDF. The 1989 and 1999 equations are in Attachment VT-4. The 1984 equations are in Attachment VT-5.

3. The data used was supplied by CDF to me in the summer of 2005. The data are for 139 of the plots in the IFI inventory system that were established within the original CFI plots (2 of the original plots were missing data in 1989). The data are from the 1989 measurement of these plots. The electronic form of the data used in the 1990 analysis of these data was lost. The current data were reentered in 2005 by CDF personnel.

4. The processing of the data to produce volume estimates was done by Larry Bednar, Bednar Consulting, Portland, Oregon.

104 • The 1989 and 1999 relations for old growth redwood and douglas fir are suspect. The 1989 equations show 40% more volume than the 1984 equations. But, the 1984 equations were developed in 1959, when the forest had a substantial inventory of old growth trees. Now the inventory is much smaller, and height data were available for only a few old growth redwood (only 5 data points in 1999). There was also no reason to discard the 1984 equations for old growth, as the diameter-volume relations for trees hundreds of years old would not have changed in 40 years. Statistically unreliable estimates were used when a better alternative was available. This is evidence that the estimates were made by people lacking statistical expertise.

105

5.8 Comparisons of Three Estimating Equations Applied to 1984 Data

Table 5.2 is similar to Table 5.1, except that it is based on the 1984 CFI data instead of the 1989 data. Again, the three estimating equations are applied to the same, 1984 data.

Observations:

106 • The comparative estimates for minor conifers are not reliable and should not be ignored (see the observations under Table 5.1).

107 • The conifer volume estimate for 1984 data using the 1984 estimating equation (1,347 million board feet) is very close to the value reported by CDF for the 1984 inventory (1,368 million). This gives some comfort that the data sample and data processing reasonably reproduce the data and analysis used originally by CDF.

• The differences in volume estimates for the different estimating equations is about the same as with 1989 data. More on this later.

108 The data in Table 5.1 and 6.2 allow us to compare the estimated volume growth between 1984 and 1989 absent any changes in estimating equations. **The comparison leaves no doubt that the 1989 inventory was very seriously in error.**

Using the 1989 estimating equations, which CDF claims are more accurate than the 1984 equations, for both 1984 and 1989, the estimated conifer volumes are: 1,747 million board feet in 1984 and 2,011 million board feet in 1989. These values imply that net forest growth after harvest equaled 264 million board feet. Timber harvests for the five-year period beginning in 1985 were equivalent to 214 million of standing volume.[29] These results are summarized in Table 5.3.

Table 5.2 Summary 1984 CFI Plot Data, volume estimates with estimating equations from '84, '89, and '99

		Volume Estimates from 1984 Inventory Data		
		1989 Equations	1984 Equations	1999 Equations
Young Growth Redwood	*Plot Total YG RW (1/2 acre/plot)*	1,605,509	1,219,621	1,381,332
	Total/acre	22,773	17,300	19,593
	Forest totals (48,682 acres)	**1,108,643,721**	**842,178,823**	**953,843,779**
	Ratio of volume to 84 equation volume	131.6%	100.0%	113.3%
Young Growth Douglas Fir	*Plot Total YG DF (1/2 acre/plot)*	681,171	538,913	637,947
	Totals per acre	9,662	7,644	9,049
	Forest totals (48,682 acres)	**470,365,394**	**372,132,997**	**440,517,915**
	Ratio of volume to 84 equation volume	126.4%	100.0%	118.4%
YG RW & DF Subtotals				
	Plot totals (1/2 acre/plot)	2,286,680	1,758,535	2,019,278
	Total/acre	32,435	24,944	28,642
	Forest totals (48,682 acres)	**1,579,009,115**	**1,214,311,820**	**1,394,361,693**
	Ratio of volume to 84 equation volume	130.0%	100.0%	114.8%
Old Growth Redwood and Douglas Fir	Plot totals (1/2 acre)	190,987	141,534	187,966
	Total/acre	2,709	2,008	2,666
	Forest totals (48,682 acres)	**131,881,036**	**97,732,443**	**129,795,258**
	Ratio of volume to 84 equation volume	134.9%	100.0%	132.8%

Minor Conifers	Plot totals (1/2 acre/plot)	21,215	51,534	27,712
	Total/acre	301	731	393
	Total forest (48,682 acres)	**14,649,781**	**35,585,561**	**19,135,513**
	Ratio of volume to 84 equation volume	41.2%	100.0%	53.8%
All Conifers	Plot totals (1/2 acre/plot)	2,498,882	1,951,602	2,234,956
	Total/acre	35,445	27,682	31,702
	Forest Total (48,682 acres)	**1,725,539,933**	**1,347,629,825**	**1,543,292,464**
	Ratio of volume to 84 equation volume	128.0%	100.0%	114.5%
All Except Minor Conifers				
	Forest Total (48,682 acres)	**1,725,539,632**	**1,347,629,094**	**1,543,292,071**
	Ratio of volume to 84 eq. volume	128.0%	100.0%	114.5%

1. The Minor Conifer Volume comparisons are not reliable.
2. The volume estimating equations are those used by CDF. The 1989 and 1999 equations are
in Attachment VT-4. The 1984 equations are in Attachment VT-5.

3.. The data used was supplied by CDF to me in the summer of 2005. The data are for the 141 original 1/2-acre CFI plots. The data were reentered in electronic form in 2005 by CDF personnel.

4. The processing of the data to produce volume estimates was done by Larry Bednar, Bednar Consulting, Portland, Oregon.

Table 5.3. Estimated 1984-1989 Inventory Growth, using 1989 estimating equations (millions of board feet gross)			
	1984 Inventory	1989 Inventory	Estimated Growth 1984-89
All Conifers	1,747	2,011	264
Harvest 1985-89			214
Total Forest Growth			480

109 The estimated net growth plus harvests (total forest growth) in the five years 1984-89 equaled 480 million board feet! The exclamation point is appropriate. This is an outlandish figure. It amounts to 96 million board feet per year, 5.5% per year. It is more than double the 42 million board feet per year that CDF uses as the basis for estimating the allowable cut in the DFMP, a figure that is extremely questionable itself. It is ***triple*** the most reliable estimate of volume growth: 32 million board feet per year estimated by the 1984 CFI inventory.

I emphasize that the results in Table 5.3 reflect inventory estimates made with one set of estimating equations. None of the difference is due to change in the estimating equations
110 between the two inventory years. The difference reflects differences in the basic tree data collected in the two different years. Something went seriously wrong with the 1989 inventory data collection and processing.

This result, together with 25 years of **self-consistent** estimates of forest growth, harvest and inventory under the CFI system (see prior section), proves beyond any doubt that the IFI estimates are far greater than the true forest inventory values. There is no way that the CFI estimates of inventories could have declined by 4 million board feet per year from 1964 to 1984 (which they did) if actual forest growth had equaled the IFI estimate of 480 million board feet per year. The IFI estimates are seriously in error.

111 The most reliable estimates of forest inventory and growth are those produced by the CFI inventory plots and estimating equations. But these estimates are now over 20 years old and not reflective of current forest conditions. JDSF is without a valid current inventory. A legally valid EIR or management plan is impossible without a valid current inventory.

The IFI whole forest estimates exceed the most credible (CFI) estimates by nearly 50%.
112 This degree of error is far outside of acceptable bounds. For instance, for SYPs, FPR 14 CCR 1991,4,5(c)(4) limits the statistical probable error for each major vegetation type to 15%, a fraction of the actual error in the IFI estimates.

5.9 CDF Knew the IFI Estimates Were Impossibly High in 1991

Paul Ederer was an aide at JDSF and worked on the data processing of the 1989 article. He wrote about his experiences in a 1992 JDSF Newsletter article, attached.[30] I also
113 interviewed Mr. Ederer in the summer of 2005.[31] Mr. Ederer reported in the article that he and his colleagues were concerned about the discrepancies between the new and old volume estimates. They did an even more careful comparison than I was able to do.

Using tree tags, they found the trees in the 1984 data that were within the 1/5-acre circular IFI-CFI plots. They then "processed the data sets identically."[32] He says in his article, in an extreme understatement, "The results were not what we expected..." The 1989 volume estimates were 37 percent greater than the 1984 estimates. The people doing the analysis knew that this was an impossibly great difference.

I asked Mr. Ederer, if an effort was made to determine the source of error that led to this impossible increase. He said, "No." I asked why not. He replied, "It was a hot potato, and no one wanted to touch it." In reviewing his remarks, he added, " There were probably other more valid reasons but I was blissfully unaware of the politicking going on within the agency and with other state departments."

114 The bottom line is that in 1991, CDF knew that the 1989 inventory estimates were impossibly high, but no one in the organization has been willing in the intervening 15 years to require that the impossibly high estimate be explained. Since 1998, I have been providing the department with analyses demonstrating the inconsistency of the 1984 and 1989 estimates and urging them to provide an explanation.[33] The only response was the analysis published by Mr. Henry[34], which itself was erroneous. CDF never went back and examined the underlying data in detail.

As Mr. Ederer said in his article, "The gain [in estimated inventory of about 500 million board feet] is every managers dream..." It was such a wonderful dream, and has been the basis for so much self-congratulatory PR about "taking a cut-over, burned-over forest and quadrupling the inventory," that management has preferred to remain in denial.

5.10 What Went Wrong with the IFI Estimates?

The public does not have to determine the source of errors that led the IFI to overestimate inventories. It is enough to demonstrate beyond a doubt that they are seriously overestimated.

For CDF's benefit, I make the following observations:

- The volume estimating equations are undoubtedly the most important source of error (though not the only one). The underlying equations were developed by Wensel and Krumland of UC and calibrated for JDSF using a 1983 Fall and Buck study. This is a
115 good set of credentials for accuracy, but some cursory analyses suggests that the underlying equations (before including the effects of estimating diameter-height relations) contribute to the erroneously high estimates.
- 116 Almost certainly there are problems in the way these equations were applied. The equations have height and diameter as two independent variables, and the values for the parameters were estimated by Wensel and Krumland from data that had values for both height and diameter. The parameter values are subject to statistical errors.

117 CDF, though, measured diameters and <u>did not</u> measure heights in its plots, except for a small subset of trees. It then used the small subset of trees to develop and estimating equation for height as a function of diameter and tree species. Herein lie multiple problems.

118 ○ First, it is statistically questionable to use a statistically derived value to replace an independent variable in an equation that itself has parameter values that were statistically derived. This compounds errors in the estimation process. A more statistically robust and accurate estimation equation would be to correlate directly **volume** with diameter measurements, rather than first estimating height from diameter and then plugging the height value (along with the diameter value) into a volume estimating equation.

119 ○ Second, the estimated equations for height-diameter relations were evidently not stable and solid. The 1989 estimated height-diameter relation yielded volume estimates that were much different than the ones in 1989. Compared to the 1984 equations, the 1989 equations produced volume estimates that were 32% greater, whereas the 1999 volume estimates were 16% greater. This wide variability casts doubts on the design and conduct of the estimation procedure.

120 ○ Third, the height-diameter estimation model did not include site class as a variable. This is a significant deficiency, because site class importantly affects height relative to diameter. The CFI equations, which had only diameter as the dependent variable (with the influence of height captured in the correlation of diameter with volume) included site class as a significant factor.

- There were evidently problems with the data collection and processing for the 1989 IFI inventory. The unsupportable estimated growth estimate from 1984 to 1989 still exists, though somewhat smaller, if the 1984 estimating equations are applied to both years of data. Growth after harvest is 12% for the five years. Total forest growth including harvests equals 366 million board feet, or 27%. This is outside the bounds of possibility. The expected outcome would be no net growth after harvest, as was the intent of the cutting policy in this period.

  One way to get at this would be to compare the 1984 and 1989 tree data plot by plot to see where and how the spurious "growth" arose.

121 • The processing of the huge amounts of data for 2050 plots of the 1989 inventory overwhelmed the rudimentary computer facilities of JDSF. The problems were detailed by Mr. Ederer, the JDSF aide, in his newsletter article. He eloquently and with feeling described the nearly insuperable problems of processing the multiple data values for each of the 50,000 trees in the sample 80286 (AT) computer. He details these in a 1992 JDSF Newsletter article, A reading of this article will convince anyone that errors were almost certain. In a personal interview, Mr. Ederer, went into more details about the complexities and difficulties of processing the data.[35] At the end, he summarized, ""Let me say that the data processing was fraught with possibilities for errors."

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[16] Vince Taylor, *Comments on the Draft Management Plan and Draft Environmental Impact Report for Jackson Demonstration State Forest,* July 18, 2002 (Hereafter, *Taylor Comment 2000*).

[17] If anything, the CFI inventory system appears to have overestimated growth in its last twenty years, because inventories declined by 78 million board feet between 1964 and 1984, or 4 million board feet per year. As harvests were set equal to estimated growth, the decline in inventory implies that estimated growth exceeded actual growth.
[18] Response to Comment 241.4, *JDSF 2002 Final EIR*, p. IV-266.
[19] See 5.1 and the accompanying discussion later in this section.
[20] Response to Comment 241.6, *JDSF 2002 Final EIR*, p. IV-267.
[21] Norm Henry, "JDSF Forest Inventory - Transitioning form the Old to the New", *JDSF Newsletter*, Spring/Summer, 1999
[22] Letter to Marc Jameson, Forest Director, JDSF, from Vince Taylor, Dharma Cloud Foundation, April 22, 1998, 7 pages. See Table 2. The new diameter-volume relations were used for both sets of plots. Attachment VT-IN-1 in Taylor Comments 2002.
[23] *Taylor Comments 2002*, Section 2.3.4
[24] Response to Comment 241.6, *JDSF 2002 Final EIR*, p. IV-267.
[25] Norm Henry, *op. cit.*, p. 6. Attachment VT-IN-11 in *Taylor Comments 2002*.
[26] *Taylor Comments 2002*, p.9.
[27] The IFI-CFI plots were IFI circular plots of 1/5 acre that were located in the centers of the ½ acre rectangular CFI plots. There were 141 plots in 1984 and 1989. In 1999, one of the plots could not be found. CDF conjectured that the plot had been logged and thereby obscured.
[28] Estimates were also produced for the 1999 data, but I did not have time to create summary tables from the individual plot and specie data; thus I did not compare results of the 1989 inventory estimates with the other ones.
[29] JDSF harvests from 1985 through 1989 in millions of board feet at the mill were: 32.7, 25.2, 37.7, 24.4, 33.0; total = 181 million board feet. Gross standing volume harvested was approximately 214 million board feet. Gross standing volume equals 1.18 net volume delivered to the mill, according to John Griffen, head of timber sales, JDSF, private conversation, January 1998.
[30] Paul Ederer, "Forest Inventory - Managing the Numeric Monster for Forest Planning," *JDSF Newsletter*, #46, Summer 1992. Included herein as Attachment VT-6.
[31] *Interview of Paul Ederer*, by Vince Taylor 4/18/05. Included herein as Attachment VT-7
[32] Ederer, *op. cit.*, p.5.
[33] See *Taylor Comments 2002*, Attachments VT-IN-1 and VT-IN-2.
[34] Norm Henry, *op. cit.*
[35] Ederer, *op. cit.*, p.5

6 Proposed Harvest Plans Will Not Achieve Maximum Sustained Production

The law requires JDSF to demonstrate that its proposed harvest plans will achieve maximum sustained production of high quality timber products (MSP). JDSF has elected to make this demonstration under the rules of subsection (a) of the relevant Forest
122 Practice Rule (14 CCR 913.11). The DFMP relies on the analysis in an unapproved Option A document filed in 2000 to show that this condition is met.

The Option A analysis uses the erroneous, highly inflated IFI inventory and growth rates to project the 100-year long term sustainable yield (LTSY) that sets the upper bound of harvests under Option A. The LTSY assumes a beginning inventory of 2.09 billion board
123 feet (all species). The modeled growth in the first decade, excluding hardwoods, appears to barely exceed the projected harvest of 39.2 million board feet per year. (Figure 6, JDSF Option A). Given the 50% overstatement of initial inventories, the projected harvest certainly exceeds the **actual** growth of the forest.

124 The most credible estimate of conifer forest growth is the 1984 CFI estimate. 29.6 million board feet (net).[36] The allowable cut, which makes additional adjustments, was set at 28.5 million board feet.[37] Even before adjusting this figure to reflects areas of the forest where harvesting will not occur or is constrained and reduce, it is below the 31 to 33 million board feet established as the allowable harvest in the DFMP.

Adjustments to reflect no harvest and limited harvest areas reduce the amount available for harvesting significantly. The Option A analysis designated 8.4% of the forest as "No Harvest."[38] The DFMP discussed possible operational constraints not incorporated in the Option A analysis and set the allowable cut between 15 and 20% less than the Option A projected harvest rate.

Adjusting the 1984 CFI allowable cut (28.5 million board feet) for "no harvest" areas (8.4%) and operational uncertainties (15-20%) yields growth available for harvest of 22 to 21 million board feet. The harvest levels proposed in the DFMP are 50% greater than
125 these values. The proposed harvest levels fail to meet the requirements of LTSY by a wide margin. The DFMP is legally defective.

6.1 Alternative Analysis of Harvest Available for Growth

In my comments on the 2002 EIR, I analyzed the growth available for harvest with methodology used by CDF in previous management plans.[39] This methodology has merit of making explicit the assumed impact on harvest of restrictions in harvesting in areas of
126 the forest. This analysis, which assumed "no harvesting" in Woodlands Transfer Area (see below), estimated the growth available for harvesting would be 18 million board feet. This is practically identical to the allowable harvest rate estimated by the methodology used in the DFMP, adding to the credibility of the estimate.

6.2 The Woodlands Transfer Area

127 The DFMP and the DEIR should examine, as one of the sub-alternatives of the proposed management plan, the case where timber harvesting is not allowed in the Mendocino Woodlands Recreational Demonstration Area (Woodlands Transfer Area) transferred into JDSF from federal ownership. If harvesting is not allowed there, the forest available for

harvest would be reduced by an additional 4646 acres (9.5%). The growth available for harvest would be 19 to 18 million board feet.

128 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].} On the face of it, this act would appear to prohibit timber harvesting, which does not appear to fit into the "exclusive uses" required by the transfer deed.

129 The state of California has maintained that it is authorized to do timber harvesting in the Woodlands Transfer Area because of an opinion letter from the U.S. Attorney General's Office.[40] Paul Carroll, who has represented Dharma Cloud in earlier suits concerning JDSF, issued an opinion letter on this issue to an unrelated client. His opinion was that the clear language of the law states that any use must be compatible with all three of "exclusive uses."[41] Clearly, under this interpretation, timber harvesting is not permitted.

130 Recent history suggests that litigation over the law governing the Woodlands Transfer Area is a possibility. The DFMP and the DEIR should explicitly consider this possibility.

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36 "The New Inventory - What It Tells Us So Far," JDSF internal document, 1993; Attachment VT-IN-5 in *Taylor Comments 2002*. The forest growth in 1984 was down from the from the 1979 inventory value: 29.6 versus 31.8 million board feet (net conifers).

37 Memorandum by Forest Tilley, JDSF Forest Manager, November 15, 1985.

38 *JDSF Option A Plan*, May 2000, Table 6.

39 *Taylor Comments 2002*, Sections 3.3.3 and 3.3.4, pp 29-30.

40 See for example, "Letter VT-241 - Response to Comment 241.28," *Final Environmental Impact Report for Jackson Demonstration State Forest*, September 2002, p. IV-275.

41 Paul Carroll, letter to Douglas Wheeler, Director of Resources, California Resources Agency, July 31, 1998. Included herein at Attachment VT-8

Attachment VT-1

Attachments

VT-1. Letter from Roger Sternberg to Chris Rowney, July 16, 2002
VT-2. CDF internal document, "Summaries To Be Calculated – Marc's request"
VT-3. Letter to George Gentry from Vince Taylor on the need to use updated inventory estimates in the preparation of the EIR, March 14, 2005.
VT-4. Volume equations used in for estimating volume from the 1989 IFI data and the 1999 CFI inventory measurement.
VT-5. Volume equations used for estimating volume from the 1959-1984 CFI inventory measurements.
VT-6. Paul Ederer article, "Forest Inventory – Managing the Numeric Monster for Forest Planning," *JDSF Newsletter # 46,* Summer 1992.
VT-7. *Interview of Paul Ederer,* by Vince Taylor, 4/18/2005.
VT-8. Paul Carroll, letter to Douglas Wheeler, Director of Resources, California Resources Agency, July 31, 1998.

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July 16, 2002

Mr. Chris Rowney, Program Manager
Demonstration State Forests
California Department of Forestry
and Fire Protection
P.O. Box 944246
Sacramento, California 94244-2460

Dear Mr. Rowney:

I am submitting the following comments on the Draft Jackson Demonstration Forest Management Plan and Environmental Impact Report at the request of the Sierra Club California. I have been asked by the Sierra Club to do an independent assessment of certain elements of the Draft Plan and EIR. The following comments are based upon my own professional judgment and experiences on-site at Jackson Demonstration State Forest (JDSF).

I am a Registered Professional Forester and have been a private consulting forester since 1998. During the period of 1998-2001, I also was the part-time Executive Director of the Mendocino Land Trust. Prior to that I was the Director of Forestland Conservation for the Pacific Forest Trust in Boonville, California. I have a Master of Forestry degree from Yale University and ran my own forestry business in Vermont for seven years.

General Comments and Observations

As a mountain biker, I use JDSF on a regular basis. Overall, I have found most of its forest management to be compatible with my recreational activities. JDSF is a valuable recreational resource to me and to many others of the public who take advantage of its trails and roads.

Some years ago, I reviewed the 1983 JDSF Plan and found it to be lacking in addressing non-timber values like wildlife. It is good to see a considerable change since then, with the new Plan paying much more attention to wildlife, watershed protection, and late seral forest management.

The level of stocking at JDSF – 43,000 mbf/acre – is far greater than not only private industrial, but also most private non-industrial timberlands in Mendocino County. Over the last 50 years, JDSF has taken a poorly managed, understocked forest and developed it into a very impressive forest. In large part this is due to its conservative level of harvests, which consistently has been lower than growth rates (p. 22, Jackson

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Demonstration Forest, Option A Plan for Achievement of Maximum Sustained Production of High Quality Timber Products, 5/9/00). It is important to note that JDSF is continuing to harvest conservatively -- between 1.55 % 1.65% of inventory per year, which will build inventory over the next decade.

Most recently, while biking in JDSF, I happened to notice the large woody debris (LWD) placed in Hare Creek. This work was so well done that to the casual observer, the LWD looked as if it was naturally occurring. It is this kind of exemplary work that should be a standard for all management and research activities on JDSF.

For the sake of brevity, I have enumerated the following additional comments and recommendations on both documents.

1) Insufficient Data: As a forester, I find that the information provided on silvicultural practices and stand characteristics is insufficient to ensure attainment of enunciated objectives in the Draft Plan and EIR. In general, the documents do a good job qualitatively describing desired outcomes, but don't provide fundamental quantitative information.

To be specific, the various silvicultural systems are briefly described, defined by acreage and are mapped. Yet basic information on timber stand characteristics including species composition, age classes, projected growth, present stocking level, present volume per acre, size class distribution, residual volumes under uneven-aged management, and similar characteristics projected over the planning horizon by management compartment is missing. While the Draft Plan may not be required to provide this information, as is the case for the preparation of Non-Industrial Timber Management Plan (California Forest Practice Rules, Section 1090.5), this is basic information needed by present and future forest managers to guide their actions and for the public to understand how the Plan is going to be implemented.

As someone who strongly supports JDSF's mission to demonstrate sustainable timber and non-timber resource management, I find that this lack of information weakens the case that JDSF will be practicing forest ecosystem management. At a time when JDSF's management is being severely criticized and public confidence seems low, more information, versus less, is needed.

JDSF managers express a legitimate concern that the more detailed the information provided in the Plan, the more constraints will be placed on their management. Noss et al (The Redwood Forest, 2000), in fact emphasize the need for managers to retain flexibility in managing large tracts of forestland:

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> *Historically, silviculture has focused on site-specific or stand specific prescriptions. It has become increasingly clear, however, that to meet conditions of ecological sustainability, managers must look beyond the individual stand-specific treatments that will ultimately achieve desired future conditions on the landscape scale. The "big Picture" view so necessary for conservation of the biological values of redwood forests (see chap. 7) therefore is also necessary for improved management of redwoods for timber. A big-picture approach requires the flexibility to apply a broad range of stand-specific management treatments and a decision-analysis process adequate to determine the appropriate mix of management activities across the landscape and through time.*

In crafting the Draft Plan, JDSF staff has put considerable effort into presenting this "big picture," but the picture as currently written is incomplete, because it doesn't project what will be happening spatially or temporally in individual management compartments. Flexibility of management will not suffer by providing this data so long as a range of silvicultural prescriptions can be applied in each compartment.

In an effort to garner more information, CDF staff referred me to the JDSF Option A Plan, which was used to fulfill the requirements of the California Forest Practice Rules to "disclose sustainable management, a balance growth and harvest over time, and protect public trust resources" (p.3). The Option A Plan provides helpful information including Table 5 (Inventory, growth, harvest over time, conifer and hardwoods), but it and most of the other data in the Option A apply to the Forest as a whole. Sample yield streams for some of the silvicultural prescriptions to be used on the Forest were also helpful, but are generic in nature and don't indicate where the final outcomes will occur.

Recommendation: Include information on stand characteristics per the requirements in preparation of a Non-Industrial Management Plan. Provide harvest and growth, stand, and age class distribution tables on a management compartment basis that indicate the forest condition now and on a decadal basis.

Recommendation: CDF staff has informed me that the Option A Plan will be revised to be consistent with the Management Plan. Since the data in the Option A Plan are used as the basis for projecting Long Term Sustained Yield, they should be incorporated as an Appendix to the Plan or EIR.

2) Forest Cover and Wildlife Habitat: In the past, JDSF has used the WHR classification system and has created a map of WHRs for the forest. The Draft Plan recognizes the problems associated with the WHR system and, as a result, JDSF has created its own Forest Cover Types, which are more applicable to present stand conditions. Although there is a map of Forest Vegetation (Figure 7) in the Draft Plan, it does not specifically identify areas containing JDSF Size Class 6 or 6M, which have the most likelihood of having late seral forest characteristics.

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Recommendation: Develop maps of JDSF Forest Cover Types today, 10 years, 50 years, and 100 years. This will add critical information for future forest managers and help the public to understand the "big picture" envisioned in the Draft Plan. The maps should illustrate changes in habitat connectivity throughout the Forest. Note that the current scale of the map of Forest Vegetation is so small that it is very difficult to interpret. Maps at a larger scale should be produced and made available at various public locations. This recommendation exceeds the Department of Fish and Game's recommendation for a new type map (page 5, Draft EIR, Vol 2.).

3) Watercourse and Lake Protection Zone Standards: On page 69 of the Draft EIR, the Plan states that a minimum of 240 square feet of basal area will be retained in WLPZs in Class I and II watercourses. Flexibility to allow for thinning in lesser-stocked sites to hasten late seral forest characteristics should be incorporated into the Draft Plan. While the present standards call for a no cut zone of 25' along Class I watercourses and canopy retention levels, there is no indication of the diameter distribution that managers should be trying to attain in riparian management zones.

In The Redwood Forest, Noss et al reached the conclusion that:

The greatest scientific shortcoming in the current California Forest Practices Act from the perspective of riparian and aquatic resources, is its reliance on the conceptual approach to stream buffer protections used in the CDF stream classification system.

Of particular concern is the lack of substantive protection for headwater channels feeding into Class I watercourses (pages 190-191). Similar concerns have resulted in adoption by the Arcata City Forest of watercourse standards exceeding the Forest Practice Rules. Recently, the Mendocino Redwood Company has applied standards for Class IIIs on one of its Timber Harvest Plans that exceed the Rules.

Recommendation: Provide for some flexibility in basal area retention standards to hasten late seral forest development. Define diameter distribution guidelines that comprise the basal area standard.

Recommendation: Adopt management standards for Class III watercourses that address serious concerns about preventing fine sediment migration into aquatic habitat.

Recommendation: Conduct long-term paired watershed studies in which the standards recommended for WLPZ protection submitted by NFMS to the Board of Forestry (December 1999) are applied versus the standards proposed in the Draft Plan. This research would provide a scientific basis for the determination of the adequacy of riparian area management zones.

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4) Snag Retention and Recruitment: Pages 16 and 62 of the Draft Plan discuss snag retention and recruitment, recognizing the deficiency of snags in "special wildlife concern areas." The Plan defines goals for recruitment, however, there is no explicit statement discussing how snags will be recruited, e.g., through green tree retention.

Forest managers and wildlife biologists go back and forth over the issue of how many snags need to be retained to provide wildlife habitat for species inhabiting the coastal redwoods. How were the goals for snag retention determined for the Plan? Is "at least one snag per acre 30" DBH" adequate throughout the Forest?"

Recommendation: Conversations with JDSF staff indicate that all snags will be left in harvest areas unless they pose a safety, fire hazard, or pose a problem for harvesting. This should be explicitly stated in the Plan. Snags that are felled for the above reasons should be left on the ground until levels of down woody debris are sufficient.

Recommendation: Snag recruitment methods should be defined.

Recommendation: Levels of snag retention and recruitment methods should be researched on the Forest in conjunction with the Department of Fish and Game. In the meantime, it would seem prudent to increase goals per the Department of Fish and Game's recommendation (page 6, Draft EIR, Vol 2.)

5) Late Seral Forest Management: The Draft Plan states on page 47 that:

Uneven-aged management will eventually produce multi-aged stands with varied levels of large trees and structural habitat elements, many of which will be characterized similarly to WHR 6 habitat as currently defined."

However, if one of the silvicultural prescriptions modeled in the Option A Plan is to be implemented, approximately 3,133 acres of stands to be managed under group selection will not have any structural retention. This represents one-third of the total of the acreage to be managed under group selection. Further, the group selection prescription identified in the Option A Plan calls for reducing a stand currently stocked with 53mbf/acre down as low as 17.7 mbf. The combination of these two factors seems to conflict with the late seral forest management goal in uneven-aged stands.

As it currently stands, the Plan does not provide enough information to determine how the above stated goal will be met and on what scale.

Late successional/seral forest development of the various management alternatives is analyzed by Dr. Dale Thornburgh in the Draft EIR (Appendix 8A-26 thru 8A-37).

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Dr. Thornburgh's assessment of Alternative C (JDSF Draft Plan), is that in 100 years and after 4 cutting cycles, stands that are currently 40-60 years old will "be progressing towards optimum conditions that are found in late successional forests." It is unclear whether Dr. Thornburgh's analysis applies to JDSF's uneven-aged management areas or to the late seral management areas identified in the Draft Plan.

Recommendation: The Plan should map second growth forests containing late seral forest characteristics using the JDSF Vegetation Type system and identify the impacts over time of proposed harvests on a management compartment and on a landscape basis. Information should also be provided on the specific effect of the Plan on older second growth forests (80-100 years).

Recommendation: The Plan should clarify whether Dr. Thornburgh's analysis applies to uneven-aged management areas in general or only to specific late seral management areas. If the latter is the case, then it would be very helpful to have Dr. Thornburgh comment on the proposed uneven-aged management silviculture in the Draft Plan and how well it will produce multi-aged stands with WHR 6 habitat characteristics referred to above.

Recommendation: Designate Late Seral Management for inner gorge areas (2,012 acres) to increase level of protection for riparian and aquatic resources

6) Old Growth Forest and Old Growth Trees: There appear to be as many definitions of old growth forests as there are forest ecologists. This lack of clarity shouldn't, however, preclude JDSF from selecting one. Without such a definition, limited management activities in old growth stands will not have a clear goal to attain.

The Plan specifically notes that individual old growth trees will be retained throughout the Forest (page 60), which will provide important structural diversity and provide additional wildlife habitat. However, the one criterion of a DBH greater than 48 inches seems to be questionable, particularly in relationship to Douglas-fir old growth, which tends to have smaller diameters than redwood old growth.

Recommendation: Define old growth forests. Noss et al (page 88) provide an excellent summary of the various definitions.

Recommendation: Change the diameter criterion for old growth conifers to 36 inches DBH.

7) Even-aged Management: According to CDF staff, 15% of even-aged managed stands will be in the 50-year or under age class at any one time. This information is important to note as it suggests that the even-aged management proposed in the Draft Plan should retain habitat connectivity.

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Again, confirmation of this statement needs to be made via the provision of more data on a management compartment basis.

On page 12 of the Option A Plan, the following statement is made:

One of the Board of Forestry and Fire Protection polices for State Forests is to maximize the mean annual increment of high quality forest products.... On most sites, redwood does not appear to have a point of culmination of mean annual increment (CMAI) within a 100-year rotation age,... Most redwood stands are of mixed species composition, containing varying proportions of Douglas-fir, a species which does not exhibit a well-defined CMAI rotation in most cases. The practical interpretation of this policy directive has been to set even-aged rotations to at least 80 years on all site classes.

The Draft Plan, however, states that on the West End of the Forest, rotation ages of 60 – 90 years of age will be applied (page 54).

Recommendation: The Plan should clearly state the rationale for conducting even-aged management with a rotation of 60 years and why the change from the original minimum of 80 years occurred.

8) JDSF Budget and Staffing

Recommendation:

- Based on a $10-15 million annual budget, it is recommended that 10% of revenues be reserved specifically for JDSF-based research, demonstration, educational, and acquisition programs, and to hire a wildlife biologist.
- The Plan should call for an annual financial report to be made available to the public. Further, a report should be made yearly on the expenditure of JDSF timber revenues for such programs as the California Forest Improvement Program (CFIP). In this way, both managers and the public will be able to see the level of investment in the Forest on a programmatic basis and where overall revenues are expended.
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I would also like to take this opportunity to thank the JDSF staff for providing information to me. Marc Jameson, Bill Baxter, and Craig Pederson helped me to better understand the management objectives and practices proposed in the Draft Plan and EIR.

Sincerely,

Roger Sternberg
RPF #2620

Attachment VT-2

CFI SUMMARIES TO BE CALCULATED - marc's request*

1. GROWTH BY SPECIES (ACCOUNT FOR HARVEST)
Use only trees which are present at both measurement points - this would exclude ingrowth or missed trees. Make conditional statement in systat to delete all trees which do not have dbh and height measurements in both time periods. Expand these to a per acre value

2. 10 YEAR HARVEST
delete all trees that are harvested in 1998 but were also harvest trees in 1988. Then delete all trees but ones with a harvest code remaining in the 1998 data set.

3. GROWTH/INVENTORY BY WATERSHED OR REGION
Use GIS to list all plots by watershed and do each separately

4. MORTALITY BY SPECIES

5. LWD BY TYPE
6. GROWTH BY SILVICULTURAL TREATMENT

7. SITE INDEX BY PLOT/SOIL TYPE
*CHECK ANOMALIES IN PLOT GROWTH - REFER TO OLD SUMMARIES WHICH ARE NOW REVISED AND GIVEN TO MARC ON 10/18/1999.
OTHER
1. GROWTH BY TYPE AND BY SPECIE
STANDING GROWTH
INGROWTH
GROWTH BY DIAMETER CLAS

GIS ACRES FROM SOIL INFO

SITE
1 - 165.6 - 0.4%
2 - 24909.4 - 51%
3 - 14940.6 - 31%
4 - 7697.2 - 16%
5 - 938.4 - 1.6%

1

MARC JAMESON

DRAFT

JDSF HARVEST ESTIMATE
1990-1998

1998-99 CFI PLOT DATA

Sum of BFVOL/AC	SPECIES	OBC	OD	YB	YD	YG	OC	TD	MADRONE	OH	SH	
PLOTNO		1	2	3	4	5	6	11	12	14	19	Grand Total
103		16315.35341		2498.832028								18814.18544
301				5493.23902	7219.634756							12712.87378
303						4958.504992						4958.504992
402					12259.02536							12259.02536
403				16272.96076	7519.407365			3161.579696				26953.94782
503				12518.38651	16778.23318							29296.6197
506				12632.24362								12632.24362
601		15435.19632		17895.76246				565.4111282				33896.3699
602				17501.51862								17501.51862
603				23633.89209					804.6189012			24438.51099
703				913.6354173	680.8808755							1594.516293
804				28218.17324	60639.0818							88857.25505
901				26023.28582	891.045107							26914.33092
904				103024.1083	646.3996714							103670.508
905				56130.35727	22546.63592			2037.808994				80714.80018
906					13859.97779				159.5454167			14019.5232
1002				21773.82039								21773.82039
1004				8202.759301				315.1741716				8517.933473
1103				7303.918023				432.2881338				7736.204157
1105			33882.79091	15436.92536	32499.4935	951.4786348	1528.375717	4768.782394			2532.677783	91600.5243
1106				5338.075175	8265.415042							13603.49022
1203				267.5513106								267.5513106
1303					4820.794659							4820.794659
Grand Total		31750.54973	33882.79091	381079.4447	188626.025	5909.983626	1528.375717	11281.04052	159.5454167	804.6189012	2532.677783	657555.0524
AVG VOL/AC HARVEST		225.1812037	240.3034816	2702.691097	1337.773227	41.91477749	10.83954409	80.00737955	1.131527778	5.70651703	17.96225378	4663.51101
HARVEST FOR PERIOD		10,911,280	11,644,146	130,961,600	64,823,139	2,031,022	525,241	3,876,838	54,829	276,515	870,379	225,975,089
ANNUAL HARVEST = (9 YEARS)		1,212,376	1,293,794	14,551,289	7,202,571	225,669	58,360	430,760	6,092	30,724	96,709	25,108,343
NET		1,091,138	1,164,415	13,096,160	6,482,314	203,102	52,524	387,684	5,483	27,651	87,038	22,597,509

48456 ACRES

2

Attachment VT-2

DRAFT

JDSF GR GROWTH
ESTIMATE
EXCLUDING TREES HARVESTED DURING PERIOD

6/23/00

Sum of CROSS SECTIONS PLOT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19 (blank)	Total
101			5380				2876						317							8573
102			4376	1439									2761							8576
103			2570																	2570
104			877			0	4254	73												5203
105			1446			931														2377
106			1572		0	0	788												37	2397
107			6253																	6253
108			801		14082								25							14908
109							1756												155	1911
110																				
111											399									399
112											371									371
113							7824													7824
114																				
115																				
116																				

Attachment VT-2

1198			8726	15699	-147					-10										24169
1201			374							553										927
1202			5743	1174							150									7068
1203	-9619		28921							163			147							19620
1204			3289	6049	3264	2798				171									93	15443
1301			182	1228						372	182									1915
1302			12458	8077						349			144							21027
1303			3882	4285						111	326									7414
1304			19530	11169						107										31297
1401			2443	402						-86	72					53				2883
1402			3186	2737						96										6019
1403			2253	17028																19281
1404			-4127							1676	142									-2309
1405	-4063			7588						33	30									3250
1501			-242	2283						1892										3115
1502			3390	6235						-675	-33									9017
1503			1165	11586						18										12950
1504			1257	17346																18602
1505			1349	3256	650	772				574									73	6671
1506			6354	4574						1128										12156
1507			5277	1545						1259										8081
1601	Z3076	0	1591	0																24667
1602			2573	9546						116										12235
1603			746	2916						364										4027
1604			443	2277						1628										4348
1605			3814	5422						831										10067
1606			1386	11227						270										12878
1607			-199	1252	580					1170										2803
1701			1870	7432						-94										9408
1702			4386																	4386
1703			572	5963						2026										8561
1704			-48							306										258
1705	2221		-40	1642						1143										5166
1706			1243	3636						500										5379
1801			8521	4215						1524										8260
1802	-395	-30622		589					0	299				-88						-30236
1803			1679	4386						2136	-100									8101
1804			376	3318						2348	298									6339
1805			5210	1549						1302										8061
1806			6545	6996																13441
1807	-52503		4527							1140										-46836
1901			4812	4873						502										10187
1902			189	158						1117										1377
1903			326	705						-83	7									950
1904			1257	2728						987										4973
1905			5883	2798						928	-170									9209
1906			1648	5758																7406
2001			-72	829						370										1129
2002			320	3417						2742										6480
2003			1223							1892										3115
2004			158	3573																3732
2005			3499	346						89										3934
2101			2508	8327						383	65									10283
2102				477						622										1099
2103									0	-36	42			342						348
2104			644	706																1350
2105			451							1087										1538
2106										147									8	155
2201				15195						305	667			155						16322
2202			389	251						1305										2946
2203			430	490						1919										2840
2301			2409	257																2666
Grand Total	-32636	-30695	763633	537426	17841	3429	18374	1328	1554	51450	1625	1542	347	395	7	53	853		400	1323713
	-231	-270	5416	3741	127	53	130	9	11	365	13	11	2	3	0	0	5		3	
PERCENTAGE	-2.5	-2.9	57.7	39.8	1.3	0.5	1.4	0.1	0.1	3.9	0.1	0.1	0.0	0.0		18 YEAR	AVG PLOT GROWTH =			9368
																ANNUAL AVG GROWTH (AC) =				539
											GROSS	ANNUAL	TOTAL FOREST GROWTH - trees present during both inventories +							45,498,671
																plus ingrowth during the period				
																		SE% @ 95% CI =		20
											GROSS	ANNUAL HARVEST ESTIMATE =								35,108,542
																		SE 1095 CI		57
																	TOTAL =			70,699,614
																	remained	SE %		60

4

Attachment VT-2

5

Campaign to Restore Jackson State Redwood Forest
P.O. Box 1789
Fort Bragg, CA 95437

Attachment VT-3

March 18, 2004

Mr. George Gentry, Executive Officer
State Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, Ca 94244-2460
Fax: (916) 653-0989

Subject: Scoping Comment on Jackson State Forest EIR

Dear Mr. Gentry:

In my oral comments at the Board of Forestry meeting in Fort Bragg, I supported the need to re-open the management plan to correct major deficiencies. This letter supplements my oral presentation.

I repeat two of the major points briefly here:

- The 2002 DFMP states (p.3) "This plan builds on the 1983 plan by elevating wildlife, watersheds, and ecosystem processes to a level of importance equivalent to the timber management and research, demonstration and education programs." The public and current environmental laws require that JDSF's management plan do what is stated.

  The proposed DFMP, however, does not do what it states it does. Timber harvesting is the dominant part of the plan. Little if any attention is paid to any of the non-timber values enumerated in the quoted sentence. Thus, the DFMP fails to meet its own statement of intent. It also fails to provide what 5,000 members of the public said they want, nor does it meet current state environmental objectives

- The DFMP fails completely to recognize the key role of Jackson State Forest for conservation and habitat in the region. The surrounding industrial timberlands contain only very young trees and badly degraded streams questionably supportable of salmon recovery. As a publicly owned forest with substantial stands of mature second growth and less degraded streams, JDSF can provide habitat otherwise absent in the region. The DFMP fails to evaluate regional ecosystem needs and incorporate them in the plan.

I want to enter into the record at this early point my strong recommendation that the Board order JDSF to:

1. Obtain an objective, third-party evaluation of the accuracy of the IFI inventory system and fix any errors that the evaluation finds.
2. Perform a new whole-forest IFI inventory.

With respect to 1), I have repeatedly provided JDSF with evidence of serious errors in the IFI inventory estimates. This evidence is contained in my comments on the earlier JDSF

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Attachment 3

EIR and in our court challenge to the EIR. I incorporate that evidence in this letter by reference. The evidence I have submitted has been ignored or dismissed, but it has never been satisfactorily answered. I would greatly prefer that the dispute be resolved out of court than in court, but I am determined that it be resolved.

With respect to 2), the last whole-forest IFI inventory was done in 1989, fifteen years ago. Management planning needs to be based on up-to-date inventory information. There is no empirical data on growth and changes in inventory at the detailed level provided by the IFI inventory system. Inventory estimates projected by computer models from 1989 to 2004 will have no empirical test of validity and cannot be considered reliable.

The IFI system replaced the earlier CFI system, used from 1959 to 1984. The CFI system was replaced because it could not provide the detailed small-area inventory data required to do adequate analysis and planning by watershed and sub-watershed.

An inventory estimate using a small subset of the 2500 plots in the IFI inventory system evidently was done in 1999. The 1999 inventory estimate was based on the 141 plots of the IFI system that were in the earlier, CFI inventory system. The 1999 quasi-CFI inventory cannot provide reliable, detailed small-area inventory data.

Accurate inventory estimates are a prerequisite for legally adequate consideration of cumulative impacts. Delaying the preparation of a new inventory will merely delay the time at which a legally adequate EIR can be prepared.

Sincerely,

Vince Taylor, Ph.D.
Executive Director

Tel: 707 964-5800 Fax: 707 937-6202 campaign@jacksonforest.com www.jacksonforest.com

DRAFT 4/3/00

Attachment VT-4

COMPUTE 1999 TREE HEIGHTS AND VOLUMES

```
BASIC
USE 'C:\Forest Inventory\HJWCFI\CFIS10158.SYS'
SAVE 'C:\Forest Inventory\HJWCFI\CFIS10158.SYS'
IF (SPECIES =1) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(5.046 - 2738350000*(DBH99^(-6.938)))
IF (SPECIES =2) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(5.046 - 2738350000*(DBH99^(-6.938)))
IF (SPECIES =3) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(6.881 - 6.248*(DBH99^(-0.335)))
IF (SPECIES =4) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(6.331 - 5.725*(DBH99^(-0.435)))
IF (SPECIES =5) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(5.713- 8.267*(DBH99^(-0.725)))
IF (SPECIES >5) AND (SPECIES<10) AND DBH99<31 AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(3.549 +
0.019*(DBH99^1.287))
IF (SPECIES =5) AND (MEASHT$<>'MH') AND (DBH99>30) THEN LET HEIGHT99=4.5+EXP(6.881 - 6.248*(DBH99^(-0.335)))
IF (SPECIES =11) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(5.717 - 3.333*(DBH99^(-0.276)))
IF (SPECIES >11) AND (MEASHT$<>'MH') THEN LET HEIGHT99=4.5+EXP(4.710 - 2.857*(DBH99^(-0.578)))
RUN

IF SPECIES = 1 THEN LET VOL99 = EXP (-6.2233+1.6117*LOG(DBH99)+1.6021*LOG(HEIGHT99))
ELSE IF SPECIES = 2 THEN LET VOL99 = .0004714*DBH99^1.725*HEIGHT99^1.809
ELSE IF SPECIES = 3 THEN LET VOL99 = .0003347*DBH99^2.012*HEIGHT99^1.664
ELSE IF SPECIES = 4 THEN LET VOL99 = .0004714*DBH99^1.725*HEIGHT99^1.809
ELSE IF SPECIES = 5 THEN LET VOL99 = .00009784*DBH99^1.767*HEIGHT99^2.128
ELSE IF SPECIES = 6 THEN LET VOL99 = .00009784*DBH99^1.767*HEIGHT99^2.128
ELSE IF SPECIES = 7 THEN LET VOL99 = .00009784*DBH99^1.767*HEIGHT99^2.128
ELSE IF SPECIES = 8 THEN LET VOL99 = .0003347*DBH99^2.012*HEIGHT99^1.664
ELSE IF SPECIES = 9 THEN LET VOL99 = .0003347*DBH99^2.012*HEIGHT99^1.664
ELSE IF SPECIES = 11 THEN LET VOL99 = .0007933*DBH99^2.3095*HEIGHT99^1.2107
ELSE IF SPECIES = 12 THEN LET VOL99 = .002524*DBH99^1.7264*HEIGHT99^1.2646
ELSE IF SPECIES >12 THEN LET VOL99 = .003747*DBH99^2.2444*HEIGHT99^0.8136

IF DBH99<11 THEN LET HEIGHT99=20
IF DBH99>10.9 THEN LET HEIGHT=5
LET ACRVOL99 = VOL99*HEIGHT99
LET NACVOL99 = ACRVOL99*((100-DEFPCT)/100)*0.93
IF NACVOL99 = . THEN LET NACVOL99 = ACRVOL99 * 0.93
```

COMPUTE 1988 HTS AND VOLUMES

```
BASIC
IF (SPECIES =1) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(5.815 - 8.488*(DBH88^(-0.584)))
IF (SPECIES =2) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(42.946 - 40.550*(DBH88^(-0.019)))
IF (SPECIES =3) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(6.119 - 6.172*(DBH88^(-0.472)))
IF (SPECIES =4) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(5.970 - 5.801*(DBH88^(-0.638)))
IF (SPECIES =5) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(5.364- 9.360*(DBH88^(-0.980)))
IF (SPECIES >5) AND (SPECIES<10) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(4.705 - 5.188*(DBH88^(-0.974)))
IF (SPECIES =11) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(4.353 - 7.604*(DBH88^(-1.256)))
IF (SPECIES >11) AND (MEASHT$<>'MH') THEN LET HEIGHT88=4.5+EXP(4.233 - 11.886*(DBH88^(-1.658)))
RUN

BASIC
IF SPECIES = 1 THEN LET VOL88 = EXP (-6.2233+1.6117*LOG(DBH88)+1.6021*LOG(HEIGHT88))
ELSE IF SPECIES = 2 THEN LET VOL88 = .0004714*DBH88^1.725*HEIGHT88^1.809
ELSE IF SPECIES = 3 THEN LET VOL88 = .0003347*DBH88^2.012*HEIGHT88^1.664
ELSE IF SPECIES = 4 THEN LET VOL88 = .0004714*DBH88^1.725*HEIGHT88^1.809
ELSE IF SPECIES = 5 THEN LET VOL88 = .00009784*DBH88^1.767*HEIGHT88^2.128
ELSE IF SPECIES = 6 THEN LET VOL88 = .00009784*DBH88^1.767*HEIGHT88^2.128
ELSE IF SPECIES = 7 THEN LET VOL88 = .00009784*DBH88^1.767*HEIGHT88^2.128
ELSE IF SPECIES = 8 THEN LET VOL88 = .0003347*DBH88^2.012*HEIGHT88^1.664
ELSE IF SPECIES = 9 THEN LET VOL88 = .0003347*DBH88^2.012*HEIGHT88^1.664
ELSE IF SPECIES = 11 THEN LET VOL88 = .0007933*DBH88^2.3095*HEIGHT88^1.2107
ELSE IF SPECIES = 12 THEN LET VOL88 = .002524*DBH88^1.7264*HEIGHT88^1.2646
ELSE IF SPECIES >12 THEN LET VOL88 = .003747*DBH88^2.2444*HEIGHT88^0.8136
IF DBH88<11 THEN LET HEIGHT88=20
IF DBH88>10.9 THEN LET HEIGHT=5
LET ACRVOL88 = VOL88*HEIGHT88
LET NACVOL88 = ACRVOL88*((100-DEFPCT)/100)*0.93
IF NACVOL88 = . THEN LET NACVOL88 = ACRVOL88 * 0.93
RUN

IF NACVOL88 = . THEN LET NACVOL88 = 0
IF NACVOL99 = . THEN LET NACVOL99 = 0
LET NACGRO = NACVOL99 - NACVOL88
```

Marc: Did use different ht/dia. coefficients for 1988 + 1999 and then applied those heights to the standard set of volume equations we use now.

Norm

Note: Obtained from CDF. The handwritten note at the end is from Norm Henry, who was the inventory analyst at JDSF at the time, to Marc Jameson, Jackson Forest Director.

Attachment VT-5

CF1 ① volume formulas

TABLE A.1

JACKSON STATE LOCAL VOLUME TABLES [1/]

~~Merchantable Cubic Feet~~ $v_1 = a_1 + b_1 \cdot d_1 + c_1 \cdot d_1^2$ ← SCRIBNER BOARD FEET

~~Scribner Board Feet~~ $v_1 = a_2 + b_2 \cdot d_1 + c_2 \cdot d_1^2$ ← MERCH CUBIC FEET

CF1	SPECIES	IFI vs	AGE	SITE	BOARD FEET a_1	b_1	c_1	CUBIC FEET a_2	b_2	c_2
2	Douglas Fir	4	YG	I,II	156.087	-33.6927	2.47545	-8.1280	0.16200	0.254435
2	Douglas Fir	4	YG	III-V	139.386	-29.3080	2.03223	-9.7284	0.86453	0.184100
102	Douglas Fir	2	OG	-	1293.277	-110.7644	3.39810	83.7489	-7.83002	0.371421
1	Redwood	3	YG	I,II	166.090	-31.2456	1.82285	6.8793	-2.14501	0.248695
1	Redwood	3	YG	III-V	(142.130	-26.8349	1.58044)	(8.5681	-2.18287	0.229721)
101	Redwood	1	OG	-	362.238	-49.1316	2.00178	17.8595	-4.20614	0.297759
12	Beach Pine	7	-	-	217.061	-38.0766	2.01718	16.3833	-3.47671	0.288064
12	Bishop Pine	7	-	-	217.061	-38.0766	2.01718	16.3833	-3.47671	0.288064
103	White Fir	5	OG	-	1293.277	-110.7644	3.39810	83.7489	-7.83002	0.371421
	White Fir	5	YG	-	-143.866	-4.6394	1.93271	-35.3049	2.46767	0.232820
6	Hemlock	6	-	I,II	166.090	-31.2456	1.82285	6.8793	-2.14501	0.248695
6	Hemlock	6	-	III-V	142.130	-26.8349	1.58044	8.5681	-2.18287	0.229721
39	Nutmeg	19	-	-	217.061	-38.0766	2.01718	16.3833	-3.47671	0.288064
21	Cypress	8	-	-	217.061	-38.0766	2.01718	16.3833	-3.47671	0.288064
31	Alder	13	-	-	366.980	-58.2037	2.61454	51.2392	-7.71842	0.405272
32	Bigleaf Maple	17	-	-	78.440	-14.4223	0.86620	9.3576	-1.24704	0.120120
37	Willow	16	-	-	366.980	-58.2037	2.61454	51.2392	-7.71842	0.405272
36	Canyon Live Oak	15	-	-	163.337	-23.7085	1.09907	26.6426	-3.12197	0.166925
33	Tanoak	11	-	-	-25.431	-3.6834	0.65936	-21.5157	0.96750	0.133158
38	Pepperwood	14	-	-	326.409	-45.4436	1.70399	58.0630	-7.64679	0.295748
34	Chinquapin	19	-	-	-25.431	-3.6834	0.65936	-21.5157	0.96750	0.133158
35	Madrone	12	-	-	-143.437	10.0495	0.2903	12.8973	-2.61390	0.240116
34	Wax Myrtle	19	-	-	78.440	-14.4223	0.86620	9.3576	-1.24704	0.120120
39	Eucalyptus	18	-	-	366.980	-58.2037	2.61454	51.2392	-7.71842	0.405272

[1/] Extracted from Jackson State Forest Inventory program written by Lee. C. Wensel

1

Attachment VT-6

FOREST INVENTORY-MANAGING THE NUMERIC MONSTER FOR FOREST PLANNING

Paul Ederer, Forestry Aide, IFF Tech.

In 1988 , a thirty years old continuous forest inventory (CFI) system was radically changed as Jackson Demonstration State Forest (JDSF) joined the high tech information age by implementing a new state of the art forest inventory system. The original system of 141 rectangular 1/2 acre plots established in 1958-60 on a regular 3/4-mile grid was laid to rest, replaced by a new system of 2350 circular 1/5 acre plots (fig. 1) randomly located according to forest cover types. A more detailed description of the new system is available in newsletter No. 28, January 1988. Data collection for this new system began in the summer of 1988 and was completed in the spring of 1990. The analysis phase started just as forestry in California began to experience sweeping changes that are still shaking the dust out of the old forest practice rules. With the anticipated changes in rules and their focus towards a regional outlook and a even timber flow, the new intensive forest inventory (IFI) data has assumed a highly significant role in forest wide planning.

IFI is equipped to supply most of the information required by pending rule changes. Increasing concern over how timber harvesting affects other forest resources both immediately and over time has resulted in more and more information being demanded of forest managers. CFI was limited in the amount and detail of information that could be obtained, especially with regard to timber stand distribution information at the management compartment and watershed level. It also lacked the capacity to link with a growth projection model.

Of course all this new information has costs attached to it. The increased number of plots to be measured and subsequent additional data analysis burden mean less time for other staff duties. The lack of staff time necessitated bringing in outside contractors which can distance the managers from the reality of the source of the numbers generated. In balancing these trade-offs, it was decided to contract the data gathering and do the analysis in-house. With field work finished by spring of 1990, a temporary forestry aide was hired to start clicking on the computer. Most of the data entry was completed by the contractor but inserting site index and hand checking for suspicious values was left to JDSF.

The IFI system has the capability to interact with any statistical and data managing program. Inventory data is read into our statistical program where it is manipulated and transformed before being written to IFI for final processing. Two important pieces of information were required before that could be done: 1) a height/diameter relationship had to be developed since heights were only taken for a small sample of the total trees ; and 2) a radial growth model had to be developed from a subsample of cored trees for IFI to project diameters to a common year.

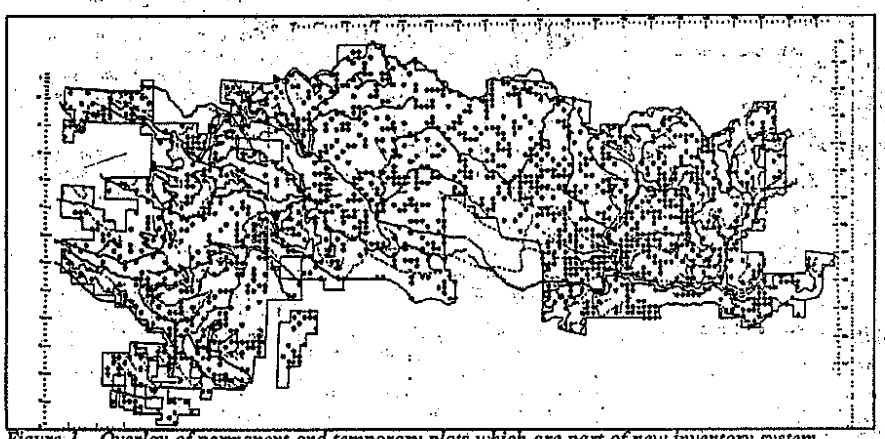

Figure 1. Overlay of permanent and temporary plots which are part of new inventory system

The height/diameter relationship was assumed to be non-linear and modeled using the following non-weighted equation:

HEIGHT=4.5+EXP(b1 + b2 * (DBH^b3))

as suggested by Forest Service Research Note PSW-408. Both equations

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1

Attachment VT-6

mentioned in the report were tried but the one shown here produced a consistently better fit with our data. Separate coefficients were developed for old and young redwood, whitewoods (Douglas-fir, grand fir) and minor conifers. Hardwood heights were not taken so coefficients from the minor conifers were used instead. Each species group was further stratified by five aggregations of 69 different stand/density codes and 3 aggregations of 12 soil/site index codes.

Ten year radial growth data was collected as it was anticipated that not all 2350 plots would be measured in a single year requiring some growth factor to adjust dbh to a common year for estimating total forest growth. Since there was no equation to directly predict radial growth, a basal area growth (BAG) variable was created. An equation taken from Research Bulletin 51 published in1985 by the Oregon State Uuniversity Research Lab was used to predict BAG. A simpler version of the equation was used as some of the information needed for the full equation was not available. BAG was envisioned as the "doughnut" of new growth formed by the difference in basal area in a 10 year period. A conversion equation was used to change the BAG variable to a radial growth value usable by the IFI. Again the data was stratified by the same species groups and stand/density, soil/site codes as were the height data. Where there were not enough data to be confident in predictions, each species group was combined by soil/site codes and then stand/density codes.

All this data manipulation exposed several problems with both the computer and programs. Most of the initial work was done using a 80286 (AT) computer, frequently pushing it to the limit of its capacity. The major problem was the size of the data file. Having input data on over 50,000 individual trees, the "monster" file created occupied 12 megabytes (mb) worth of space on the hard drive. After performing a few data transformation operations in which backup files are automatically written, the hard disk would be filled. The computer was then unable to complete the assigned task or old files would have to be deleted to make room for the new. Even with a data compression program the file could not be squeezed onto one floppy disk, requiring an hour long multi-step procedure to save a file. The file size was also a hindrance to data checking; no reasonable way was found to check it manually so a technique had to be developed for the computer to do it. The problem arises in the difficulty of having the computer program error check certain items and how to anticipate every possible error condition. The data management program used was usually up to the task, but it was not always obvious how to get it done, necessitating many calls to the company.

A frustrating time ensued as errors like plot data being triplicated or deleted from the file crept in during the processing phase before being noticed. The causes for the errors then had to be determined and eliminated. A program upgrade process was also endured as it required switching between two versions of the statistical program for certain analyses. The new version was significantly better visually and procedurally than the old, so we used it as much as possible. The newer version lacked some vital routines however, resulting in extra time spent converting the data between versions with the risk of errors or the program crashing.

The system was upgraded to a 80386 model computer with the newest disk operating system (DOS 5.0) installed which lessened data storage problems and significantly increased the file processing speed. At this point in the inventory cycle, the data management program is completely operable in its new version. A future addition of a tape backup system for the hard drive will provide easy data storage and mitigate the fear of a major data loss.

As reported by the old inventory system, gross softwood volume on the forest has fluctuated around 1.36 billion board feet (standard error of 8.4%). The new inventory system indicates the Forest contains 1.87 billion board feet (standard error of 1.9%). The gain is every forest managers dream but at this time we view the new number with a cautious eye. One probable cause for the difference is the volume equations that were developed for the new system. As a check we did a comparison of the 141 old CFI plots in 1984 and 1989. Using tagged tree numbers, we were able to reconstruct the 1989 circular plots in the old 1984 rectangular plots and then process the two data sets identically. The results were not what were expected, with the '89 data suggesting 2.2 billion b.f.and the '84 data indicating 1.6 billion b.f. Some increase would be anticipated but a 37 percent increase is suspicious.

During the time this article is being written the California State Board of Forestry is considering monumental changes to the regulations that govern how timber is managed in the State. Several versions of different rules are being considered, but one main focus is on sustained yield and long term timber management. Emphasis on forest wide planning will require managers to have information at their finger tips on sustainable productivity, growth rates and growth potential, area in each timber type, diameter and age-class distribution and more.

For future management decisions an accurate estimate of inventory is required. A minor error projected over the 100 year planning period could cause major deviations between paper planning and on the ground realities. As this is the first test of a completely new and integrated system, problems were bound to occur and lessons learned in this cycle will be applied to the next. It is unknown how the pace of computer development will proceed but for this type of project bigger and faster computers are needed. The trend is for more and more information to be collected and used in addressing new forest practice rules so the demand for computer power will increase. We estimate having to track up to 4,400 different possible stand conditions. An obvious area to streamline is data entry. The forest is currently testing a

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programmable data recorder that will eliminate the re-entry of data from field forms to computer disk. The recorder will be able to check data as it is entered and eliminate most typographical errors .

The space age could make its mark on JDSF if a Global Positioning System (GPS) is used for accurately locating plot centers (see Newsletter No. 40). There has been a problem in assigning the plot to the correct forest cover type for analysis. With GPS linked to a Geographic Information System all inventory data could be easily accessed and stratified by management area, watershed or whatever unit was desired by managers. At some organizational level this type of system will be a necessity in order to meet the demands of the new forestry regulations.

This paper is dedicated to the entire staff at Jackson Demonstration State Forest whose knowledge and friendship has been inspiring.

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Attachment VT-7

Interview of Paul Ederer, by Vince Taylor 4/18/05

Paul Ederer worked for JDSF as a Forestry Aide during the time that the 1989 IFI inventory data were being processed. He now works for Campbell-Hawthorne timber company. The primary purpose of the interview was to learn from him about the processing of the 1989 JDSF inventory data and to get his view of the possible causes of the big discrepancy between the 1984 inventory estimate and the 1989 estimate.

The notes have been reviewed by Paul and approved for submission to the Board of Forestry (see Attachment 1, e-mail excerpts).

Notes on conversation with Paul Ederer on 4/18/05

I met with Paul at the café at the Fort Bragg Depot at 3:00 p.m. on April 18, 2005.

I started by asking him about his current employment, what he did, and whether he'd worked for GP previously. He work primarily on forest restoration, but during the slow season (Spring), he does THP preparation. Today he worked above Cleone in an area filled with brush (but with a million dollar view). He enjoys his job and finds Campbell good to work for, now that they have adjusted to the realities of the property they bought. He told me quite a bit about how Campbell conducts its inventory, which I will record at another time.

Paul did work for GP briefly, 1993- 1999, but worked for Simpson 1992-1993 in Arcata after leaving JDSF.

Paul worked for JDSF starting in 1990. It was his first job after college (OSU). He was hired as a Forestry aide, to help with processing the first IFI (Intensive Forest Inventory) data, collected in 1988-89. He said that his first task was to visually scan a mountain of computer scatter plots (he indicated with his hand a stack of papers perhaps three feet high) for "outliers," data points that are so far from the norm as to be suspicious. He said he recalls the task as being extremely tedious and boring. This was only the first of many aspects of the data processing of that suggests room for error. It is only human to start glazing over and not really seeing when one is repeating boring tasks for long periods of time.

Paul wrote an article for the JDSF Newsletter in Spring 1992 describing his experiences.[1] He finished working for JDSF in Spring 1992. He worked seasonally May to November.

[1] Paul Ederer, *Forest Inventory – Managing the Numeric Monster for Forest Planning*, JDSF Newsletter, No. 46, Spring 1992.

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In his article, Paul described the data-processing problems caused by the huge size of the data file, relative to the computer capabilities of that time. In our conversation he expanded on the difficulties:

- The computer was so slow that he would often start a run in the morning and then go out to the woods for the day. When he returned in the afternoon, the computer would still be working.
- The files had to be broken down into many small segments (up to 100), generally according to a stand type or forest compartment. Each segment then needed to be processed separately, involving numerous manual steps and relying up entering keystrokes tied to macros (recorded sequences of keystrokes) that had been previously prepared by someone else. There was no way of knowing what was going on in the computer, what calculations the computer was performing. The intermediate results for all of the segments then needed to manually combined to get a final whole-forest result.
- One of the steps involved in breaking down the data file was to save a copy of the file (onto a floppy disk) and then to work with the copy. Some plots got entered into the working database multiple times. This error was not detected by JDSF staff but by people using the data at Humboldt State University, who noticed that plot numbers were appearing multiple times and/or that certain plot numbers had unreasonable numbers of trees. [Comment by Paul: This was more of a joint effort where we became aware of and fixed some problems and Humboldt State staff were able to find and correct more.]

  Paul thought that the multiple entries might have occurred when saving the files. "The computer was so slow in responding to the save key that I could easily have thought that it didn't register the keystroke; so I could have hit the save key a second time or more."
- Paul summarized the situation, "Let me say that the data processing was fraught with possibilities for errors."

Paul also talked about the estimates that were derived from his (and others') efforts:

- The final figure that was generally accepted by the staff was 42,000 bf/acre. There was a lot of discussion among the staff. The consensus was that this number "passed the sniff test." But, there was also a feeling that the true number could have been significantly higher or lower.
- An initial estimate was 50,000 bf/acre. This was viewed as suspiciously high, and in looking for reasons, they found the duplicated plot entries (apparently thanks to HSU). This correction (and possibly others) led to reducing the estimate to 42,000 bf/acre. [This was still almost 50% greater than the estimate of the 1984 CFI estimate made 5 years earlier.[2]]

I queried Paul about a comparison that he reported in his article. To try to understand the discrepancy between the old (1984) and new (1989) estimates, they compared inventory

[2] The 1984 CFI estimate was 28,000 bf/acre; thus the new IFI estimate was about 50 percent higher.

data from 1984 and 1989 on a set of plots that were in both inventories (the original CFI inventory plots). They "created" data subplots within the 1984 CFI data that corresponded exactly to the new, smaller IFI plots that were placed within the old CFI plots.[3] They then could compare the inventory estimates on an identical set of plots for 1984 and 1989. "We were able to ... process the two data set identically."

I asked Paul whether "identical processing" meant that they used the same height-diameter and volume equations on both sets of data. "I am virtually sure that we did. It was a very complicated process involving a lot of steps. I don't think we could have done anything else."

It is an understatement to say, as Paul did in the article, "The results were not what we expected, the '89 data suggesting 2.2 billion b.f. and the '84 data indicating 1.6 billion b.f." Over a five-year period, one would have expected very little change in the inventory estimates. Over the prior 20 years estimated inventories from the CFI system had changed very little during each 5-year interval. In his article Paul concluded, "Some increase would be anticipated, but a 37 percent increase is suspicious."[4]

I asked Paul what he and others thought could explain this difference. He replied that they didn't really have an explanation. They felt their job was to pass on this result to the higher-up managers, and it was up to the managers to act appropriately on this information. He said that later when nothing was done that he was disappointed. "I can tell you, if I was a manager and was given this major unexplained discrepancy, I would have told my staff that I wanted them to dig into it and provide me with an explanation." Why didn't this happen, I asked. He replied, "It was a hot potato, and no one wanted to touch it." "There are probably other more valid reasons but I was blissfully unaware of the politicking going on within the agency and with other state departments."

I want to emphasize that the result of this comparison is so contrary to expectation that it completely undermines the credibility of the data processing procedures used to compute the estimates for the whole forest based on the 2350 sample plots of the entire IFI system. The comparison was of samples taken on the same plots only five years apart, supposedly using exactly the same computational procedures and equations. Harvesting was taking place during this period at approximately the forest growth rate, so there should have been only a small change in the estimated inventories between 1984 and 1989 – not the 37% difference found. Something was radically amiss with the computational process. Paul's earlier remarks about the incredible manual complexity of the process and lack of any means of validating the results give ample explanation of how the computations could have been wildly wrong.

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[3] There were 141 ½-acre rectangular plots in the CFI system. The IFI sample plots included 1/5-acre circular plots placed within each of the CFI plots. JDSF went back to the CFI plots and, using tagged tree information, reconstructed the circular IFI plot within the 1984 CFI data.

[4] The estimate for 1984 using the IFI system is also significantly higher than the estimate of 1.37 billion b.f. made by the CFI system in use in 1984.

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To his knowledge, and as far as I have been able to determine, no one has ever gone back and checked the IFI estimates using more robust computers and applying error-checking and validation procedures.

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Attachment VT-7

Attachment 1: Approval by Paul Ederer to submit his interview.

From: Vince Taylor [mailto:vtaylor@mcn.org]
Sent: Tuesday, November 29, 2005 6:34 PM
To: Paul Ederer
Subject: Jackson EIR

Dear Paul,

…
Secondly, **I'd like to submit our interview, minus your comments, as part of my submission on the EIR. Do I have your permission?**

…
Thanks,

Vince

Subject:
RE: Jackson EIR
From:
"Paul Ederer" <PEderer@campbellgroup.com>
Date:
Wed, 30 Nov 2005 09:11:15 -0800
To:
"Vince Taylor" <vtaylor@mcn.org>

Vince, Next week we will start tree planting and I will be unavailable for any comments. **It's Ok to submit my interview.** …
Paul

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Attachment VT-8

PAUL V. CARROLL
Attorney at Law
5 Manor Place
Menlo Park, California 94025
telephone (650) 322-5652
facsimile (same)

July 31, 1998

Douglas Wheeler, Director of Resources
James Branham, Chief Deputy Director of Resources
California Resources Agency
1416 Ninth Street, Room 1311
Sacramento, CA 95814

Re: Mendocino Woodlands Recreational Demonstration Area

Dear Gentlemen:

I write in regard to the 5,426 acre Mendocino Woodlands Recreational Demonstration Area on behalf of the Big River Watershed Council.

This beautiful area of California is comprised of the 780 acre Mendocino Woodlands Outdoor Center, a surrounding 2,550 acre special treatment area, and an additional outlying area of 2,155 acres, adjacent to Russian Gulch State Park. The special treatment and outlying areas are currently under the control of the California Department of Forestry as part of the Jackson State Demonstration Forest. I understand, though, that plans are afoot to transfer the special treatment area from CDF to the California Department of Parks and Recreation. The Big River Watershed Council applauds this transfer.

But I write now to urge you to also transfer the remaining 2,155 acre outlying area to the Department of Parks. Such a transfer makes sense from both legal and environmental perspectives. CDF's use of the land for logging violates the plain language of the Congressional enactment authorizing the land's conveyance to the State of California. Transferring the land to the Department of Parks would honor Congress's intent, and greatly benefit the environment, creating a continuous expanse of state park stretching from the Pacific Ocean through the Russian Gulch State Park and on to the Woodlands Outdoor Center.

The Mendocino Woodlands Recreational Demonstration Area was transferred by the

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United State to California in 1947. The transfer was authorized by an earlier act of Congress ("Act") that stated in pertinent 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 June 6, 1942 [56 Stats. 326; 16 U.S.C. 459t].) The quitclaim deed transferring the land expressly derived its authority from the Act, and California accepted the transfer under the same authority, expressly agreeing to take the land "for public park, recreational, and conservation purposes."

Members of the public have expressed their concern over the conflict between the Congressional directive to use the land for "public park, recreational, and conservation purposes," and CDF's use of the land for logging. Recently, Richard Wilson, the Director of CDF, responded to these concerns by letter dated September 24, 1997. Mr. Wilson pointed out that the Director of the National Park Service and the Assistant Secretary of Interior, in 1942 and 1947 respectively, were of the opinion that logging was consistent with the Act and its limitations on the use of the land.

Mr. Wilson quoted from the October 31, 1946, letter of the then Assistant Secretary of the Interior, Girard Davidson. I, too, will quote part of this letter, because it vividly illustrates how the Act was misinterpreted by those meant to enforce it. The Assistant Secretary's letter provided: "I believe that the State can appropriately determine in future years the extent to which the area should be used for (1) public park, (2) recreational, or (3) conservation purposes, or for any combination of these purposes, and that so long as the area is used for one or more of those purposes, the conditions stated in the proviso quoted above will be met."

The Assistant Secretary's interpretation—that the land could be used as a public park *or* for recreational purposes *or* for conservation purposes—is contrary to the plain language of the Act. Congress did *not* provide that the land could be used for "public park, [or] recreational, [or] conservation purposes." To the contrary, it provided that the land was to be used for "public park, recreational, *and* conservation purposes."

The Assistant Secretary's substitution of the disjunctive "or" for the conjunctive "and" was a serious legal error. In the construction of a statute, such as the Act at issue, the terms "and" and "or" have well defined legal meanings, which often determine the larger meaning of the statute. Congress's use of the conjunctive "and" means that all three uses—public park, recreational, and conservation—must be honored by the State. (*Lusardi Construction Co.* v. *Oubry* (1992) 1 Cal.4th 976, 988 [construing statute according to Legislature's use of the disjunctive "or"]; *People* v. *Skinner* (1985) 39 Cal.3d 765, 775 [Legislature's use of "and" to be construed conjunctively unless it appears clear that the word has been erroneously used]; *Melamed* v. *City of Long Beach* (1993) 15 Cal.App.4th 70, 79 ["and" should be interpreted to connote a conjunctive meaning].)

This interpretation is further bolstered by the three stated purposes for which the land was to be used—*public park, recreation*, and *conservation*. These terms and the ideas they embody are mutually inclusive and reinforcing: they all point to a conservationist ethic.

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Logging, therefore, is not compatible with the plain, unambiguous language of the Act. Mr. Wilson erred in relying upon an individual's interpretation of the statute, rather than on the statute itself.

Transferring both the outlying and special treatment areas avoids Mr. Wilson's erroneous legal interpretation and the future possibility of litigation. In light of the language of the Act and the identical language of the quitclaim deed, CDF is without legal right and jurisdiction to use the Mendocino Woodlands Recreational Demonstration area as a demonstration forest for logging operations. Any future logging operation on the land invites a legal challenge on this basis.

But more importantly, a transfer of the outlying area to the Department of Parks would greatly benefit the environment and those of us who cherish it. To the west, the outlying area borders Russian Gulch State Park, which reaches to the Pacific. To the east, the outlying area borders the special treatment area, which in turn surrounds the Woodlands Outdoor Center. If transferred as parkland, the outlying area would connect two areas of parkland that now remain separate. Thus joined, one could walk on State parkland from the Pacific Ocean through the changing landscape of Russian Gulch, with its coastal waterfalls and pygmy forests, on to the staircase of redwood forest, and finally into the Woodlands Outdoor Center with its beautiful, historic cabins and structures.

And the outlying area (and special treatment area) would join two parks into a larger, more complex ecosystem. The ecological benefits of preserving larger landscapes are now well accepted—the degree of biodiversity is proportional to the area of ecosystem preserved.

In light of the foregoing, Big River Watershed Council respectfully urges you to transfer the outlying area to the Department of Parks. The public would benefit from a beautiful addition to California's parkland, the natural world would benefit from preservation of a greater landscape, and the continuing controversy over CDF's unlawful logging of the land and jurisdiction over it would come to an end.

I also respectfully ask that you respond to this letter. Numerous concerned groups and individuals have a keen interest in the land and wish to know what your office intends to do.

Thank you for your consideration of this matter. I look forward to hearing from you.

Very truly yours,

Paul V. Carroll

cc: Senator Mike Thompson

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Assemblymember Virginia Strom-Martin
Richard Wilson, California Department of Forestry
Ken Jones, California State Parks
Susan Smartt, California State Parks Foundation
Sierra Club, Redwood Chapter
Mendocino Land Trust
Save The Redwoods League
Ronnie James, Mendocino Woodlands
Big River Watershed Council
Mendocino Environmental Center
Mendocino Area Parks Association
Trust For Public Lands

Mailed Letter P-184

Response to Comment A
The DEIR and RDEIR are intended as a public disclosure and decision making tool to be used by the Board to analyze the significant potential effects arising from implementing the draft JDSF Draft Forest Management Plan (DFMP) and the Administrative Draft Final Forest Management Plan (ADFFMP), to identify alternatives, and to disclose feasible measures to reduce or avoid significant impacts. The lead agency, in this case the Board, is obligated to produce a comprehensive document that addresses the full range of potential significant environmental impacts in sufficient detail that a determination of significance can be made with regard to the proposed project and the alternatives. The size of the document is largely determined by the complexity of the potential effects of the proposed project, plus the alternatives, and the requirement of CEQA that the EIR adequately address those potential effects. The DEIR is also responding to a judicial decision that required significantly expanded regional setting and cumulative effects sections.

Response to Comment B
While portions of the DEIR were technically oriented, other portions were readily understandable to lay readers. For example, the impact summary tables at the end of each resource analysis section.

Copies of the DEIR and RDEIR were made available at libraries locally, regionally, and statewide. Copies also were available at a number of CAL FIRE facilities. Free copies on CD were available on request from the Board of Forestry and Fire Protection. The document also was available for download via the Internet.

Response to Comment C
The summaries at the end of each resource analysis section were developed to demonstrate similarities as well as differences among Alternatives. Consistent with CEQA guidelines, CAL FIRE evaluated a broad range of alternatives and used a matrix to summarize the differences among alternatives (Guidelines § 15126.6d). The impact levels used to characterize effects are required in environmental impact analysis reporting. While the check-boxes alone may appear to provide a somewhat coarse (but CEQA-compliant) ranking, the text within the tables provides finer-grained information about the performance of the various alternatives at addressing potential environmental impacts. Further discriminating information about the alternatives can be found in the text portion of the various impact analysis sections.

The range of alternatives was intended to consider the impacts of a set of alternatives that more-or-less fit within the program bounds established by existing statutes and Board of Forestry and Fire Protection policies for the management of the Demonstration State Forests in general and JDSF in particular. Thus, alternatives that might have generated a wider range of potential impacts—establishing a park or developing residential subdivisions—would not feasibly attain most of the project's basic objectives (see CEQA Guidelines section CCR § 15126.6).

Response to Comment D
The Board believes that the document is comprehensive, well organized, and provides a level of analysis appropriate to a largely programmatic EIR.

General Forest Inventory and Growth Response
The commenter has provided a large number of comments to support his viewpoint. Most of these comments however, reiterate a much smaller number of arguments repeated numerous times in slightly different contexts. The basic thrust of the comments involves two assertions:

1. The estimates of growth on JDSF increased unrealistically between two inventory measurements, 1984 and 1989. The commenter believes the "old" 1959-1984 growth and yield estimates are accurate, and that the Department has overestimated the sustainable

harvest volume in the management plan/EIR by using the “new” 1989-2005 growth and yield estimates.

2. The inventory used in the management plan and EIR is outdated.

With respect to item 1, it is important to distinguish between data and subsequent estimates that are based on these data. All the inventory data measured since 1959 are accurate and remain valid today. Estimation equations using these data change over time as scientific knowledge advances. It is reasonable to expect that over a period of 45-plus years, new and better estimation equations will be developed. Such new estimation equations necessarily occur on the scene at one point in time, and thus may appear to provide estimates of total timber volume on the Forest that are inconsistent with pre-existing equations.

By virtue of incorporating both diameter and height, the “new” estimation equations are preferable to the “old” equations. This is so because the “new” equations account for changes in diameter-height relationship with changes in for example tree age and stand density.

Contrary to the commenter’s claim, self-consistency of volume estimates over time is not a reliable diagnostic of their validity. Estimation equations are by definition self-consistent. Just as the 1959-84 volume estimates were self-consistent using the same estimation equations, the 1989-2005 equations are self-consistent using the same or very similar estimation equations.

The commenter’s own analyses support the conclusion that the old growth and yield estimates are not significantly different from the new growth and yield estimates.

Finally, experts may disagree over the exact levels of inventory and growth for a forest property. Ultimately however, they share a general agreement regarding the sideboards on orders-of-magnitude levels of growth and yield in the redwood region. This agreement is based on commonly accepted standards and practice in the profession, evidenced in professional knowledge and the scientific literature. There exists a substantive body of such accumulated knowledge on the growth and yield of forest stands in the redwood region for the last 100 years, embodied in professional experience and the reviewed literature. This accumulated knowledge tells us that any well-stocked forest in the redwood region, such as JDSF, with average site II growth potential and stocking levels greater than 20 thousand board feet per acre on average, will grow at a substantially higher rate than that advocated by the commenter. The commenter’s claims regarding growth and yield on JDSF are at odds with this entire body of evidence.

The commenter goes to some lengths to make the case that the Department has not provided him with an adequate explanation of the reason for the differences between the old and new growth and yield estimates. Such an explanation only becomes important if it has been determined a priori that one of the growth and yield estimates are correct and the other is incorrect. The commenter states that they cannot both be correct.

The Board believes they both are correct. The Board believes that approaching the analysis with the mindset that some of the equations and growth and yield estimates that have been used on JDSF during the 45-plus years of inventory efforts are incorrect, correct or inconsistent is a bit disingenuous. The Board has determined that the “old” growth and yield estimates are valid under the range of conditions for which they were developed. Differences between “old” and “new” growth and yield estimates are within the range of what can be expected when adopting new estimation equations and inventory sampling designs. The “old” and “new” growth and yield estimates are not inconsistent. The new equations and associated growth and yield estimates used in this Management Plan/EIR constitute an improvement over the old equations and inventory estimates. They are accurate and they constitute the best available information at this time.

Consequently, a detailed investigation of what may have caused the differences between the “old” and “new” growth and yield estimates becomes moot. The Board believes that this is not a necessary

or instructive course of inquiry. The Department has outlined a suite of possible factors, including growth and other structural changes, a change in inventory design, forest development, a change in volume and height equations, sampling error and possibly other unknown factors. The Board believes that any combination of these factors can explain the differences between the 1984 and earlier growth and yield estimates and the 1989 and more recent growth and yield estimates.

With respect to item 2, the inventory used to support the management plan and EIR is approaching the end of its useful life span, but careful updates for growth and harvest have preserved its accuracy. Subsequent inventories, one conducted in 1999 and two conducted in 2005, corroborate the inventory used in the management plan and EIR.

Response to Comment 1
In addition to a knowledge of mathematics and statistics, a relevant educational background combined with a mature depth of experience relating to forest structure and development, growth and yield and silviculture, is essential in order to objectively assess a complex set of forest inventory and growth analyses. Many of the theoretical and practical implications of the art and science of forestry and its many subtleties can only be gained through practical experience. The State of California requires candidates to meet significant educational and practical experience requirements before they are allowed to sit for the Registered Professional Forester examination. Many of the comments below do in fact demonstrate a lack of basic expertise in forestry (comments # 27, 30, 60, 67, 69, 70, 85, 112, 118, 119, 120, 2002 comment #241.8).

Response to Comment 2
The revenue generated from the Forest is not allocated by the department. The legislature establishes the FRIF budget allocation on an annual basis. The Department of Forestry and Fire Protection determines how the limited budget allocated back to the state forests is utilized. Any proposed changes from year to year (including personnel and operating expenses) require preparation of a budget change proposal (BCP), which is subject to approval by the Secretary of Resources, the Governor, and the Legislature.

Response to Comment 3
See response to comment 2 above.

Response to Comment 4
The DEIR/RDEIR presents an environmental analysis of the management plan proposal submitted to the Board. Funds, including those allocated to personnel and general operating expenses, are utilized to implement the management of the Forest. Alternatives for management of the Forest, which inherently entail different budget scenarios, were considered in the DEIR/RDEIR.

Response to Comment 5
Comment noted.

Response to Comment 6
See responses to comments 2 and 4 above. The Board does not have the authority to allocate or distribute revenue generated from the Forest. The Board will certify the EIR and approve the management plan for the Forest. This will provide guidance for the expenditure of the available funds that are authorized by the legislative process.

Response to Comment 7
The DEIR includes an analysis of the potential for impacts associated with management activities. The impacts associated with roads was also considered in detail. However, neither the Board nor the EIR process can guarantee the level of available funding. It is anticipated that funding will be sufficient to implement the management plan.

Response to Comment 8
It is the obligation of the Department to implement the management plan as approved by the Board. Failure to implement the plan would result in Board action to remedy the situation. The Department receives an annual allotment of funds for management of the Forest. The funds are expended to manage the Forest.

The commenter states that the budget is inadequate, but that it is not guaranteed. While the Board generally agrees with this statement, the Board anticipates that the Department will request sufficient funds to effectively manage the Forest. Failure to manage the forest as prescribed by the management plan would lead to re-evaluation of the plan by the Board.

In the absence of a completed road inventory, it is speculative to provide a schedule of operations. The level of repair, maintenance, improvement, and decommissioning need is unknown at this time. The road inventory will serve as a basis to establish a work schedule. However, implementation of the Road Management Plan will result in an improvement in environmental conditions related to roads and their usage.

For Alternative C1, the DEIR applied an additional management measure for an Accelerated Road Management Plan. This accelerated plan also was adopted as a part of Alternative G and the ADFFMP. The accelerated plan calls for completion of the inventory of roads within 3 years rather than 5. Until completion of the road inventory, JDSF will survey and evaluate all appurtenant roads as a part of each THP and then complete the identified needed road upgrades as a part of the THP.

Contrary to the stated concern, forest research is funded from revenues generated within the state forest system.

The relationship between revenue generation, timber harvest, and operating budget are somewhat speculative, and not static. The Department has recently sought to increase the budget allocation for state forest management. Annual revenue is dependent upon many factors, such as the market for timber and variations in operating costs associated with the harvest of timber. The potential impacts associated with the harvest of timber have been thoroughly considered in the DEIR and RDEIR, and significant cumulative impacts are not anticipated from the implementation of the proposed management plan.

Response to Comment 9
The Board recognizes that Alternative E may result in a lesser level of impact relative to Alternative C. However, the Board is not obligated to select the environmentally superior alternative. The Board developed Alternative G following the public comment on the DEIR. Alternative G, or the ADFFMP, provide substantial additional areas for the development of late seral forest or older forest structure and places significant limitations on the use of all forms of even-aged management.

Response to Comment 10 and 11
Please see responses 02, 04, and 06 above.

Response to Comment 12
The Board recognizes that there are differences between each of the alternatives. Alternatives C1 and C2 are most similar. An analysis of project impacts may result in a similar finding relative to level of significance, though the impacts are somewhat dissimilar. These differences are discussed in the DEIR. See also the above response to comment C.

Response to Comment 13
The Board has determined that the analysis was appropriately conducted. The comment does not include sufficient specificity to enable a reasoned response.

Response to Comment 14
The Board may rely upon both qualitative and quantitative information in the analysis of potential impacts and utilized the best information that was readily available. The management plan was prepared by professional staff, in consideration of potential impacts. The EIR constitutes the formal environmental assessment for the management plan. The Board is not surprised by the fact that most elements of the management plan were prepared in an effort to avoid significant environmental effects. Where the DEIR analysis indicates that that the DFMP could result in significant adverse environmental impacts, the DEIR develops mitigations to reduce the impact to a level of less than significant. See also the response to comment C.

Response to Comment 15
The comment does not specify a specific impact for which Alternative E should be rated as “no impact” or “beneficial” while Alternative C2 should have a different rating. Only a very general example is provided. The impact assessments in the DEIR provide multiple examples where Alternative E is found to have a lesser level of impact than Alternative C1. To list a few examples:

- Botanical Resources—fungi species and Mushroom Corners Management;
- Wildlife and Wildlife Habitat--late successional/old-growth forest, snags and down wood; other unique/special habitats and features, wildlife and communities and species habitat values; southern torrent salamander and tailed frog;
- Hazards and Hazardous Materials—impairment or physical interference with an adopted emergency response plan or emergency evacuation plan
- Heritage Resources—impacts on traditional Native American plant collecting resource areas and for increased health risks from application of herbicides.

Response to Comment 16
The EIR distinguishes between the various alternatives. The characterization of overall impact is based upon categories that reflect a range in the level of impact. The DEIR does not imply that the environmental impacts of Alternatives C2 and E, or other alternatives, are indistinguishable. Each section provides information that distinguishes elements of the alternatives.

Response to Comment 17
Please see General Forest Inventory and Growth Response, above , in addition to response to individual comments below.

Response to Comment 18
Please see General Forest Inventory and Growth response, in addition to response to individual comments below.

Response to Comment 19
This comment implies that a lack of inventory data at the planning watershed level represents a failure to meet the minimum obligations under CEQA and to provide a basis for informed decision making and public participation in the development of the Management Plan. The DEIR is a programmatic document that provides sufficient information with which to perform an analysis of potential impacts associated with the management plan. In addition, future projects will tier to the EIR. Environmental analysis will be performed for those projects. In the case of timber harvesting plans, a more detailed inventory is generally performed for the project. A later comment (see below) requests data at the stand level. The appropriate level of detail of inventory data for analysis depends on the objective. The management plan/DEIR is a forest wide planning effort, consequently the proper scale of data and analysis is the entire forest and adjacent ownerships.

Response to Comment 20
Growth estimates, as reported in the DFMP/ADFFMP and DEIR/RDEIR, were based upon field measurements, modeling, and a comparison of plots over time. The CFI plots were measured in 1989, 1999, and most recently in 2005. The growth estimates obtained from modeling and plot measurement are all within a similar range. The Forest Practice Rules require that long term

sustained yield (LTSY) be estimated, which normally requires modeling, since it is an estimate of future growth and yield. The complete CFI plot database is a matter of public record.

Response to Comment 21
The inventory data relied upon in the DEIR/RDEIR includes a forest-wide inventory produced in 1989, with partial replacement of plots in 1997, all brought up to present with the growth model CRYPTOS. Using simulation models to update an inventory is an accepted industry practice. In addition, as was done between 1959 and 1989, an estimate of forest-wide inventory was produced with the CFI plot system. Results of both methods are within an acceptable range. As stated on page VII.6.3-4 of the DEIR, a new forest-wide inventory was in progress while the EIR was being prepared. In addition, the CFI plot system was measured. Both of these processes occurred in 2005. The resulting estimates of forest inventory and growth are very similar to the earlier estimates, and within an acceptable range of statistical confidence.

Response to Comment 22
The inventory information upon which estimates of growth and inventory are based are current, and based upon sound methods and analysis. Sixteen years of subsequent measurements support the inventory information on which the EIR relies.

Response to Comment 23
A statistical analysis has been performed on the property-wide inventory, and has been found to be well within acceptable limits. The methods used to calculate growth conform to industry norms, and are well supported in the literature.

Response to Comment 24
An estimate of current inventory was produced by projecting the Intensive Forest Inventory (IFI) plots to the present in the growth model CRYPTOS. In addition, the CFI plot system was utilized as a check upon forest-wide inventory in 1999 (see ADFFMP Chapter 2, Resource Inventories, Data and Information Management), and a new set of inventory plots (approximately 5,000 plots) was installed during 2005. The results obtained from these inventories are very similar and within an acceptable range.

Response to Comment 25
The planned harvest rates are well below the estimated growth rates for the forest. Harvest during the first decade is expected to vary between 20 and 25 million board feet per year, while the level of growth is at least double this value, resulting in a very conservative level of harvest.

Response to Comment 26
The Board agrees that accurate and adequate estimates of current inventory and growth, as well as information on past harvests, are important to the analysis of cumulative effects as the result of probable future timber harvest.

Response to Comment 27
The management plan/EIR is a forest wide planning effort, consequently the proper scale of the cumulative impacts analysis is the entire forest and adjacent ownerships.

An analysis should be based upon information that is readily available. In this case, a substantial level of analysis was conducted at the sub-watershed level, depending upon the detail of information known. Please refer to DEIR Sections VII.6.1 through VII.7 for examples. See also Section VIII, Cumulative Effects and Volume 2, Appendices and Volume 1B, Map Figures for localized information considered in the assessment at various levels of detail.

What is meant by the term "management compartment (unit)" is unclear. Management compartments/units as used in forestry often differ from sub-watershed units. Management units as the name implies, tend to follow logistical and operational boundaries. Watersheds are defined by geographical boundaries. Management units often cross watershed boundaries. An analysis of

impacts to watersheds, wildlife, and other resources is reflected in other forms of data, including forest vegetation and habitat types, forest canopy coverage, slopes, soils, and geology, just to name a few. Timber inventory and growth were utilized primarily as a means to estimate future forest structure, harvest, and growth. The inventory also served as a basis for long-term habitat development projections (DEIR page VII.6.6-134).

Response to Comment 28
Impacts are capable of occurring at many spatial levels, including specific sites within watersheds, between multiple watersheds, forest-wide, or even regionally. The DEIR provides a fairly coarse assessment of impacts, due primarily to the fact that specifics at the project level are not yet known. As each project is planned, a more refined analysis will occur, and projects will be modified, mitigated, or eliminated based upon the outcome of the analysis. This approach is appropriate for a programmatic EIR.

Response to Comment 29
Please see the responses above.

Response to Comment 30
The Board is in general agreement with this statement. However, it is not the intention of the EIR to provide an analysis of impacts extending 100 years into the future. It is recognized that the inventory, and subsequent analysis and projection will periodically be revisited. Plans may be adjusted based upon changes. The management plan for which this EIR was produced will remain effective for approximately 10 years, after which a new plan will be prepared for review by the Board. At that time, new inventory and growth information will be incorporated into the plan. The purpose of the 100-year planning interval is to investigate the long-term effects of planned actions in the next one or two decades. Existing trees may take an additional 60 to 80 years to grow to fully develop, and the 100-year look-ahead is necessary to gain an idea of the long term steady-state behavior of the forest ecosystem under proposed management. The interval for analyzing potential error is the next one or two decades, not 100 years.

Response to Comment 31
The Board is in general agreement with this statement. The level of confidence that one has with initial estimates may vary depending upon what information is being considered, why it is being consider, and the purpose for which the data was developed.

Response to Comment 32
A non-industrial timber management plan (NTMP) is a document established by the Board of Forestry, and prepared for the harvest of a finite parcel of land where the operational specifics and environment are known in detail (Title 14 CCR 1090). It is a plan that, once approved, has an infinite life span. It allows periodic timber operations after submittal of a notice that is not subject to approval subsequent to the initial approval of the NTMP (unless substantial environmental changes have occurred). For this reason, the level of timber inventory and growth information required is fairly detailed. An NTMP is currently restricted to ownerships of 2,500 acres or less. It is illuminating to note that Option A plans and sustained yield plans, that do not have an infinite life span, do not require stand characteristics by management unit.

The DEIR is a programmatic document. Subsequent timber harvest will require the preparation of a timber harvesting plan (THP), which will include an analysis of environmental impacts, and is subject to agency and public review. At that time, detailed timber inventory and growth information may be required by the reviewing agencies, to enable a viable review of the impacts assessment performed by the Department.

Response to Comment 33
Please see response to comment 32 above. The level of information required for any subsequent THP, and for the accompanying analysis of LTSY, will be quite detailed (see Title 14 CCR 1034 and 913.11).

Response to Comment 34
The primary purpose of timber inventory and growth information required for an NTMP is to enable the Department and the public to assess sustainability and compliance with the concept of maximum sustained production (MSP), which is demonstrated through compliance with the Forest Practice Rules (Title 14 CCR 913.11). In the case of this DEIR and management plan, the level of forest inventory information submitted is sufficient to enable an assessment of sustainability at the forest level.

Response to Comments 35-38
No rationale is provided for why a management unit level of detail is desirable. Such detail would only be beneficial if it were necessary for the analysis supporting the Management Plan and EIR. The Management Plan/DEIR is a forest-wide planning document, and there is therefore no reason to break down inventory information by management unit. The Management Plan/EIR is a landscape level analysis that relies less on traditional timber-oriented management units for planning, and more on desired forest structures and habitat at a landscape level. The classification of the vegetation for habitat analysis purposes has been updated since the DFMP was produced (see DEIR Map Figure K).

The EIR includes a project description and an assessment of impacts. The assessment of forest habitats is often closely associated with structural attributes such as average tree diameter, the presence of understory, canopy closure, and trees species present. The forest habitats present are described and depicted (DEIR page VII.6.6-2, Regional Extent of Wildlife Habitats, and Map Figures J and K). Timber volumes are generally computed in an effort to estimate harvest and growth potential, and are not normally necessary nor utilized for assessment of watershed and wildlife impacts. Indirectly, stand structure is projected in the habitat analysis.

Mr. Sternberg's comments appear to have been quoted out of context. The request for a highly detailed inventory picture by management unit must be seen in the context of an NTMP, where management units are relatively fixed, and a high degree of regulatory relief is traded for a highly prescriptive set of inventory information. The fact that it is required by the forest practice rules in NTMPs is irrelevant because of the different approval life span for NTMPs and the different approach taken in the documentation, review, and approval on individual THPs.

The DEIR/RDEIR and DFMP/ADFFMP report an appropriate level of inventory information to enable those that review the management plan and EIR to gain an understanding of the plans for future management, and to understand the analysis of environmental effects. The underlying forest inventory information is more than adequate to support the Management Plan/EIR analysis. The detailed forest inventory information, consisting of over 5,000 inventory plot records, a database, manuals, data analysis, and reports, was not included in these documents, but serves as a basis for both planning and analysis, and will continue to be utilized by the Department as management proceeds. The inventory is available for examination by the public upon request. Substantial quantities of this information have been provided to the commenter.

Response to Comment 39
See response 38 above. The Board disagrees with the opinion regarding the level of detail needed for an adequate cumulative environmental impacts analysis. The commenter does not define what he means by "adequate ecological management", however, the intent of the management plan and DEIR is to provide an assessment and plan for future management that complies with all legal mandates and prevents significant adverse cumulative effects.

Response to Comment 40
The DEIR includes an assessment of watershed effects at the sub-watershed level (Section VII.7 and 10, Section VIII, Cumulative Effects). Biological impacts are assessed at the forest and assessment area levels (sections VII.6.6 and VIII), partially due to the fact that wildlife populations are not confined to single watersheds or sub-watersheds. In addition, throughout the EIR and the

management plan, management planning and implementation processes are specified and described in consideration of potential impacts at the project level and project assessment area level.

Response to Comment 41
See responses 35, 36, and 38 above.

Response to Comment 42
Terrestrial habitats within JDSF are depicted in DEIR Tables VII.6.6.1 and VII.6.6.2, and on Map Figure K. These habitats conform to the California Wildlife Habitat Relationships System (CWHR), which was utilized in an analysis of potential impacts to terrestrial wildlife species. The basic structural components of each CWHR habitat type can be found in the CWHR manual (Mayer and Laudenslayer 1988). The JDSF inventory, combined with a delineation of unique vegetation polygons, served as a means to determine the CWHR habitat types. The potential impacts associated with timber harvesting plans will be assessed to a level of detail that is greater and more site-specific than can be done in this programmatic EIR. This constitutes an appropriate tiering of analysis.

Response to Comment 43
The assessment of watershed effects conformed generally to planning watersheds (see response 27 above). Habitats and home ranges for many terrestrial wildlife species do not conform to planning watershed boundaries, necessitating an assessment at a scale that often crosses planning watershed and ownership boundaries.

Response to Comment 44
Please see responses above.

Response to Comment 45
The analysis in the DEIR utilized information, to the extent known, on the existing conditions (e.g., CWHR habitat classifications), locations, and proposed management of the THPs identified in DEIR. This information was used in models that made projections of wildlife habitat and peak flow effects, for example. Baseline vegetation and habitat conditions, for example, are provided in Map Figure K and related tables found in DERI section VII.6.6.

Response to Comment 46
This is not an environmental issue. Management plans for JDSF have been prepared periodically since the 1950s. These plans have characterized the forest in varying ways, generally providing a brief description or numeric characterization of timber conditions within major watershed areas. However, the information was generally based upon the CFI plot system, which included approximately 141 individual plots. The basis of information reported at the watershed level was often based upon a very small number of plots, which tends to make the information of limited value on a statistical basis. For most of the past management plans, no environmental analysis was required, nor performed.

Two facts explain the seeming difference in format with past management plans: first, past management plans were developed before the widespread use of computers. Because working up estimates was laborious and expensive, the best way to disseminate inventory information was to include a selection of the most widely used tables and graphs in hard copy form in the management plan. With the widespread use of computers today, the full range of such reports can easily be produced at will from the inventory database, and there has been a gradual trend away from including large numbers of hard copy inventory reports in the management plan itself.

Second, the extensive menu of classic timber-centric inventory reports in past management plans are reflective of a much greater focus on forest products commodity production. As the focus has gradually changed to include a much greater emphasis on other forest values, such as wildlife habitat, these charts and tables have become less important parameters in the Management Plan.

Response to Comment 47
See response 46. The comment does not explain why the lack of timber resources tables of past management plans prevents informed decision-making. The Board is confident that the inventory information provided in this programmatic Management Plan/EIR, with its depth of related wildlife and habitat information, provides a valid basis for analysis and decision-making.

Response to Comment 48
The inventory used to support the ADFFMP and DEIR/RDEIR is current in the sense that it accurately captures the current resource conditions. It is approaching the end of its useful life span, but careful updates for growth and harvest have preserved its accuracy. The inventory was projected to the present by use of the growth program CRYPTOS. Using a simulation model for short-term updates of an inventory is an accepted industry practice. In addition, the CFI plot system has been measured on a periodic basis, producing an estimate of periodic annual growth and a check upon forest-wide inventory. The IFI plot system has been replaced by approximately 5,000 temporary plots, installed during 2005. In addition, the CFI plot system was remeasured during 2005. The results of both measurements are consistent with the projections.

Response to Comment 49
See response 48. In forestry, where trees can take over a century to grow to maturity, an inventory that is 16 years old can easily be considered current and provide accurate estimates, given careful updates for harvest and growth to the present. Three subsequent independent inventories, a CFI remeasurement in 1999, a CFI remeasurement in 2005 and an intensive forest inventory in 2005, all support the inventory used as a basis for the management plan/EIR.

Response to Comment 50
The IFI plot system that was initially installed in 1989 was not intended to be partially replaced on an annual basis. The partial replacement strategy was abandoned in favor of periodically installing a completely new inventory. Given JDSF's role as a research destination, there are compelling arguments for a complete replacement inventory strategy, as well as demonstrating the application of different inventory systems. A new inventory was successfully completed in 2005.

Response to Comment 51
A 16 year-old inventory, although nearing the end of its useful life span, is not outside of normal standards in forestry. Many different inventory systems are used throughout California. There are trade-offs in every mode of managing inventory systems. Stand-based inventories, systems with partial annual replacement, and systems with complete periodic replacement all have advantages and drawbacks associated with them. All continue to be used widely, and no one system is recognized as superior to all others. A few of the many considerations in selecting an inventory system includes management objectives, cost and the existence of other inventory systems such as a CFI. One point to note is that neighboring forest properties to JDSF have changed ownership frequently over the years. The landowners held up as an example are both working to install relatively new inventories, and do not have the background and historic record of inventory that exists at JDSF. The measurement intervals mentioned for these companies are plans for the future, not proven track records. With one or two exceptions, no other forest landowners in the State have the track record of data measurement over the number of years found at JDSF.

The inventory estimates utilized in the DFMP/ADFFMP and DEIR/RDEIR are accurate. The CFI plot system was measured in 1989, 1999, and 2005. The IFI system was installed in 1989 with partial plot replacement in 1997. The IFI system was projected forward by CRYPTOS, while taking both harvest and growth into account. The results of this projection compare favorably with more recent CFI and IFI inventory measurements. A set of 5,000 temporary inventory plots was installed in 2005, with inventory results comparing favorably with the projections of prior inventory efforts.

Response to Comment 52
The on-going inventory effort is discussed within the DEIR (page VII.6.3-4). The new inventory was started and the field work completed in 2005; however data processing and analysis were not

completed until well after completion of the DEIR. The 2005 forest resource inventory corroborates the results of the updated 1989 inventory used as a basis for this DEIR. As a research forest, JDSF constantly collects and updates resource information data. Resource inventories for large forested properties are in a constant state of update and refinement, while the analysis performed for the EIR incorporates the best readily available information. Recent inventory estimates remain consistent with prior estimates.

Response to Comment 53
This statement is essentially correct. Please see DEIR Appendix 7A, page 4, where the projection process is described. This is not an environmental issue.

Response to Comment 54
The 1997 replacement plots were put in as near the old deleted plots as possible to preserve the original sampling design of the 1989 inventory. The statistical usefulness of the inventory was retained.

Response to Comment 55-56
The available plot data is a matter of public record. The Department does not normally "publish" plot data. The 308 permanent plots were originally planned to augment the CFI plots but were not remeasured. The original CFI plots were measured in 1989, and provide detailed estimates of forest growth based on actual measurements of the same trees at two points in time.

The CFI system is current and viable, and continues to be measured on a periodic basis. Growth estimates have been produced every 5 years, based upon actual field measurements. The latest 2005 CFI supports the figures used in the management plan/EIR. See discussion of CFI above.

Response to Comment 57
See responses above. The commenter overlooks the fact that JDSF was a prime contributor of growth and yield data used in constructing the CRYPTOS growth model, which was used for the Management Plan/EIR analysis. The model is therefore in a very real sense calibrated to JDSF. The growth projections were validated against data collected in 1999 and 2005. Years of empirical experience with the growth model on JDSF has proven its reliability.

Response to Comment 58
It is recognized that estimates of timber inventory and growth extended over a 100-year period may have a lower level of reliability than current estimates. No one should expect CRYPTOS or any other growth model to give exact long-term projections. All growth models accumulate errors over time. Evidence from studies with cross-sectional data however, have shown that forestry growth models, when used correctly, can be surprisingly accurate even for long-term projections. Another factor to consider is that the 100-year projections used for sustainability analysis is primarily a look-ahead of the likely long-term steady-state consequences of continuing planned management for the next 10-20 years out over the lifetime of a stand of trees, and less a prediction of what will actually happen 100 years hence. Model consistency is therefore a consideration in addition to accuracy. The projections of inventory and yield in this Management Plan/EIR use the best available data and methods. The data used constitute some of the most detailed and accurate time series of data available. The Board believes that the inventory and growth estimates are accurate.

Response to Comment 59
The annual growth estimate, stated in the ADFFMP (Chapter 3, Sustained Yield Timber Production on JDSF), is based upon the difference between the two most recent successive CFI plot measurements, while taking mortality, ingrowth, and periodic harvest into account.

Response to Comment 60
The commenter states that it is incorrect to add harvest volume to calculated growth. He subsequently seems to utilize this procedure in his own analysis in comments 108-110. It is

appropriate to add harvest to net increase in volume between two points in time to arrive at a measure of growth. The growth was correctly calculated and reported.

Response to Comment 61
Past estimates of growth, primarily those made between 1959 and 1984, are not an environmental issue related to the EIR. The most recent estimate of inventory that the commenter apparently supports was made 22 years ago. As is shown later, the CFI estimates are internally consistent when the estimation equations are used correctly.

Response to Comment 62
The Board agrees with this statement.

Response to Comment 63
The DFMP does not propose an annual harvest of 39 million board feet. The ADFFMP, based on Alternative G proposes that annual harvest be between 20 and 25 million board feet per year (net scale) during the first decade. The RDEIR provides an estimate of LTSY that is over 50 million board feet/year at the end of 100 years (Alternative G). This estimate of long term sustained yield is constrained by operational limitations and other forms of mitigation. This is not intended to represent an estimate of total gross growth on the Forest. The modeling conducted in order to estimate LTSY predicts that an average annual harvest during the first decade is sustainable. Assuming that harvest and growth proceed as predicted in the model, this level of harvest will ultimately lead to a higher sustainable level of harvestable growth during the last decade of the planning period.

The difference between standing gross volume and net scaled volume can vary significantly for individual trees or stands, but estimates for the entire forest are less than 10 percent, depending upon the purpose being considered. It is normal practice to report expected harvest yields in net terms.

Response to Comment 64
See responses above. CAL FIRE has demonstrated that the estimates are backed up by objective data and reasonable assumptions. The growth estimate is in fact a confirmed, measured, actual figure.

Response to Comment 65
See comments 59 and 60. The growth figure is based neither on a computer growth projection, nor is it a major error in elementary algebra. The quoted passage was not the basis for the growth estimate. The DFMP growth figure of 65 million board feet was based on the difference between successive continuous forest inventories measured at two points in time, accounting for ingrowth and harvest. These methods can be found in many forest measurements textbooks.

Response to Comment 66
The CRYPTOS growth model that was used was developed with a significant amount of data from JDSF. See the response to comment 54, above. The growth model, as utilized by the Department, returns results that compare favorably with field measurements.

Response to Comment 67
The details of the calculations used to arrive at the growth estimate of 65 million board feet is standard methodology in forest inventory, and was therefore not described in the EIR. The commenter has been provided with all the CFI data for JDSF and is therefore in a position to validate the calculation.

It should be noted that the growth estimate, 65 million board feet, cannot be considered incredibly high. The level of growth achieved on JDSF is commonly observed throughout the region, but not often at the forest-wide level. This can be attributed to good growing sites, a high level of stocking, and an historically low rate of harvest relative to other regional ownerships.

Response to Comment 68
Statements from internal agency documents are quoted out of context. The Department, and other entities that address complex technical problems and issues, often communicate internally, and often produce hypothesis tests or preliminary analysis in many forms, and for many reasons. If anything, the document cited serves to demonstrate the value of free discussion of technical forestry issues among JDSF staff.

Response to Comment 69
The process of computing growth has been correctly applied. In a later comment (comment 108-110, table 5.3), the commenter uses the same methodology that he criticizes here. It is appropriate to add harvest to net increase in volume to arrive at a measure of growth. The growth was correctly calculated and reported by the Department.

Response to Comment 70
It is appropriate to add harvest to net increase in volume between two points in time to arrive at a measure of growth. See responses 60 and 69 above.

It is well known in the forestry profession and in the received literature that opening growing space through harvesting can increase the growth on the remaining trees.

Response to Comment 71
See responses to comment 60, 69 and 70 above. The concept is fully described and explained in the Forest Measurement literature.

Response to Comment 72
The derivation of estimates included in the DEIR has been described above. The results cited in the DEIR and management plan are calculated using standard practice in the forestry profession. The commenter has been in receipt of all CFI plot data for JDSF for many years. The CFI data is a matter of public record. All results can be reproduced using standard practice and methods in the forestry profession.

General response to section 5, comments 73-121
The commenter presents various trend analyses of historical published inventory results that purport to show unrealistically high growth rates between 1984 and 1989. He explores this result further by re-estimating 1984 and 1989 inventories, but the results are invalid due to mathematical errors and questionable assumptions. When the data are analyzed correctly with defensible assumptions, these historical data in fact show a consistent pattern of reasonable growth rates.

Response to Comment 73
See previous responses to this concern.

Response to Comment 74
The inventory and growth estimates are accurate. The projected timber harvest rate is well below the level of growth, resulting in an increasing timber inventory over time. (See DEIR Table VII.6.3.1)

Response to Comment 75
In the previous Final EIR, the remarks were refuted by substantial evidence from the record (see comment letter VT-241 and the response in the 2002 FEIR; these materials are reproduced in the FEIR in response to comment letter P-185 from Mr. Taylor). The responses remain valid.

Response to Comment 76
This concern is based upon an apparent misunderstanding of forest inventory and growth processes. As stated above, and within both the DEIR/RDEIR and the DFMP/ADFFMP, projected growth is much greater than projected harvest.

Response to Comment 77
Many potential reasons for a change in growth and inventory from 1984 and before to 1989 and after are evident. The inventory plot design changed in 1989. New volume equations were adopted. Forest structure changed as a result of growth over the 47-year life span of the CFI system. The reader should keep in mind that the CFI plot system and coincident analysis documentation were initiated 47 years ago, and science and professional knowledge has made major advances in this period. The 1989-2005 sequence of CFI data constitute a 16-year sequence of equally stable, self-consistent data. Many improvements have been made since 1959, and the Board is confident in the current methods.

Response to Comment 78
Comment noted. It should be noted that any set of forest inventory estimation equations are by definition self-consistent.

Response to Comment 79
The concern being expressed is unclear. The Department stands by the entire set of CFI remeasurements, ranging from 1959 through 2005. The data are valid. Estimation methods and assumptions used to develop forest inventory estimates have changed over the 47 years that the inventory system has been in place. When examined with a consistent set of methods and assumptions, the entire data set display a sequence of self-consistent and reasonable growth and yield estimates.

The conclusion that 1959-84 inventory estimates as estimated in past years are the true and accurate measure of growth and yield, simply because they are self-consistent, is inappropriate. The 1989 through 2005 estimates are also self-consistent, over a period of 16 years. In addition, improved estimation methods have been developed that, when applied to all the data, do not show a conflict between the 1984 and earlier versus the 1989 and later inventories.

Response to Comment 80
Comment noted.

Response to Comment 81
This concern is unclear. Actual inventories did not decline between 1969 and 1984. All the inventory data measured since 1959 are accurate and remain valid today. Estimation equations using these data change over time as scientific knowledge advances. It is reasonable to expect that over a period of 45 years, new and better estimation equations will be developed. The entire CFI sequence is self-consistent and is consistent with the IFI data used as a basis for the management plan and EIR.

Response to Comment 82
The statement is not an expression of environmental concern. The Department provided a rebuttal of the previous set of comments (see response to comment 75, above). A large number of these comments consisted of selective quotes taken out of context from historical Department documents. These remain unsubstantiated speculation.

Response to Comment 83
The statement is not an expression of environmental concern. The analyses previously presented by the commenter in 2002 were speculative, selective, and unsubstantiated.

Response to Comment 84
The Board finds that CAL FIRE's estimate of inventory and growth is accurate and was appropriately determined. The commenter received electronic copies of the raw data from the Department for years1959 to 1999, along with all the necessary documentation to replicate the Department's inventory estimates. The entire CFI sequence is self-consistent and is consistent with the IFI data used as a basis for the management plan and EIR.

Response to Comment 85
The Department has not published comparisons between actual harvest data and that predicted by the 1989 inventory. Such a comparison would not be statistically meaningful. Even with the large number of plots in the IFI, too small a number of plots would fall in individual harvest units to permit a meaningful inference. The methods used by the Department to predict harvest volumes within individual timber sale areas vary from the CFI system, involving a much more intensive local inventory. In addition, there are the potentially confounding localized effects of defect, breakage, mis-manufacture, clearing for road construction, clearing for cable corridors, and other related issues. Some of these factors can result in a difference between predicted and actual timber volume removal. Additionally, it is recognized that local tree dimension/tree volume relationships can be quite variable at the stand level.

Self-consistency is a feature of all forest inventory estimates by definition, and therefore has little utility as a validation measure. It is only one piece of the overall validation effort. Other validation aspects exist, such as check cruising, comparison against published data, and verification by authoritative growth models.

The Board agrees that inventory estimates are not hard facts. The Department's statement, however, was that inventory data are hard facts.

Response to Comment 86
The commenter states that “apparently, somewhere in the IFI process, errors of data processing or statistical analysis occurred, causing inventories to be overestimated.”

Based on earlier comments, this impression is apparently due the fact that the estimates of growth on JDSF increased noticeably between two inventory measurements, 1984 and 1989. The commenter feels the “old” 1959-1984 growth and yield estimates are accurate, and that the Department has overestimated the sustainable harvest volume in this Management Plan/EIR by using the “new” 1989-2005 growth and yield estimates. All the inventory data measured since 1959 are accurate and remain valid today. Estimation equations using these data change over time as scientific knowledge advances. It is reasonable to expect that over a period of 45 years, new and better estimation equations will be developed. Such new estimation equations necessarily occur on the scene at one point in time, and thus can be expected to provide estimates of total timber volume on the Forest that appear to be inconsistent with pre-existing equations. JDSF has revised their estimates numerous times over the 45-plus years history of the CFI system and will continue to do so as better methods are discovered and advances are made in developing better estimation equations. Differences in volume and growth estimates introduced by new and better estimation equation equations do not constitute evidence that the new equations are incorrect. Nor do they indicate that the old equations were “incorrect”; they constituted the best available information at the time and remain valid estimators for stands maintained at a constant stage of development. The differences simply reflect the fact that we develop better knowledge of forest growth and yield over time.

Response to Comment 87
The commenter alleges that because the Department never published the 1999 CFI inventory estimates, it is impossible for the public and decision-makers to know to what extent the 1999 CFI validates the 1989 IFI. The Department, and other similar entities, do not publish inventory estimates as stand-alone reports. Rather, they are used for decision support and research projects. These data are readily available however. The plot data is a matter of public record available to anyone. The Department has provided the commenter with a complete set of the CFI plot data in electronic form, including the 1999 remeasurement.

Response to Comment 88
The commenter alleges that the Department used different volume equation forms in the 1989 and 1999 CFI inventories. The same volume equations were used in 1989 and 1999. The Department previously provided the commenter with a reference to the appropriate volume equations used for both the 1989 and 1999 CFI.

An essential concept to recognize is that JDSF is a research forest. A large number of exploratory analyses and projects are undertaken that may or may not result in official estimating equations. Preliminary work products are not intended as an “official” Departmental analysis tool. See also the response to comment 103.

Response to Comment 89
The equations utilized to report the forest inventory are appropriate. The Department has utilized and tested various equations and coefficients in the past. See the response to comment 88. Self-consistency is not a reliable diagnostic of the accuracy of inventory and growth estimates in that all forest inventory and growth estimation equations are by definition self-consistent. The length of time over which a set of estimation equations are used are not a reliable diagnostic either, but merely a statement of a management situation.

Response to Comment 90
The word “they” in the Department's response refers not to the IFI and CFI inventory estimates, but to “the IFI and CFI”, meaning the inventory sampling design. The Department's 2002 response remains correct.

Response to Comment 91
In the short term, the fact that new estimates correspond to previous years' estimates does provide an element of validation to the new estimates. In the long term, the form of trees changes over time, as do relationships between tree diameter, tree height, tree form, and tree volume. Improvements in statistical methods inevitably occur over a period of 47 years. Eventually, forest growth and development will require revising old equations and introducing new ones. New equations are not introduced gradually but rather at one point in time, thus necessarily causing a break in the consistency of estimates over time (if the new equations did not cause a break in consistency, they would not be different from the old ones). In the natural world of constantly developing forest ecosystems, it would be inappropriate to force new inventory estimates to be "self-consistent" with old equations given the existence of new and better equations.

Response to Comment 92-93
As expected, the 1989 IFI and the 1989 CFI will give very similar results. The purported 40 percent to 50 percent difference between the IFI and CFI estimates does not exist. The Board agrees that the results of the 1989 CFI inventory and the 1989 IFI inventory are not statistically significantly different, at the 95 percent level of confidence. To extrapolate that finding to claim sampling error, alone or in combination with other factors, cannot be the source of differences between different inventories is unsupportable.

Response to Comment 94
Two parameters are being confused in the comment, as is evident in the interchangeable use of the constructs volume-height relations and volume-diameter ratio. The Department did not focus on either, but rather discussed the relationship between diameter and height as one of many possible reasons for changes in CFI inventory estimates over time. Changes in the relationship between tree height and tree diameter are well documented in the literature. The Department has performed an examination of these relationships and has introduced new revised volume equations that account for height as well as diameter. See also the response to comment 91.

Response to Comment 95
Some of the factors leading to varying inventory estimates have been explained above. The responses above have explained additional potential causes for inventory estimate variation over time. An increase in stand age and density are only two of the likely factors that have contributed to changes in the CFI inventory estimates over time.

Response to Comment 96
The CFI data from 1959 onward do not show that stand density steadily and significantly decreased throughout the period. The inventory is for the entire forest, not for individual stands or groups of stands. It is inappropriate to assume that the inventory is a representation of every stand within the Forest. The change in the relationship of tree height to tree diameter is not unidirectional at all levels and in all stands. A considerable degree of variance exists.

One must be cautious about how stand density is calculated and at what spatial scale. At the forest-wide level, a considerable amount of timber harvest has taken place since the forest was acquired from the Caspar Lumber Company in 1947. Many stands have been selectively harvested, but at variable rates of thinning. A substantial acreage of even-aged stands has not been harvested since the stands were regenerated. In still other areas, residual overstory trees have been removed, leaving behind developing stands of dense second growth forest. Even-aged harvest has resulted in dense young stands of third-growth forest in still other areas. Overall, however, much of the young forest on JDSF is slowly aging.

Response to Comment 97
The view expressed is not supported by the evidence. The response has been misrepresented.

Response to Comment 98
An objective examination of the data reveals that 95 percent confidence intervals around the two inventory estimates overlap, which means that sampling error could be one of several factors explaining the difference.

Response to Comment 99
The Department's reasoning relative to stand density is misrepresented. The Board refers to the source document referenced by the commenter.

The statement "each of the three inventories (1984, 1989, 1999) used a different estimating equation" is incorrect. The same volume equations, the "CRYPTOS volume equations", were used in 1999 and in 1989[1]. It is also incorrect to state that merely because a different volume equation was used at one point to calculate inventory results using the 1984 data, that the volume equation utilized is the best equation for the 1984 data. The CRYPTOS volume equations constitute the best available volume equations for all three measurement periods, the 1984, 1989 and 1999 data.

General response to Comments 100-112
It appears that the analysis provided by the commenter contains significant errors, all of which err in favor of the arguments made (it is not possible to fully evaluate the commenter's analyses since it does not provide a description of methods and assumptions). The difference between the two inventories is physically possible as a result of growth alone. An objective analysis of the data reveals that there is insufficient evidence to reject the hypothesis that the two inventories for 1984 and 1989 give the same results, at the 95 percent level of confidence.

The Board believes that approaching the analysis with the mindset that some of the equations and growth and yield estimates that have been used on JDSF during the 45-plus years of inventory efforts are incorrect, correct or inconsistent is inappropriate. The Board believes both the 1984 equations and growth and yield estimates (the old system) and the 1989 equations and growth and yield estimates (the new system) are accurate. The old system continues to provide accurate estimates over the range of conditions for which it was developed. The new system takes advantage of additional information, i.e. tree heights, to provide more flexible estimates over a wider range of conditions. The differences in estimates between the old and new systems do not represent an

[1] Wensel, L. C. and B. Krumland 1983. Volume and taper relationships for redwood, Douglas-fir and other conifers in California's north coast. Bulletin 1907, Division of Agricultural Sciences, University of California, Berkeley.

inconsistency between the two systems, but rather they are within the range of variation of what one might expect when introducing a new inventory design and a new set of estimation equations.

Given that both the old and new systems are valid, it is not instructive nor necessary to undertake a detailed study of the data to identify the factor(s) that caused the differences between the two estimation systems. The Department has identified a number of possible factors that could have caused growth and other structural changes, a change in inventory design, forest development, a change in volume and height equations, sampling error and possibly other unknown factors. The Board believes that any combination of these factors can explain any differences between the 1984 growth and yield estimates and 1989 and more recent growth and yield estimates.

Estimation equations change over time as scientific knowledge advances. It is reasonable to expect that over a period of 45-plus years, new and better estimation equations will be developed. Such new estimation equations necessarily occur on the scene at one point in time, and thus may appear to provide estimates of total timber volume on the Forest that are inconsistent with pre-existing equations.

By virtue of incorporating both diameter and height, the “new” estimation equations are preferable to the “old” equations. The “new” equations account for changes in diameter-height relationships with changes in, for example, tree age and stand density. This does not mean the old equations were wrong or inaccurate. They remain valid for the range of conditions for which they were developed.

Sixteen years of CFI repeat measurements and an intensive forest wide inventory in 2005 support the inventory estimates that were used as a basis for the management plan and EIR. The 1989-2005 inventories constitute the most accurate inventory and growth estimates for the Forest. All authoritative evidence in the received literature indicates that the inventory and growth estimates used in this management plan/EIR are reasonable[2].

Response to Comment 100
There are no “1999 estimating equations”, as noted in earlier correspondence from the Department to the commenter[3]. By virtue of being a research forest, JDSF have investigated and used a plethora of different experimental volume and diameter-height equations. The set of equations incorrectly portrayed by the commenter as “the 1999 volume equations” were an intermediate work product and were never adopted as a standard for operational use. All inventories from 1989 onward have used the same volume equations, namely the CRYPTOS equations locally calibrated as per JDSF Newsletter 22 and with locally derived diameter-height equations, all of which were made available to the commenter.

Response to Comment 101
Complete documentation including all species codes were provided by the Department to the commenter along with electronic copies of all the inventory data. Cross-referencing species codes between 1984 and 1989 inventories is straightforward given the full name of the species associated with each code.

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[2] Wensel, L. C., B. Krumland, and W.J. Meerschaert. 1987. CRYPTOS user’s guide: the cooperative redwood yield project timber output simulator. Bulletin 1924, Agricultural Experiment Station, Divison of Agriculture and natural Resources, University of California, Berkeley.

Forty percent of the data used to develop the CRYPTOS growth model came from the CFI plots on JDSF and the neighboring Georgia-Pacific property (now Hawthorne Timber Company).

Lindquist, J.L. and M.N. Palley. 1963. Empirical yield tables for young-growth redwood. Bulletin 796, Agricultural Experiment Station,, Divison of Agricultural Sciences, University of California, Berkeley.

[3] Email from Helge Eng to Vince Taylor dated August 2, 2005.

Response to Comment 102
The nature of this comment is unclear. In addition, the commenter's calculations are in error. Forest-wide total volume estimates using the 1989 CFI (using what he refers to as the 1989 equations) are 10 to 15 percent greater than volume estimates arising from the 1984 CFI (using what the commenter refers to as the 1984 equations) depending on site index and species included, not 31.6 percent.

If the commenter refers to isolating the effect of the volume equations (i.e. calculating the 1984 CFI volume using the 1989 volume equations and the 1984 volume equations), the conclusion is not incorrect. The difference then is approximately five percent.

Response to Comment 103
There are no "1999 estimating equations", as noted in earlier correspondence to the commenter[4]. By virtue of being a research forest, JDSF has a plethora of different experimental volume and diameter-height equations. The set of equations incorrectly portrayed by the commenter as the 1999 volume equations were an intermediate work product and were never adopted for use. All inventories from 1989 onward have used the same volume equations, namely the CRYPTOS equations locally calibrated as per JDSF Newsletter 22 and with locally derived diameter-height equations, all of which were provided to the commenter by the Department.

Response to Comment 104
The old growth volume equations used in the inventory for this management plan/EIR, referred to by the commenter as the 1989 relations, were developed from old growth tree data on the Forest. It was a statistically better fit to the data than what the commenter refers to as the 1984 equations. In other words, it was a more accurate volume equation. The commenter's basis for asserting that the 1984 equations were a better alternative and that the 1989 equations were unreliable appears to be the observation that the 1989 equations produced higher volume estimates than the 1984 equations.

Response to Comment 105
The equations utilized to estimate the volume of old growth trees are valid representation of the old trees that exist within the Forest. The new equations were found to provide more accurate estimates of volume, based upon the population of old trees that remain. Similarly to younger trees, old trees are capable of altered form and growth patterns under various individual tree and stand conditions.

Response to Comment 106
While the commenter does not provide detail of the methods used, it appears that incorrect species codes may have been used on two occasions. The Department provided the correct species codes to the commenter.

Response to Comment 107
Using the current CFI database, the total volume estimate for 1984 CFI data (all species) using the 1984 equations is about 1,620 million board feet, depending on site estimates used.

Response to Comment 108-111
In comments 60, 64, 69, 70 and 71, the commenter states the opinion that the Department erred in calculating growth by adding harvest to net growth, yet correctly adds harvest to the difference in net growth within his own calculations.

There appear to be mathematical errors in the commenter's analysis. The commenter's 1989 estimated volume of 2.011 billion board feet is incorrect. Using the 1989 volume equations and the locally derived diameter-height equations, the correct estimate is 1.804 billion board feet, based upon the current CFI database provided to the commenter by the Department. The commenter chose not to document his methods and assumptions, but it appears likely that an error was made in applying species codes from 1984 to 1989 data.

[4] Email from Helge Eng to Vince Taylor dated August 2, 2005.

The harvest figures for 1985 through 1989 cited in Mr. Taylor's footnote 29 appear to have been added incorrectly. The five harvest figures, when summed, total 153 million board feet. There appears to be a second mathematical error in the footnote, since the correct total (153) appears to have been multiplied by a factor of 1.18 twice to arrive at the incorrect total of 214 million board feet. Further, it is inappropriate to apply a single factor to total net scaled annual harvest volume from multiple harvest sites in order to estimate total gross volume. These factors vary considerably across harvest sites and years, depending upon what type of timber is harvested, the form of the trees, and the nature of tree defect in various parts of the forest. The context of the noted personal communication between Mr. Taylor and forester Griffen is unknown. Further, it is common to report forest inventory in terms of net volume, not gross volume, especially when using the inventory to estimate timber yield.

Using an appropriate method for calculation of the 1989 CFI inventory volume (CRYPTOS volume equations and 1989 diameter-height equations, and including minor conifers and hardwoods), the results of the correct analysis, using the commenter's assumptions and methodology, should be as follows:

All numbers in millions of board feet.

	1984 Inventory	1989 Inventory	Change 1984-1989
All Trees	1,698	1,804	106
Harvest 1985-1989			154
			260

The estimated growth of 260 million board feet from 1984 to 1989 translates into 1,069 board feet per acre per year, well within the range of observed rates of growth in this area, and within the range of what was used in the management plan/EIR.

The commenter bases his assertion that the 1989 inventory estimate is biased on the fact that the 1959 to 1984 series of measurements provided what he feels are self-consistent estimates. The Board argues that the more recent series of measurements from 1989 to 2005 provide an equally self-consistent series of inventory and growth estimates. Given the advances in technical knowledge of volume estimation techniques since 1959, the Department feels the more recent series of data from 1989 to 2005 is preferable.

The 1989 inventory results are well within expectations. Errors were not made in the 1989 data collection and processing. The Board believes the commenter’s claims in comments 108-111 are not correct, in light of the mathematical errors made by the commenter and the results of the correct analysis above.

Response to Comment 112

There appear to be errors in the commenter's analysis (see above). The statement, “the IFI whole forest estimates exceed the most credible CFI estimates by nearly 50%”, is not supported (see response to comments 108-112 above). The Department’s database shows that the 1989 IFI estimate is bracketed within the range of inventory estimates that came before it and after it.

It is unclear which one of the set of numbers the commenter has produced is being represented as correct. The commenter here claims the 1989 IFI estimate exceeds the 1984 CFI estimate by nearly 50 percent, yet in comment 102 he claims the 1989 estimate was 31.6 percent greater than the 1984 estimate.

The inventory upon which the DFMP/EIR (and ADFFMP/RDEIR) is based is corroborated by the most recent data, the 1999 Continuous Forest Inventory, the 2005 Continuous Forest Inventory and the 2005 Intensive Forest Inventory.

The commenter confuses a perceived difference in volume estimates between the 1984 CFI and 1989 CFI inventories with the statistical concept of sampling error as discussed in the forest practice rules for sustained yield plans.

Response to Comment 113
This comment summarizes a conversation with Paul Ederer regarding his work on processing the 1989 inventory data. It should be noted that the report is interspersed with the commenter's editorial comments. For example, the statement, "the people doing the analysis knew that this was an impossibly great difference" is that of the commenter, not Mr. Ederer. The report of the conversation (attachment VT-7) and the newsletter article itself (VT-6) represent a relatively normal process of starting up the implementation of a new inventory design, new processing software and new estimation equations.

Response to Comment 114
The 1989 inventory estimates are well within reason; see responses to comments 100-112 above. The analyses reported in the newsletter article can be considered normal when starting up and implementing a new inventory design. Contrary to the commenter's claim, CAL FIRE has continuously gone back and maintained and reconciled the underlying data in their databases.

Response to Comment 115
The commenter suggests the CRYPTOS volume equations used on JDSF contribute to erroneously high volume estimates. The basis for his claim appears to be "some cursory analyses", presumably undertaken by himself.

Tree volume equations for the redwood region were developed by Dr. Bruce Krumland and Dr. Lee Wensel (Volume and Taper Relationships for Redwood, Douglas Fir and Other Conifers in California's North Coast, Bulletin 1907, University of California, printed 1983). These are also known as the CRYPTOS volume equations. They constitute the state of the art of volume equations for the area, including JDSF. These equations were derived from regional data, including data from JDSF. The authors recognized that there may be localized variances in tree volume relationships, so a calibration routine was created. Staff of JDSF conducted a local study and determined the local calibration that could be applied at the forest-wide level. This calibration factor has been appropriately derived and applied to the JDSF tree volume estimates.

In the absence of any real evidence beyond a vague reference to cursory analyses, the Board continues to believe the CRYPTOS volume equations are the best available estimation equations and rejects the suggestion they contribute to erroneously high volume estimates.

Response to Comment 116
It is not clear what the commenter views as a problem. Parameter estimates in all regression equations are subject to statistical error. This is normal. It is not clear how it follows that "there are almost certainly problems in the way these equations were applied".

Response to Comment 117
Deriving relationships between tree height and tree diameter is standard practice in the industry. The purpose of sampling is to keep the costs of estimating inventory at a reasonable level. Measuring the height of all trees within all plots would be prohibitively expensive.

Some individual tree characteristics are normally derived through the sampling process, where parameters are estimated based upon relationships observed in the field (e.g., height-diameter relationships). This approach has been an accepted methodology in sampling across a broad range of natural resources disciplines from agriculture to forestry, for many years. It is an area of active, ongoing statistics research. See also the response to comment 118 below.

Response to Comment 118

The methodology that the commenter feels is statistically questionable has been in common usage in sampling, not only in forestry but in almost any other discipline, for many years. See the discussion entitled Statistical Imputation below.

The belief that a local volume equation (volume is estimated directly from diameter without estimating height explicitly) is more accurate is not necessarily correct. The source of variation introduced into the regression equation from the actual variation in heights of trees on the ground does not disappear, it is merely made implicit and hidden in the overall variability that has to be explained by the regression equation. The trend in forestry research over at least the last 30 years has been away from local volume equations toward standard volume equations (both height and diameter are included as explanatory variables). The standard volume equations allow potentially more accurate estimation of volume because more sources of variation can be isolated and explained separately.

Statistical Imputation

Forest inventories are designed to provide unbiased and efficient estimates of resource parameters. Designs must consider the time spent at each plot, travel time, and variability of the parameters. Efficiencies may be gained by identifying variables that are correlated where one is expensive to measure and the other inexpensive. The relationship between these variables may be exploited to measure only a subset of the expensive variable. This approach has its foundation in both the statistical and forest biometrics literature, which are discussed below.

This discussion follows from Little and Rubin (2002). Single imputation refers to filling-in or imputing a missing value from information gained from the portion of the dataset where no missing values occur and/or from an outside source. Approaches to imputation are generally classed as either explicit or implicit modeling. The explicit model is based on a predictive distribution based on a formal statistical model with explicit assumptions. The implicit model focuses on an algorithm, which implies an underlying model.

Explicit modeling methods include mean imputation, regression imputation, and stochastic regression imputation. Implicit modeling methods include hot deck imputation, substitution, cold deck imputation, and composite methods. The implicit method names referring to decks derive from their origins at the US Census Bureau using card readers. The most common methods utilized in forest inventory analyses are the explicit methods of regression and stochastic regression imputation (Biging et al., 1994; Scheffield and Schweitzer, 2002).

There are a number of standard forestry methods that take advantage of double sampling techniques whereby the inexpensive variable is used to estimate the expensive variable. The first example is volume basal area ratios (VBAR), where a subset of trees is measured completely, ratios determined, and applied to the diameter only measured trees (Shiver and Borders, 1996). Multi-staged sampling may also be employed, particularly for large ownerships. Primary sampling units (e.g. stands) may be selected completely at random or with probability related to some parameter measured from say remotely sensed data. Correlations between remote sensing and ground based estimates (e.g. volume) allow efficient estimates to be made by imputing for primary sampling units where ground measurements were not made. Finally, height-diameter curves allow heights to be imputed from the relatively easy to measure diameters (Husch et al., 1993).

In summary, the use of efficient statistical approaches incorporating imputation techniques is commonplace in forestry applications and scientific research in general.

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Response to Comment 119
The comment's concern appears to be that a perceived wide variability in volume estimates resulting from the use of different diameter-height equations at different points in time casts doubts on the design and conduct of the estimation procedure, and a concern the diameter-height equations are not stable and solid.

First, the variability observed by the commenter includes the confounding effect of growth in addition to any possible effects of different height-diameter equations. Second, the variability estimates calculated by the commenter are incorrect. The correct figures are: a 10 to 15 percent increase between 1984 and 1989 (depending on site estimates used in the 1984 equations), and a 14 percent increase between 1989 and 1999. These figures give little cause for concern about excessive variability. Finally, the stability of the equations must be evaluated over a range of data for each equation separately. It makes little sense to compare the different equations. A perceived lack of stability in the equations could in fact be a reflection of real changes in the diameter-height relationship on the ground.

Response to Comment 120
The diameter-height equations remain unbiased uniformly minimum variance estimators, that is they produce an accurate estimate of the real heights. The inclusion of site as a variable is an advantage if there is some reason to stratify height estimates by site class. This was not the case on JDSF. In addition, recent research suggests that site can be surprisingly variable over the landscape and is therefore not as reliable a stratification tool or explanatory variable as previously thought.

The commenter's estimate of the 1984 CFI volume estimate using 1984 equations has been shown to be incorrect (see comment 107). The cursory analysis of growth from 1984 to 1989 using the 1984 equations is also incorrect.

Response to Comment 121
Selective quotes from an interview with Mr. Ederer with the commenter's editorial comments, do not provide a convincing argument. JDSF Newsletter article #46 does not describe any insuperable problems in processing the 1989 inventory data, nor does it in any way imply that errors were almost certain. The commenter appears to argue that the 80286 computers used to process the 1989 CFI and IFI data at the time constituted such rudimentary computing facilities as to virtually guarantee errors. The implied correlation between computing power and potential for error in data processing seems speculative.

Response to Comment 122
The term “unapproved” does not mean that there is in some way a deficiency in or a problem with, the JDSF Option A plan. It simply means the Option A plan has not yet been approved by the regulatory authority. The Option A plan review process has been halted at the request of the Department until the JDSF management plan is approved.

The Department has performed an analysis of long term sustained yield (LTSY) resulting from Alternative G, and a revised Option A plan is being drafted to reflect the ADFFMP that is based on Alternative G.

Response to Comment 123
The inventory estimate utilized in the computation of LTSY is accurate, and the projected level of harvest during the initial decade of the planning period is a conservative estimate that is well below the current level of growth. The beginning inventory of 2.09 billion board feet is accurate and is supported by all the three forest inventories that have been installed after it.

Response to Comment 124
The Board believes the most credible estimates of current and expected future growth is contained in this Management Plan/EIR. The estimates are developed using current data and best available models and equations. It is noteworthy that actual growth estimates from the CFI plots corroborate the CRYPTOS model projections in the Management Plan/EIR. The 1999 and 2005 inventory re-measurements corroborate the inventory estimates used in the Management Plan/EIR.

Response to Comment 125
The commenter appears to suggest that the use of unexplained “adjustments" to forest growth and allowable harvest are the preferred sustainability analysis. The Board prefers to base their determination of the LTSY on the Department’s objective and rigorous analysis using the best available science, and with exhaustive day-lighting of all methods and assumptions. The proposed level of harvest during the next decade is well below the level of growth, which will help facilitate the growth predicted in 100 years.

Response to Comment 126
The commenter refers to an analysis he has ostensibly performed, but provides no further details. Consequently it is impossible for the Board to make any judgment of the validity of his methods or results. The Department's Option A plan considers 300,000-plus variables. It is a state-of-the-art GIS-based planning effort that fully accounts for all of the major sources of variation and provides a robust and accurate estimate of sustainable harvest levels on the Forest. See also the response to comment 125 above.

Response to Comment 127
The Board has considered alternatives that include removal of the Woodlands area from JDSF and management of the Woodlands STA area as a no harvest area (Alternative E) or for transfer to the Department of Parks and Recreation (Alternative D) preserve (see DEIR Table VI.1). Areas that are removed from JDSF are not included in any estimate of LTSY or allowable harvest.

Response to Comment 128
The harvest of timber is not prohibited within the Woodlands area that was deeded to California by the Federal Government. Timber harvest within the Woodlands Special Treatment Area is a use approved by the Federal government in 1947, and was also recognized by the Legislature (Division 5, Chapter 8, PRC 5829). The Management Plan does however incorporate strictly selection or late seral forest development harvests in the Woodlands Special Treatment Area, in recognition over public concerns over harvesting here.

Response to Comment 129
The Federal Government determined that the harvest of timber falls within the meaning of "conservation purposes" and is an appropriate use of the area. All areas of the Woodlands Special Treatment Area are coincidentally available for recreational uses, and other uses consistent with those of parks. See the response to comment 128 above.

Response to Comment 130
This is not an environmental issue. Litigation may occur at any time, and with regard to virtually all aspects of management. This is a speculative matter.

P185

Dharma Cloud Foundation
PO Box 1066
Mendocino, CA 95460

February 24, 2006

Mr. George Gentry, Executive Officer
State Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, Ca 94244-2460
Fax: (916) 653-0989

RECEIVED BY
FEB 27 2006
BOARD OF FORESTRY AND FIRE PROTECTION

Subject: Jackson State Forest Draft EIR – Part 1

Dear Mr. Gentry:

Enclosed are:

1. A copy of the 2002 Final EIR for JDSF
2. A copy of my comments on the 2002 Draft EIR for JDSF

I am submitting these as the first part of my comments on the current Draft EIR for JDSF. Please collate these with other comments your receive from me. All my submissions should be considered as a whole.

Sincerely,

Vince Taylor

Vince Taylor

Tel: 707 937-3001 Fax: 707 93-73001 vtaylor@mcn.org
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Mailed Letter P-185

The commenter has resubmitted comments that he made on the 2002 DEIR for the May 2002, Draft Forest Management Plan. These comments have limited relevance to the 2005 DEIR, which is substantially revised from the 2002 DEIR. The most relevant responses to the comments on the 2002 DEIR are the ones that were provided in the 2002 Final EIR. These are reproduced here. The 2002 FEIR submitted is hereby incorporated by reference.

VT-241

Campaign to Restore Jackson State Redwood Forest
100 Manzanita Street
P.O. Box 1789
Fort Bragg, CA 95437

JUL 18 2002

July 18, 2002

Chris Rowney, Deputy Chief for State Forests
California Department of Forestry
1416 9th Street
PO Box 944246
Sacramento, CA 94244

Dear Mr. Rowney:

Accompanying this letter are my comments and supporting exhibits on the Draft JDSF Management Plan and Draft EIR for that plan.

Please enter my comments and supporting exhibits into the official record of the development of the Draft JDSF Management Plan and CEQA mandated review.

Sincerely,

Vince Taylor

Vince Taylor, Ph.D.
Executive Director

Tel: 707 964-5800 Fax: 707 964-6202 campaign@jacksonforest.com www.jackson

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

Vince Taylor
July 18, 2002

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Personal

Born May 14, 1956, Cincinnati, Ohio (citizen of U.S.A.)
Married, three children

Education:

1994 **Ph.D. Conservation Biology-Landscape Ecology** from The Ohio State University, Columbus, OH
Dissertation: "*A Regional Nature Reserve Design Using Geographic Information Systems for the Edge of Appalachia, Adams County, Ohio*"

1985 **M.S. Zoology** from Miami University, Oxford, OH
Thesis: "*Population genetics of yellow perch in Lake Erie and selected impoundments*"

1980 **B.S. Botany, B.A. Zoology, and Secondary Education Certification** from Miami University, Oxford, OH

Professional Experience:

August 1997-present. **President and Executive Director of the Conservation Biology Institute.** Corvallis OR http://www.consbio.org

January 1995-2000. **Founder and President of Earth Design Consultants, Inc.** Corvallis, OR

1994-1995. **Ecologist for North American Wilderness Recovery, Inc.** Portland, OR Responsible for scientific research and technical advising for conservation planning.

1992-1993. **The Ohio State University Presidential Fellow.** Columbus, Ohio
Responsibilities focused on research in conservation biology.

1989-1992. **Graduate Researcher: Center for Mapping, The Ohio State University.** Columbus, Ohio
Responsibilities included grant proposal writing, research project liaison, computer mapping and educational materials production.

1987-1989. **High School Science Teacher, Sycamore High School.** Cincinnati, Ohio
Courses taught included Biology I, Human Anatomy & Physiology, and Chemistry.

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.

2 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]

3

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).

4

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]

5

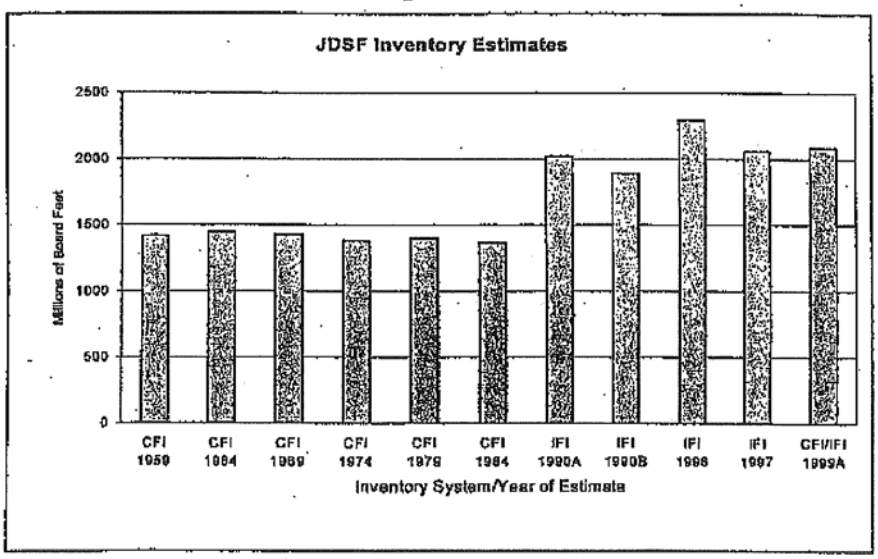
5 The fundamental question, which is not addressed by the DFMP or the DEIR, is, "How can the vastly higher recent estimates of forest inventory and growth be reconciled with the much lower, stable estimates that were produced over 25 years by the previous inventory system?" The new estimates are so much 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.

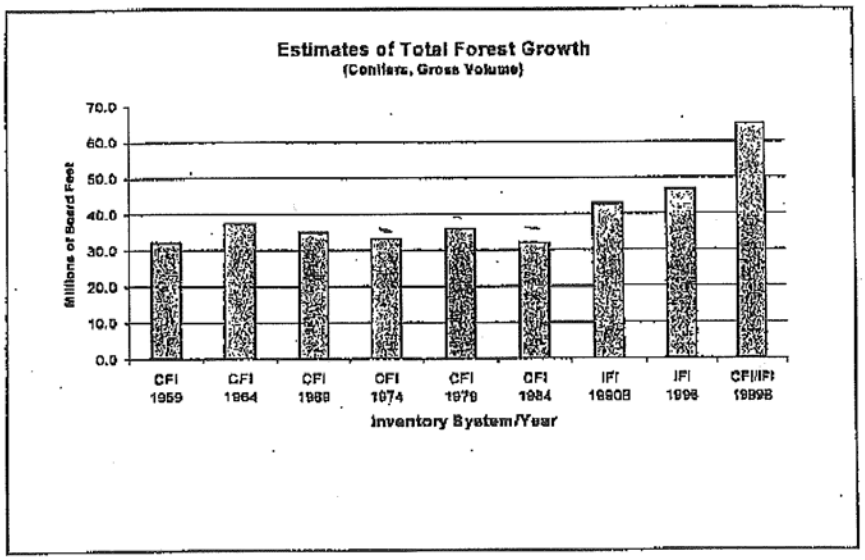
5

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."

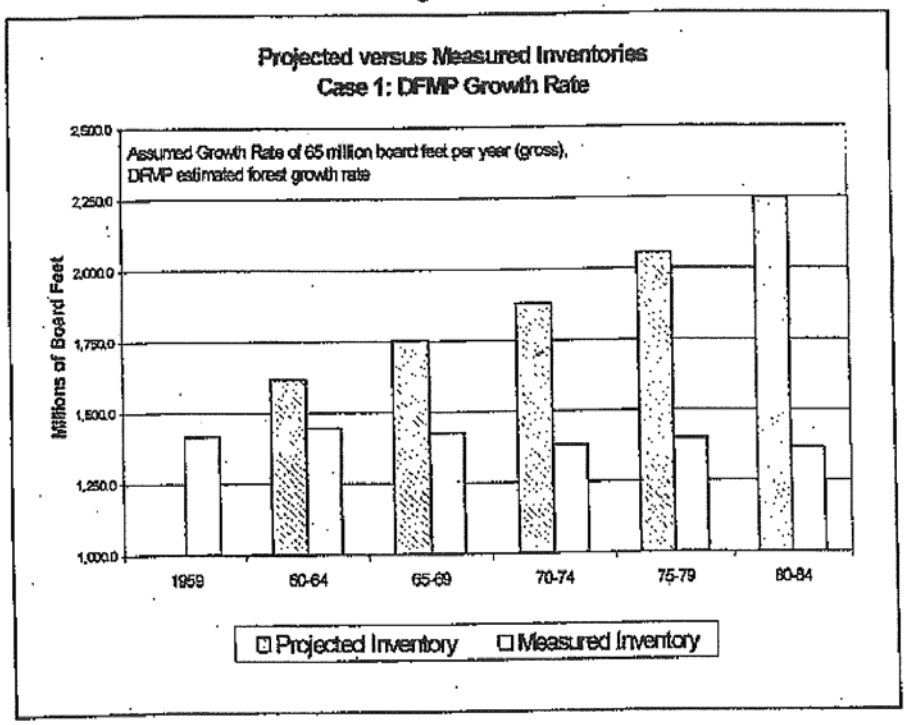
Figure 2-2



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



5

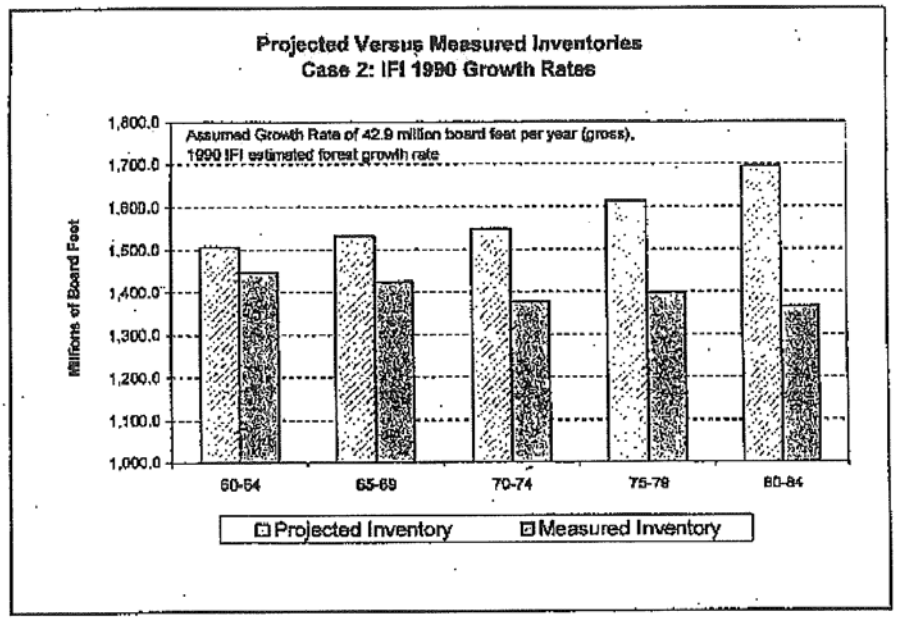
Figure 3 shows the projected inventories assuming the DFMP growth rate applied from 1959 through 1984. Projected inventories increase from 1417 in 1959 to 2248 in 1984, an increase of 831 million board feet. During this same period the measured inventories *decreased* by 52 million board feet versus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



5

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?

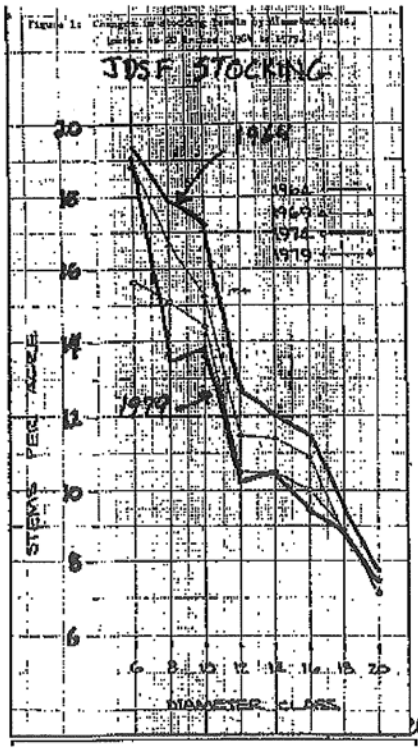
2.3.4 The CDF Argument for Increasing Underestimation Fails Empirically

6 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.**

Figure 2-5



6

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 accuracy of CFI measurements, they should have caused a growing overestimation of inventory, that

Vince Taylor

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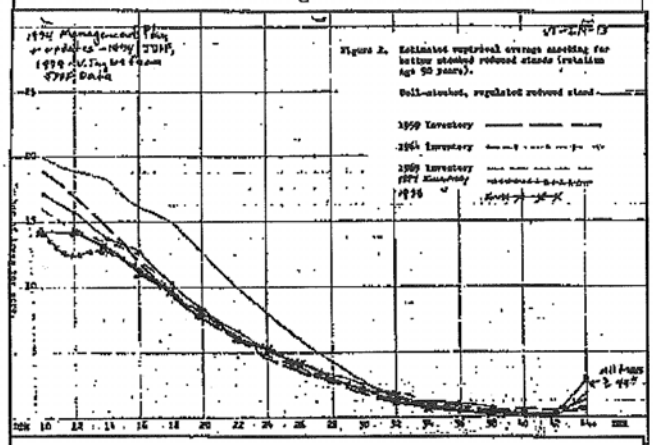
Figure 2-6



Source: VT-IN-13

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."

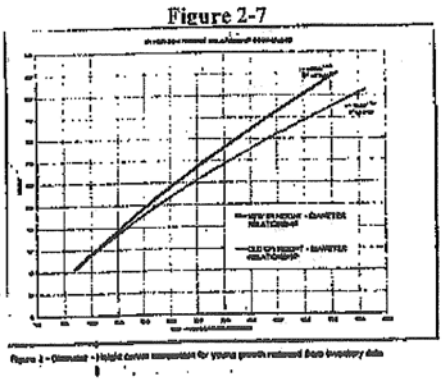
2.3.7 The New Empirical Relations between Diameter and Volume

6 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%.

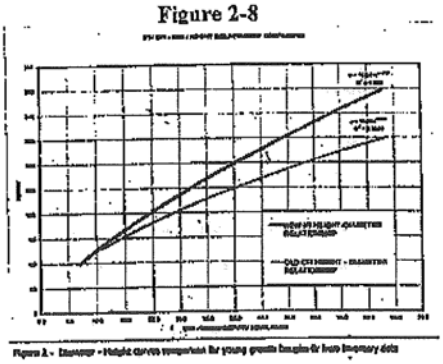
This estimate is derived as follows. A comparison between the new and old relations was published by CDF.[9] Two figures are provided, one for redwood and one for Douglas Fir, showing volumes as a function of diameter.

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-A

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]

6

> 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.

7

> 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.

8

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:

9

> ...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.

9 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]

10

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.

10 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 1

Various Estimates of Forest Inventory and Growth, Jackson State Forest										
(Conifers, Gross Volumes)										
Year	1959	1964	1969	1974	1979	1984	1990A	1990B	1996	1997
Inventory System	CFI	CFI	CFI	CFI	CFI	CFI	IFI	IFI	IFI	IFI
Adjusted Total Forest Inventory (1)	1417	1446	1424	1379	1399	1365	2021	1892	2296	2057
Adjusted Total Forest Growth per year (1)	32.1	37.5	34.9	33.1	35.8	31.9		42.9	46.6	
Total Forest Inventory per Acre						28062	41532	38900	47200	42280
Forest Growth per Acre						655.0		882.0	957.0	
Forest Acres in Inventory Measure	50000	50000	50000	50000	50000	48750	44151	48586	48652	48652
Unadjusted Forest Inventory	1456	1486	1464	1417	1438	1368	1834	1890	2296	2057
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 convers John Griffen, JDSF.										
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.

11

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

10

- 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.

10 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. ... This is most important for JDSF because of the revenues generated are most critical to the CDF programs. (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

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.)

10

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:

12

> 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.

12

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

13 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
14 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.

15 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

16 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

17 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.

17

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.
[10] *Considerations for Determination of Allowable Annual Cut*, John Griffen, JDSF, 10/23/79.
[11] Vince Taylor, VT-IN-24.

4 Other Comments

4.1 Public Comment and Scoping Sessions

18 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:

19

> 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,

20

> 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.

21 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 22 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."

23 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."

24 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.

25 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.

26 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.

27 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.

28 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

29 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 30 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 31 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. 32 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]

33 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.

Letter VT-241 (Campaign to Restore Jackson State Redwood Forest)

Response to Comment 241.1
The forest inventory, timber growth, and allowable cut information presented in the DFMP was subjected to an independent review as part of the DEIR process. The review indicated that JDSF personnel used "modern, best available techniques to ensure the growth and yield estimates utilized in the planning process were as comprehensive and accurate as possible" (refer to Appendix 8A – Page 15). The timber inventory and growth techniques used by JDSF staff are fully disclosed in the Appendix. The information is provided in the appendix rather that the body of the DEIR due to the technical nature of the material (CEQA guidelines section 15147).

Many of the comments included in the letter are aimed at management practices proposed in the DFMP or past actions of CDF. A reference to general response 1 is appropriate in many cases, however a more direct and detailed set of responses has been provided. Furthermore, Article 10 of the CEQA guidelines addresses many of the concerns included in the comment letter. Section 15146 states that the degree of specificity required in an EIR will correspond to the degree of specificity of the activity described in the EIR. A program EIR need not be as detailed as an EIR on a specific project that may follow. The level of analysis in an EIR is subject to the rule of reason. The information presented and the analysis needs to be specific enough to permit informed decision making and public participation. However, the need for thorough discussion and analysis is not to be construed to serve as an easy way for project opponents to defeat projects. Section 15147 states that information contained in an EIR shall include summarized technical data, and detailed technical data should be placed in an appendix. Section 15148 states that scientific documents relating to environmental features should be cited, but not included in the EIR.

Considering these guidelines, the amount of information and level of detail provided in regards to forest inventory, timber growth and allowable cut information presented in the body of the EIR, Appendix 8 and as cited is entirely appropriate for a program EIR.

Response to Comment 241.2
The inventory data in the DFMP and DEIR presents a detailed and accurate picture of the resource situation on the Forest, and is more than adequate for informed decision-making and public participation. The inventory results provided in Appendix 8 of the DEIR are aggregated by geographic area (east end and west end of the forest), vegetation and site classes. The inventory was designed for this scope of analysis and reporting and is consistent with standards of practice in the profession. This level of detail exceeds that contained in past management plans. All the inventory data for JDSF is publicly available in electronic form, and was made available to the commenter. The commenter is free to engage in any data analysis he sees fit.

Past management plans for JDSF and the inventory information therein exhibit a clear pattern of change over time as the management situation changed. Research and demonstration on JDSF is now shifting away from a primary emphasis on timber commodities to also include issues such as sustainable forestry, public trust resource protection and non-timber commodities. Many of the detailed timber resource reports of past plans have been replaced with other analyses more relevant to the challenges of forestry in the twenty-first century. The current JDSF management plan continues the tradition of adapting to changes in societal priorities and forest research needs.

Response to Comment 241.3
The inventory and growth data presented in the management plan and reviewed in the DEIR are accurate and unbiased. The data is presented in a logical, organized fashion that enables the reader to evaluate the proposed management plan. JDSF inventories were developed according to accepted scientific and professional standards by licensed professional foresters. CDF believes the inventories supporting this management plan to be correct and unbiased, and constitute the best available evidence of inventory and growth information on JDSF.

The February 11, 1999 letter from then-Director Wilson to Vince Taylor answered the earlier questions raised and demonstrated that the concerns were groundless. Consequently, there is no reason for CDF to engage in further analyses.

The complete inventory data for JDSF was made available to the submitter on July 13, 2001. CDF believes that the data speak for themselves, and that an examination of the actual data will confirm CDF's analysis and results.

Response to Comment 241.4
This comment, and other related comments questioning the validity of the presented inventory and growth information, presents no analysis of the actual inventory data. Rather, the submitter presents only speculation about purported inconsistencies in CDF's published inventory reports spanning four decades, selectively quoting summary statistics out of context and incorrectly interpreting results. This speculative line of theorizing about likely problems with JDSF's inventories are groundless. They are also wholly irrelevant because the inventory data are hard facts, not subjective opinion. The actual inventory data can easily be examined to indisputably verify or refute CDF's inventory estimates. All JDSF inventory data were made available to the submitter on July 13, 2001. CDF believes that the data speak for themselves, and that an examination of the actual data will confirm CDF's analysis and results.

Response to Comment 241.5
The management plan was not based on the IFI alone, both the IFI and the CFI served as a basis for the plan.

The discussion of discrepancies in growth estimates mixes apples and oranges by comparing different definitions of growth. The forestry literature identifies at least four different definitions of stand growth, incorporating different combinations of mortality, ingrowth, and harvest. A rigorous explanation of the different components of growth can be found in most forestry textbooks.

The most recent 1999 CFI remeasurement supports the IFI inventory results. The IFI and CFI are independent sampling efforts, with different objectives and sampling designs. They are not directly comparable. Both inventories must also be tempered with an understanding of the nature of statistical estimates. For these reasons it would be unreasonable to expect them to give the exact same results.

The underlying premise that a lack of close correspondence in estimates between previous generations of CFI data and recent IFI data in and of itself is indicative of an error in the IFI, CFI or both, is intrinsically invalid. It is unreasonable to demand perpetual consistency between inventories over time, especially over a time span of four decades. Forest inventories are moving targets because forests are dynamic living systems that continually alter their growth relationships with time. Inventories are used as adaptive management tools that enable the scientific and professional community to acquire new knowledge over time. This in turn may warrant taking a fresh look at old assumptions and revisiting the analysis of old data.

It is relatively easy to find inconsistencies in any time series of data that spans 40 years of measurements, if one sets out to do so. Such an approach however, fundamentally misses the point. Rather than a liability, CDF believes such inconsistencies constitute a compelling testimony to the CFI's proven value as an adaptive management tool. The JDSF CFI data is an unequalled repository of historical resource information in the redwood region. The CFI system is still in use for both research and management, which is a testament to its quality and value as a feedback mechanism.

Response to Comment 241.6

Initial CFI inventories incorporated the premise of harvesting exactly equal to growth, thereby maintaining the initial age structure of the Forest and obviating the need for measuring heights at every remeasurement. The fact that past CFI reports did not update the height-diameter relationship to account for a maturing age structure over time does not indicate that historic nor current results are wrong. It simply reflects a gradual discovery of the fact that the Forest was not cutting as much as it was growing thereby creating an older forest and gradually requiring an update of the height-diameter relationship.

The commenter selectively quotes one of several factors of the cause of changes in diameter-height relationships in a forest over time, and incorrectly labels it as CDF's explanation. The February 11, 1999 letter from then-Director Wilson to Vince Taylor resolved the issues raised here.

The comment includes a CDF document that explains the differences between the CFI and IFI inventory results (comment attachment VT-IN-11). The comment provides figures 1 and 2 of the CDF document as comment Figures 2-7 and 2-8, and refers to them as showing volume as a function of diameter. This is not correct. The figures show the relationship of tree diameter to height. While the comment may be correct in stating there is about a 7% difference in the segment of the curves for redwood trees from 12 to 30 inches DBH, this is a difference in height, not volume. When this difference in height is converted to difference in volume, the difference is 14% as demonstrated in the CDF document provided with the comment. The CDF document also demonstrates how this 14% difference accounts for the majority of the difference in the CFI and IFI inventory results, given the statistical accuracy of the two inventories. The difference in diameter-height relationships is based on measured differences, not theoretical as indicated in the comment.

Response to Comment 241.7
A review of the CRYPTOS methodology used to estimate growth on JDSF is provided in the JDSF Option A document. Appendix 8A of the DEIR includes an independent review of the growth estimate on JDSF. The review indicated that although there are some concerns with the way CRYPTOS responds when trees are added to the understory of a modeled timber stand, JDSF was aware of this, made adjustments, and used the model appropriately. The modeled growth estimates were judged to be reasonable considering:

- modeled growth was more conservative than the measured growth
- future inventories would be used to monitor modeled growth against the measured growth, and
- adaptive management would allow JDSF to periodically adjust estimated growth levels.

Response to Comment 241.8
JDSF data collection procedures for the IFI and CFI, including the site index sampling protocol, is statistically unbiased and follows accepted sampling practices in professional forestry. This comment appears to arise from a lack of knowledge of the definition of site index in forestry and appropriate sampling procedures. Most forestry textbooks provide a thorough discussion of this subject.

JDSF data collection procedures for the IFI and CFI follow standard and practice in the industry. They are objective and unbiased.

The documents cited to support this comment, and other comments, question the validity of the data because field data collection procedures were clarified while in progress. To the contrary, this citation indicates that appropriate data collection quality control and quality assurance practices were in place. Check cruising field data and providing the results of the check cruise to the field crews is the standard practice. If problems are found or suspected, procedures are changed or other action is taken to address the problem. This is the process documented in the citation.

Response to Comment 241.9
This comment is incorrect. The 65 MMBF growth figure used in the DFMP and the DEIR is based on remeasurements of 141 CFI plots completed in 1999.

This comment appears to be based on an internal CDF memo describing a computer growth simulation based on remeasurements of 141 CFI plots completed in 1999. The memo in question simply describes an independent growth model projection done to compare with the estimated growth. It is standard practice in the industry to conduct independent simulations using several methods to compare with and validate an inventory or growth estimate.

Confusion may stem from the fact that the 1999 CFI remeasurement data was used in both the CRYPTOS run referenced in the comment and the calculation of the 65 MMBF growth figure used in the DFMP. It is interesting to note that the modeled future growth is fairly close to the measured past growth. The CRYPTOS run cited in the comment was completed by JDSF staff for in house use, not to support growth estimations for the Option A document, the DFMP or the DEIR. The allowable cut figure used in the DFMP is based on the JDSF Option A document. A separate set of CRYPTOS model runs were used in the Option A document. DFMP page 47 references the measured 65 MMBF forest growth and the Option A allowable cut of 39 MMBF.

All of the growth and allowable cut estimates are based on the standard of practice within the forestry profession and, while not directly comparable due to the different methodologies used and different objectives, they can be used in combination to develop a better understanding of forest growth on JDSF. As discussed in the Appendix 8A, measured growth provides insight on how the forest has grown in response to past management. Modeled growth provides insight on how the forest will likely respond to proposed management practices. Allowable cut estimations take into the various constraints that limit harvesting.

Response to Comment 241.10
CDF staff continually engages in vigorous debate about JDSF management. Sometimes they will exaggerate their discussion to get a point across, or play devil's advocate to explore the consequences of different viewpoints. CDF attempts to cultivate this kind of open discussion between our staff, and in fact view this as a strength rather than a weakness.

The material quoted represents one of many different viewpoints held by CDF Foresters on a variety of issues. Many of these communications constitute preliminary work products completed several years ago and appropriately should be interpreted in context of the eventual resolution of the issues that were discussed. None of this material present evidence to indicate the current management plan or DEIR is inadequate in any way. The DFMP and DEIR utilize current, statistically valid forest inventory information.

Validation: The IFI inventory was check cruised to rigorous standards and found to be accurate. The 1995 validation project was a preliminary work product. Its objective was to bring the IFI inventory data into a spatial GIS context. This was the beginning of a larger effort to begin a sustained yield plan project. The validation project was replaced by the sustained yield plan / habitat conservation plan project, starting in 1996.

This communication cited in this comment in regards to the validation project is quoted out of context. The remainder of the communication reveals that no concern about inventory accuracy existed. No particular problems were encountered beyond what is normal in inventory updates and data management.

Group Selection: Group selection is defined as an uneven-aged silvicultural method in forestry. The management plan proposes that the majority of JDSF acreage be managed under uneven-aged methods. It is also important to recognize that as part of JDSF's research and demonstration forest, the management plan attempts to maintain flexibility to implement as wide a range of different silvicultural methods as possible.

Response to Comment 241.11
The management plan describes in detail the criteria and decision process used in developing the five-year harvest schedule. JDSF foresters used IFI results along with other information including professional judgment and knowledge of on-the-ground conditions to develop the silvicultural allocation plan and the five-year schedule of THPs. This constitutes the standard of practice in the industry.

Response to Comment 241.12
The comment fails to include a critical component of the Forest Practice Rules (FPR) applicable to maximum sustained production (MSP). The code and regulation quoted in the comment provide guidance regarding MSP, while the FPR include a set of rules that THPs need to comply with to demonstrate MSP. The DEIR provides a discussion of the current rule requirements regarding MSP. Achieving MSP through compliance with the FPRs should also fulfill the Board's direction to manage State Forests to achieve MMAI. The Draft Management Plan and THPs on JDSF follows all the laws, regulations and policies pertaining to maximum sustained production, including the CMAI/MMAI mandate.

The CMAI construct by definition applies only to stands managed under even-aged silvicultural systems. The majority of the acreage on JDSF is managed under uneven-aged silvicultural systems, making CMAI a non-issue on the majority of JDSF acreage.

It is true that the point of CMAI for coastal redwood on medium to poor sites is not as well defined as for other conifer species in this area. The CMAI concept as used in forestry however, usually refers to stand growth not individual tree growth. Few if any stands on JDSF consist purely of redwood trees. Most stands contain a mix of redwood with other species such as Douglas-fir, for which the age of CMAI is well established. Consequently, the range of rotation ages we plan in the Management Plan are intended to bracket the age of CMAI.

The CMAI policy must be interpreted in context with all of the other BOF policies JDSF must comply with, in addition to the Forest Practice Act and the Forest Practice Rules. JDSF must balance the CMAI mandate with the requirement to annually sell high yield timber sales,

contribute to the local economy, and research and demonstrate a wide range of forest management practices. Elevating the CMAI policy to a status of exclusive priority would violate all of these other mandates.

CDF's approach to meeting all of the policies of the BOF has not changed since the last management plan in 1983. The BOF approval of the 1983 Management Plan indicates that CDF's balancing the CMAI mandate with other BOF policies as well as laws and regulations, meets the overall mandate of the BOF as expressed in their policies.

Some stands on JDSF, primarily on the east end, are below optimum conifer stocking according to many criteria. Achieving maximum sustained production in these stands may indicate harvesting before the age of CMAI.

Identifying the ages of CMAI for coastal redwood forests is an area of research that JDSF has engaged in for some time and that will continue as part of the research and demonstration mandate. Stands in old growth groves and many second-growth stands currently have and will develop rotation ages to bracket the CMAI of redwood trees.

Response to Comment 241.13
This conclusion is based on a misunderstanding of the requirements of the FPRs and the interrelation of the various documents that will govern JDSF management. As indicated in the DEIR, the management plan and the Option A plan to which the THPs will be tiered clearly demonstrates that all THPs on JDSF will achieve maximum sustained yield.

The discussion of criteria for developing the 5-year short-term harvest schedule includes management objectives articulated in the management plan, and stand manipulation priorities. Both criteria include the CMAI objective.

Response to Comment 241.14
The allowable cut is clearly defined in the DFMP. The management plan references the JDSF Option A plan for details of the methods used and modeling results used in deriving the allowable cut. CDF believes the JDSF Option A plan objectively establishes that this harvest level is sustainable and will not degrade forest values.

Response to Comment 241.15
This statement is not entirely correct. The inventory methodologies and growth estimations used to determine the allowable cut figure for the DFMP were evaluated as part of the DEIR process. JDSF has used currently accepted inventory methodologies conducted under the supervision of an RPF. Likewise, the growth estimations were conducted appropriately. When reviewed in its entirety, the determination of allowable cut in the DFMP is a conservative figure that should be below forest growth for at least the next several decades. The DFMP clearly outlined the process used to determine the allowable cut figure, and the DEIR conducted a review of that process and found it to be acceptable. There are many ways to conduct forest inventories and growth estimates. They each have strengths and weaknesses that need to be evaluated to determine the most appropriate method for a given set of circumstances.

Developing and conducting appropriate forest inventories and growth estimates for an ownership falls within the realm of professional forestry and professional foresters supervised the JDSF inventory and growth estimations. The comment indicates disagreement with the methodologies used, but this disagreement does not mean that the methods used or the results are invalid or incorrect.

Forests are characterized by very large areas and a large number of individual trees per acre, making inventorying parts of the forest each year and updating for growth and harvest on remaining acres a common practice. It is not uncommon for forest inventory data to be 10 – 15 years old. CDF's inventory efforts are continuously ongoing; parts of the Forest is inventoried each year. CDF's inventories and growth estimations reflect the standards of practice in the profession.

Response to Comment 241.16
The purpose of the Management Plan is to provide on-the-ground management guidance for JDSF foresters. The determination of the allowable cut and its supporting analyses is contained in the Option A plan for the Forest. The Option A plan includes the type of information requested in the comment regarding reduction of harvest potential in special concern areas. The Option A plan for JDSF has been submitted for approval to CDF Forest Practice and is currently under review.

The allowable cut calculation method used in past management plans and referenced in the comment is one possible approach to estimating an allowable cut. Many other approaches exist, including the approach used in the JDSF Option A plan. An allowable cut based solely on growth estimates and acreage reduction factors permits only a rudimentary ability to recognize constraints on timber production from other forest values. Such an approach allows no facility for evaluating the long-term consequences of proposed actions, an essential step in deriving a sustainable harvest level for forest stands, which can take many decades to grow to maturity. A long-term harvest schedule as used in the Option A plan, with explicit recognition of constraints on timber production from other forest values, allows a much more accurate estimate of the allowable cut. CDF believes the projections of forest growth used in the Option A plan accurately estimates true growth rates on the Forest.

Response to Comment 241.17
CDF believes the allowable cut estimate is conservative and constitutes an objective and accurate estimate based on the best available data. The methods used to arrive at the estimate are standard and practice in the industry and they are well documented.

The illustrative calculation provided to support the submitter's statement is meaningless in its oversimplification. Restricted acres are only in rare cases entirely removed from timber production; most often restrictions call for some kind of light harvest regime. Different stands in different areas of the forest have different rates of growth. The 1999 CFI data represents the most recent estimate of current growth on the forest.

Response to Comment 241.18

The DEIR does not and is not required to include all public comments submitted at the scooping sessions.

Response to Comment 241.19
Several comments request changes in the language of the management plan to correspond to the opinions of the submitter. CDF recognizes that there may be disagreements on many of the statements in the management plan. CDF however, believes the management plan, as supported by the EIR, is correct in its current form, and is based on substantial data, solid science and high professional standards.

The question the EIR needed to address is, given the current condition of the Forest, will the proposed action result in significant environmental effects. The EIR includes substantial discussion on past harvesting and silvicultural methods used on the forest that have resulted in the development of the current Forest condition. The effects of the proposed action on timber inventory and maximum sustained production of high quality forest products (MSP) is addressed in EIR section 6.3.6 Timber Resources - Project Impacts. The EIR found that when the proposed harvest levels are compared to either the measured growth or the modeled estimated growth, there would not be a significant environmental effect. This determination is based on forest inventory methods and forest growth modeling conducted under the supervision of RPFs. The DEIR, the DFMP and the Option "A" document all recognized the potential for discrepancies between modeled growth and measured growth. The DEIR determined that the periodic forest inventory updates were appropriate to monitor the relationship between modeled growth, measured growth, forest inventory levels and harvest levels.

Response to Comment 241.20
Several comments request changes in the language of the management plan to correspond to the opinions of the submitter. The comments presented are largely subjective opinion. CDF recognizes that there may be disagreements on many of the statements in the management plan. CDF however, believes the management plan, as supported by the EIR, is correct in its current form, and is based on substantial data, solid science and high professional standards.

Response to Comment 241.21
The commenter has presented no convincing evidence of inaccuracies in JDSF's inventory data, but merely speculative theories of "likely" problems with JDSF's inventory data and analysis. The JDSF inventory data support the statements made in the management plan and the DEIR. Comments focus on past management practices and largely disregards the management practices proposed in the DFMP currently under review. For example, it is true the old growth trees have been largely harvested from JDSF under past management plans. However, the transition from old growth harvesting to young growth management was considered beneficial, and demonstration of the orderly transition was one of the primary objectives of the State Forest

System. The DFMP focuses on retention of the remaining old growth and demonstrating continued management of young growth forests. The EIR recognized this and indicated that significant impacts to existing old growth resources are likely to occur.

The increase in miles of road reflects the relocation of roads from lower slopes with higher potential for impacts, to upper slopes with lower potential impacts. Although road miles may have increased, impacts have decreased. The road management plan included in the DFMP will continue this trend. This was recognized in the EIR.

Caspar Creek and Hare Creek were among the first areas logged during the original old growth logging, and therefore included the oldest young growth on the Forest. When JDSF started to harvest young growth, it was logical to start in the areas with the oldest young growth, with no thought given at the time to seral stage distribution. The clearcut harvest in the North Fork Casper Creek is part of the long term Casper Creek Watershed Study that has produced significant new understanding of forest management impacts.

Points (d) and (e) in this comment are misinterpretations of data as showing a negative impact or declining trend across the forest. Point (d) relies on figure 1 of the 1983 FMP, which shows a change in size class distribution over time, to indicate a declining trend. This data when considered alone is not enough to make such an interpretation. When additional factors such as age and volume are included, the size class distribution can be seen in perspective. When a stand increases in age and volume, as the other figures and tables in the 1983 management plan indicate, it would be expected to see an overall decrease in trees per acre and a shift in size class distribution with fewer smaller trees. This is indicated in figure 1 referenced above. Point (e) is a continuation of previous comments in general disagreement with current inventory results. However, the CDF document included as comment attachment VN-IN-11 demonstrates that the CFI inventory, when properly adjusted using the corrected diameter to height ratios, indicates a steady increase in forest inventory. As a final note, the EIR indicates that ongoing monitoring and studies show generally improving trends in watershed condition.

Response to Comment 241.22
It is not correct to assume that specific details of activities for the next five years are known now. Rotation ages, cutting cycles and specifics of silvicultural prescriptions are only specified in broad categories. Harvest plan boundaries, yarding methods, stream classifications, species occurrence during the year of operations and numerous other details are not know for individual projects. Completing a detailed analysis of these potential future projects would require a large amount of speculation and result in very uncertain findings. A detailed analysis of future harvesting will occur on a project basis through the THP review process. This tiered approach is in compliance with CEQA guidelines and is appropriate for the proposed management plan.

Response to Comment 241.23
CDF believes the statement is an accurate reflection of the contents of the management plan.

Response to Comment 241.24
The management plan strives to integrate all the plans for different disciplines into one consolidated management plan. CDF believes the recreation portion of the management plan is a solid basis for management guidance as well as public participation.

Response to Comment 241.25
Guidelines for forest management in neighbor buffers are spelled out in the management plan. Because of an infinite range of individual management situations, professional expertise of resource managers in each particular case guided by direction in the management plan is preferred. This is standard accepted methodology.

Response to Comment 241.26
The Railroad Gulch study is a long-term research installation. Logistical factors such as funding and staffing level commonly warrants modifying original study plans. CDF believes the Railroad Gulch study experimental design is robust to changes in treatment timing and the study continues to be viable.

Response to Comment 241.27
The Mendocino Woodlands special treatment area includes a portion of the Thompson Gulch watershed. The Thompson Gulch watershed also extends upstream beyond the boundary of the STA. One of the potential timber harvest operations identified in the short-term harvest schedule includes a portion of the Thompson Gulch watershed. The exact boundaries of the timber operations are not yet known. Those depicted on the figure constitute a very rough estimate. The upper Thompson Gulch operation, to the extent that specifics are known, will include a demonstration of silviculture designed to accelerate the recruitment of late-seral forest habitat. The specifics of the silvicultural prescription are unknown, and will not be known until such time as CDF personnel evaluate the area and consult with applicable fish and wildlife agencies on prescription design. DPR will also be consulted for that portion of the operation that may include the STA. The Department will not speculate concerning the specifications of this potential future plan or the environmental effects that may occur.

Response to Comment 241.28
Walter S. Roundtree, Deputy Attorney General, in opinion 47-4 (March 31, 1947) provided an interpretation of the types of uses that would be allowed in the Mendocino Woodlands Area based on the language contained in the transfer deed. In that opinion, a letter from the Assistant Secretary of the Interior dated October 31, 1946 is quoted as follows:

"I also believe that the harvesting of forest products in accordance with recognized conservation principles and practices, and the conducting of forest experiments and demonstrations would be compatible with the term "conservation purposes," since it is generally acknowledged that such economic and scientific utilization of timberland areas ultimately results in the conservation of our forest resources."

The Deputy Attorney General concurred with the Assistant Secretary of the Interior that the language of the deed does not preclude the logging proposed by the state.

Response to Comment 241.29 and 241.30
The forested landscape of JDSF is a constantly changing mosaic characteristic of a living ecosystem. The direction and rate of change varies with an almost infinite number of factors. This variability defies the imposition of rules, thresholds and quantitative standards. This issue is best dealt with on a case-by-case basis using professional judgment of experienced foresters familiar with the local conditions.

Response to Comment 241.31
The discussion of impacts on recreation in the DEIR uses standard techniques for analysis. CDF believes this discussion follows the standards of practice in the industry and is a meaningful basis for informed decision-making and public participation.

Response to Comment 241.32
An economic analysis of the alternatives is included in the DEIR. The estimate of employment related to timber harvest uses standard techniques for estimating short and medium term employment changes. Long-term studies of unemployed timber workers have demonstrated that workers do find other employment after their unemployment payments run out of if new opportunities emerge. The length of unemployment has been documented to be up to two years in many cases. Many workers have to take employment at jobs paying closer to the average wage in the county as opposed to the higher wage they received for their specific skill set in the timber industry. Economic costs to the state unemployment fund and individual workers will be high and directly proportional to estimated wage losses.

Response to Comment 241.33
A review of the economic effects and employment opportunities at JDSF from hiking, wildlife viewing, mountain biking, kayaking and general forest viewing showed no conflict between the recreation open access policy on JDSF and the limited acreage in timber harvests – they are complementary.

Tradeoffs between recreation values and timber values were considered in detail in the Option "A" harvest schedule that determined the allowable cut.