FORESTRY RESEARCH 0333

GENERAL POLICY 0333.1

Pursuant to its responsibilities to determine, establish and maintain adequate forest policies, the Board has found that;

A. Forests provide numerous benefits to Californians. The creation and use of these benefits often involve complicated relationships between man and the wildland environment. Because of the complexities, man often does not have sufficient knowledge to manage effectively the forest ecosystems that are used by people. More also must be learned about the importance of natural forest systems to man's psychological and social needs.

B. This lack of knowledge is becoming increasingly critical. As more people use a limited forest base, economic and ecologic considerations clash more frequently. For recreational subdivisions conflict with concerns over soil disturbance or amenity values. If more were known about the forest ecosystem, these conflicts might be resolved on a more knowledgeable basis.

C. Historically, the forestry research program in California has been inadequate. There has been no central policy and no continuing organization to assess needs, develop the resources necessary to maintain an adequate ongoing research program and to coordinate the several elements required for such a program.

D. The Board is required by law to determine and report on the State's need for forest management research and to suggest needed projects. The Board is also required to conduct or provide for a program of research in specific areas set forth in law. These include forest management, soil characteristics and erosion rates, costs and feasible methods of reforestation, range improvement, and utilization of wood wastes for energy production. The Board's mandate to develop an "adequate forest policy for California" (PRC 740) requires an interest by the board in the interrelationship of all forest resources.

In light of these findings, the Board concludes that the public's interest is best served by developing and maintaining a vigorous program of forest research. The Board, as part of its general policy responsibilities, herein sets forth its policy on forest research.

DEFINITIONS 0333.2

"Forestry research" means the development of knowledge about forest resource systems and about man's interrelationship to these systems. It refers to programs to obtain and apply technical knowledge about forest resources systems and ways in which they may serve man's needs. It also includes the development of methods to apply technical knowledge to the framing and resolving questions about public policy relative to forest resources.

FORESTRY RESEARCH PROGRAM 0333.3

In order to promote a vigorous program of forestry research, the Board has found that in the public interest, it should, in conjunction with the Department, forest user groups, other State and Federal agencies, the University of California and other institutions of higher education, and the general public;

A. Inventory and assess needed forestry research at timely intervals;

B. Develop a master research plan that specifies and establishes priorities among needs and programs. The research plan will be updated every two years to reflect new needs and priorities;

C. Develop legislation needed to maintain a continuing and vigorous program of forestry research;

D. Foster and participate in mechanisms for ensuring cooperation and coordination in the development and implementation of research programs.

DISSEMINATION OF NEW KNOWLEDGE 0333.4

To be useful, findings from research must reach resource managers, field personnel, and policy makers. The faster that new knowledge can be put into practice, the greater the potential gains in time or money saved.

The Board believes that California must have an aggressive program to put new knowledge into use in the shortest possible time. Considering the large number of users of forestry information and the high investment in forestry within California, current investment in activities to utilize available knowledge is inadequate.

To speed the flow of forestry knowledge, the Board has found that:

A. The Board, through its licensing programs and other mechanisms, will attempt to keep all Registered Professional Foresters, timber operators, nonindustrial, private forest landowners and the general public advised of new technology as it becomes available. A dialogue must be encouraged among professional foresters and timber operators to transfer technology gained as land managers to other professionals in the field.

B. The board will promote programs for dissemination of new knowledge from research activities.

C. The Director should encourage the California State Forestry Committee to assume the lead role in setting statewide policies and priorities for technology transfer. This committee is the California counterpart of the "State Forestry Committee", formed in 1978, in each state at the request of the U.S. Secretary of Agriculture.

D. The Director should utilize a variety of activities, including Research Notes and periodic meetings with foresters and timber operators, to promote dissemination of the latest findings from research as they become available.

COMMITTEE ON RESEARCH 0333.5

The Board has established a Committee on Research to:

A. Review ongoing research programs;

B. Advise the Board on research needs, priorities, policy, and such other matters as the Board directs;

c. Take the lead role to improve coordination and cooperation of the various industrial, educational, State and Federal agencies involved in research; and

D. Recommend a system through which information can be collected, maintained and disseminated on all completed forestry research projects.

The Committee on Research includes members drawn from the Department, forest user groups, other State and Federal agencies, the University of California, and other educational institutions as may be appropriate. The Board appoints the members and designates the Chairman. The Committee meets as required on the call of the Chairman of the Board, or of the Chairman of the Committee, or of a majority of its members. The Committee reports to the Board its recommendations for action biennially, beginning on June 30, 1980, and may submit interim reports of recommendations if needed.

The Committee may enter into arrangements with other agencies or advisory committees of the Board to assist in obtaining information and in conducting such analyses as are required for it to fulfill its functions. The Director, to the extent feasible, provides necessary staff support and funds to assist the Committee in its work.

COOPERATION 0333.6

Cooperation between the forest products industry, nonindustrial private forest landowners, other forest user groups, public agencies, and the general public, is essential to the development and maintenance of a vigorous forestry research program. Only through cooperation will it be possible to realize the full range of research possibilities and to arrive at acceptable priorities. The forest research program will inevitably be subjected to severe financial constraints. Through cooperation, the Board believes that all parties will come to view forestry research as an investment in the future. The future promises uncertainty with more people, limited land, and greater environmental problems. The Board believes that cooperation in forestry research will be one of the most cost-effective ways to meet these increased pressures.

PROGRAM PURPOSE AND LAND USE PRIORITIES 0351.2

The primary purpose of the State forest program is to conduct innovative demonstrations, experiments, and education in forest management. All State forests land uses should serve this purpose in some way. In addition:

A. Timber production will be the primary land use on Jackson, Latour, and Boggs Mountain State Forests. Timber production will be subordinate to recreation on Mountain Home State Forest;

B. Recreation is recognized as a secondary but compatible land use on Jackson, Latour, and Boggs Mountain State Forests. Recreation is a primary use on Mountain Home State Forest as prescribed by Section 4658, Public Resources Code:

C. State forest lands may be used for Department administrative sites when such use will benefit State forest programs or protection;

D. Special uses primarily benefiting non-forestry and/or private interests will have low priority. Such uses that conflict with State forest objectives are discouraged.

DEMONSTRATIONS AND EXPERIMENTS 0351.3

The Board, consistent with PRC Section 4631, recognizes and reaffirms that the primary purpose of State forests is to conduct demonstrations, investigations, and education in forest management. The Board wishes to emphasize and expand demonstrational, experimental, and educational activities on the State forests. Accordingly, in the operation of State forests, the Department will:

A. Conduct a balanced program of demonstrations and investigations in silviculture, mensuration, logging methods, economics, hydrology, protection, and recreation; directed to the needs of the general public, small forest landowners, timber operators and the timber industry.

B. Continue and develop procedures to assure dissemination of information obtained on State forests to forest landowners, (especially small owners), timber operators, and the general public.

C. Integrate the Department's Service Forestry Program with State forest demonstration activities to more effectively reach small forest landowners and the general public.

D. Conduct periodic field tours to exhibit State forest activities and accomplishments to forest industry, small forest landowners, relevant public agencies, and the general public. Field tours should be initiated by the Department and conducted at such times and places to encourage general public attendance.

E. Seek special funding as needed from the Legislature to support specific research projects on State forests.

F. Consult with and solicit the cooperation of the State universities and colleges, U.S. Forest Service, and other public and private agencies in conducting studies requiring special knowledge. Enter into cooperative agreements with other public and private agencies for investigating forest management problems of mutual interest. It is particularly of mutual benefit to make the State forests available to educational institutions, and other agencies for research projects.

G. Cooperate with the Department of Parks and Recreation in establishing forest management demonstration areas compatible with recreation for educational purposes adjacent to the Mendocino woodlands Outdoor Center on Jackson State Forest.

Gary Nakamura (chair)
Jonathon Ambrose
Kathy Bailey
Dave Finigan
Mike Jani
Joe McBride
Marcia McNally
Matt O'Connor
Steve Staub
Hal Wagenet
Don Yasuda

Demonstration State Forests Advisory Group, State of California

February 27, 2006

Stan Dixon, Chairman
and George D. Gentry, Executive Officer
Board of Forestry and Fire Protection
P.O. Box 94244-2460

RE: Comments on the Draft EIR for the Jackson Demonstration State Forest Management Plan, December 2005

Dear Sirs:

As the members of the Demonstration State Forests Advisory Group we are writing to comment on the Draft EIR for Jackson Demonstration State Forest (JDSF) released by the California Board of Forestry and Fire Protection in December 2005. We commend the Board and Department staff. The weaving together of history, academic literature, trend analysis, and scientific research provide a window into JDSF's operations, its challenges, and opportunities. The document is long but interesting and impressive.

Convened by the Director of the California Department of Forestry and Fire Protection (CDF) it is our charge to provide advice on the research and demonstration activities of the state forests. In doing this we represent a broad view, coming from forestry (Nakamura, Jani, McBride, and Staub), fisheries (Ambrose), wildlife biology (Yasuda), hydrology (O'Connor), open space planning (McNally), local government (Finigan and Wagenet), and conservation advocacy (Bailey).

Since early 2005 we have met periodically on the state forest to learn in the field about management activities and to discuss research needs for the program state-wide. In December we drafted a preliminary list of research initiatives which we will be discussing in the months to come. A good deal of our discussion has focused on forest certification but other equally important research needs include:

1. How can the conversion of working forests be slowed, in particular what will make the best economic argument to forest landowners?
2. What role does a demonstration state forest play in preventing fragmentation of the larger, landscape-scale forest and its function as wildlife habitat, watershed, source of income for a local community, and so on?
3. What is the mutuality of revenue generation and demonstration of a working forest and how can this be communicated to the public?

4. What environmental services does a state forest provide?
5. How can working forests be compatible with and contribute to the quality of life goals of neighbors and communities?
6. What are ways to inform and engage state forest neighbors and the interested public in stewardship, such as participatory or all-party monitoring?
7. How can silvicultural practices address critical environmental needs while embracing opportunities such as carbon sequestration?
8. What is the appropriate technology and level of infrastructure for the state forest, particularly road construction and maintenance?
9. What are effective ways to demonstrate contemporary and emerging forest practices, inventory techniques, and so on to small-acreage, non-industrial forest landowners?
10. What is the changing face of California demographics, what forest values do citizens hold, and how can the state forest provide this citizenry with relevant demonstrations and appropriate recreation opportunities?
11. Are there externalities in environmental advocacy in California, in other words what are we exporting in terms of environmental impacts to those regions harvesting timber and producing products imported to California?

These are issues we expect to be addressed in state forest research. That said, we are aware that effective research and demonstration has been elusive on JDSF. In 1980 under the leadership of Professor John Helms a task force found that there had been a disproportionate emphasis on timber management and sales despite statute and Board policies that identified demonstration as a primary reason for the state to own forest land. JDSF and CDF have the opportunity to change this situation with a new management plan for the forest. By elevating the primacy of watershed and ecological process and research and demonstration to that of timber production this can be accomplished. We recognize efforts to address this critical need in the Draft EIR and urge the Board to hold the Department's feet to the fire in implementing these objectives. This Advisory Group will be watching to see how this mandate emerges in management activities on the forest.

The DSFAG members all agree that the effective use of the Demonstration State Forests suffers from the lack of adequate, certain, and sustained funding. We agree that timber harvest receipts from Jackson State Demonstration Forest are an appropriate source for some of this funding and that revenue generated by JDSF can be used to support research and demonstration activities at other Demonstration State Forests as well as at Jackson.

The DSFAG members have not come to consensus on supporting a particular EIR Option. We have restricted our advice to the implications of the Options for research and demonstration, and find that Options vary in their emphasis or ability to research and demonstrate even-aged management, herbicide applications, and other practices. The Options also vary in the potential revenue they might generate, being greatest with Options C, and less with D, E, and F (80 % to 55% of Options C).

Although these alternatives provide significantly different income streams, the more important consideration is how much timber revenue is actually applied to forest

operations including the demonstration and research program. We strongly support allocating any income generated at Jackson first to the forest's operations, maintenance, road rehabilitation, and research and demonstration projects; and second, to those same needs at other Demonstration State Forests.

Jackson Demonstration State Forest is the flagship state forest for California. As such it should be demonstrating the most advanced silvicultural practices, cutting edge research, forward-thinking management for habitat protection, and watershed health. The draft is a step toward making these things a reality on the forest. Again, we commend this effort and offer any assistance we might provide.

Respectfully submitted,

Gary Nakamura on behalf of the Demonstration State Forests Advisory Group
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Chapter 4. Research and Demonstration

Introduction

Jackson Demonstration State Forest is the largest publicly owned forest in California with a research and demonstration mandate. JDSF was acquired for the purpose of demonstration of economical forest management. During the process leading to the development of this management plan, the Board of Forestry and Fire Protection made it clear that they wanted JDSF to focus first and foremost on this research and demonstration mission. This is reflected in the number one goal this plan establishes for JDSF:

> Improve the amount and quality of information concerning economic forest and timber management, forest ecosystem processes, watershed processes, performance of forest protection measures that are available to the general public, forest landowners, resource professionals, timber operators, the timber industry, and researchers.

The Management Plan also designates two Major Demonstration, Experiment, and Education Areas, one on the east side of the Forest and one on the west, to provide the public and researchers access to a wide range of forest management examples within a relatively small area. It also provides for three Riparian Restoration Demonstration Areas, where research and demonstration will focus on the effectiveness and costs of difference approaches to riparian area protection and restoration. These important areas are designated on Map Figure 5.

Research, demonstration, and data collection conducted over the past 50 years within the state forest system has focused largely upon timber-related issues and, in terms of JDSF, watershed effects (e.g., Caspar Creek Watershed Study). Common subjects have included silvicultural systems, growth and yield, timber yarding practices, timber and log inventory, and sediment and stream-flow.

Within the past 15 years, the scope of forest research has expanded to include biological resources found within the forest environment. Evidence of this can be found in numerous publications associated with the Caspar Creek Watershed Study (see, e.g., the US Forest Service Caspar Creek website: http://www.fs.fed.us/psw/ef/caspar_creek/). For specific examples, consider the following topics of JDSF-related research presented at the 2004 Redwood Region Forest Science Symposium:

- Clonal spread in second-growth stands of coast redwood;
- Streamside temperatures within the coast redwood zone;
- Effects of timber harvest on fog drip and stream flow;
- Trends in streamflow and suspended sediment after logging;
- Rainfall interception in a coastal redwood forest;
- Role of fire in coast redwood forests;
- Salmonid communities of South Fork Caspar Creek;
- Modeling coast redwood variable retention regimes;
- Whiskey Springs redwood thinning study: a 29-year status;
- Erosion rates over millennial and decadal timescales;
- Significance of suspended organic sediments to turbidity, sediment flux, and fish-feeding behavior;
- Stand dynamics of coast redwood/tanoak forests following tanoak decline.

The primary goal of JDSF during the planning period will be to improve the amount and quality of research and demonstration information on forest management and forest biophysical processes to the public, small forest landowners, resource professionals, timber operators, the timber industry, and researchers. This goal can be met by conducting demonstrations and investigations through consultation and cooperation with universities and colleges, Federal agencies, and other public and private

researchers. Increased funding and staffing should be pursued to accelerate the expansion of knowledge through additional demonstration and research efforts and establishment of a Forest Learning and Interpretive Center on JDSF.

Jackson Demonstration State Forest is committed to providing innovative demonstrations, experiments and education. The number of acres and breadth of age classes and seral stages contained within JDSF will allow for large landscape level research and demonstrations to complement stand and individual project level work. JDSF will demonstrate the full range of intensity of forest management while maintaining a diversity of stand conditions for future research not yet known. JDSF explicitly acknowledges that forest management is a much broader concept than the growth and yield of merchantable timber. Special concern areas such as riparian and older forest corridors, unusual plant communities, ecological processes, wildlife use of habitat corridors or structural elements, and individual species are all worthy topics for examination within the research and demonstration program.

There remains a great deal of uncertainty in the regulation of forest management activities to maintain maximum sustained production, and in the level of mitigation necessary to protect and enhance watersheds and wildlife habitats. Regulatory standards are often established in a forum that combines and balances scientific knowledge, landowner rights and desires, and legal constraints. There is a growing need to determine the environmental effects and costs of regulatory standards as applied or proposed for application in the field. The State Forest should remain available to assist landowners and regulatory agencies in this effort. It can be desirable to test a range of variables or conditions, such as buffer widths and even-aged unit sizes to be able to make scientifically valid comparisons of the effects of various management options. CAL FIRE will work with the Board, and State and Federal regulatory agencies in order to establish a mechanism or process by which the system of State Forests can be a testing ground for various levels of regulation and mitigation. This may require the Department to seek limited exemption from certain regulatory or standard mitigation requirements. Designating specific areas as experimental forest under CEQA or the Forest Practice Act might be one exemption method used. This process will remain sufficiently constrained to maintain public confidence in the overall management of the Forest.

The research and demonstration, timber management and recreation programs of the State forest will be integrated to the degree that current operational timber management practices can be used to effectively demonstrate Best Management Practices and a variety of silvicultural systems, including alternative treatments and innovative experimental practices. Recreational use of JDSF offers the State an opportunity to introduce the public to timberland management through casual encounter, guided trails, roadside displays, etc. Jackson Demonstration State Forest will seek out and apply new and emerging management practices in order to expand our knowledge of forest management practices and their effect on the ecosystem. In order to achieve this objective, State Forest staff will maintain an ongoing exchange of ideas and information with forest landowners through advisory groups, publications, symposia, workshops, and professional contacts.

Many of the projects and studies done on the state forest have excellent demonstration potential. Many of the project sites are visited numerous times each year by tour groups. These sites include uneven-aged silvicultural study areas such as the Railroad Gulch Silvicultural Study and the Caspar Creek Cutting Trials; the in-stream large woody debris placement studies on Parlin Fork, Hare Creek, and Caspar Creek; as well as all of the operational timber sale areas where selection cutting has been done. Even and uneven-aged silviculture has been successfully combined with investigations of watershed processes and rehabilitation and fisheries demonstration in the Caspar Creek Watershed Study. Both the North and South Forks of Caspar Creek are used frequently for demonstrating these subjects to a wide range of clientele. Vegetation management is done extensively on the State Forest and has been successfully demonstrated in its various stages to many groups. Young stand management using precommercial thinning techniques and mature stand stocking control using commercial thinning can be viewed in many of the past timber sale areas for demonstrational purposes. A range of age-classes has developed on the Forest, which constitutes a valuable demonstration opportunity.

JDSF staff currently includes three full-time positions dedicated to research and demonstration (Forester II, Forester I, and Forestry Assistant II). A research coordinator and a biometrician are located at CAL FIRE's Sacramento headquarters.

Planning for Future Research and Demonstration

Key Areas of Increasing Effort

The Department intends to manage the state forest system as a demonstration of sustainable forest management, while creating and maintaining a diverse forest laboratory available for research on a vast array of subjects. Informational needs associated with forest management are very large and changing. At JDSF, this dynamic situation underscores the importance of maintenance or creation of a varied forested landscape, while being mindful of the need to remain relevant to the informational needs associated with management of private timberlands. For these reasons, the following become key factors in a long-term research plan:

- Increasing quantification of the forest
- Creation of a varied landscape while managing in accordance with approved management plans.
- Detailed documentation and quantification of changes due to management activity.
- Continued and increasing monitoring of various aspects of the forest environment to enable assessment of trends and conditions. Efforts will be made to move away from qualitative assessments to scientifically defensible tests of individual practice effectiveness. This adaptive management feedback loop will provide a mechanism to alter existing and proposed management practices where necessary.
- Conduct of specific research designed to answer critical questions identified by the Board and the Demonstration State Forest Advisory Group or other advisory bodies that may be established.

Increasing resource allocation to each of these activities over time will be key to the ultimate effectiveness of the state forest system. CAL FIRE's intent is to accomplish this through internal funding, grants, and cooperative arrangements with various partners.

Experimental Design – Replications and Controls

As a research and demonstration forest, JDSF is in the unique position of preparing for the eventuality of unknown future research projects with objectives that are likely to be substantially different from those of today. The research and demonstration program staff will participate in the forest management planning process to help keep options open and maintain a wide range of conditions in the field for future research installations.

A significant objective during the planning period will be to create and maintain a system of replicated diverse stand structures and potential control areas throughout the Forest. This system is planned to be able to accommodate a wide range of experimental designs that require replication of treatments.

This system of replicated stand structure will include a flexible strategy for creating control areas. Some stands may be set aside temporarily, or for longer periods, if needed, as controls to assess baseline change over time, and may be established as components of specific research proposals. The assignment of areas and specific locations of experimental controls will be a dynamic process as stand development evolves over time or as different research projects are initiated and completed. When a

particular timber stand has fulfilled its function as a control, it will become available for treatment and another area within the watershed may be designated as a new control.

Watershed-level Research

The forested environment is composed of an interacting set of biological and physical resources and processes. Future management should create conditions that facilitate needed research into these interacting factors. For example, forested watersheds possess essential habitats and habitat elements for both terrestrial and aquatic species. The interactions and dependencies between these resources combine with management activities to create complex forest management challenges. State forest management should enable an increasing level of research at the watershed level or similar scale. Increasing paired watershed studies, combining detailed examinations of habitats and forest management treatments, should be a goal within the state forest system.

Testing and Comparing Management Goals and Intensity

Developing information on the effects of common or anticipated practices conducted at varying levels of intensity is a key aspect of forest management research. The North Fork phase of the Caspar Creek Watershed Study embodies this philosophy. In this study area, an attempt was made to create effects that could be quantified and evaluated. Watershed studies can serve this purpose by applying differing types of management at varying levels of intensity. For example, one watershed may be managed to simulate a very high level of timber production, another may be managed at a lesser intensity designed to foster both timber and other resource values, and a third may be held as a control. This approach also can serve to compare and contrast management by the various owner behavior groups characteristic of the private sector.

Anticipating Change

Forest management is a long-term enterprise. Generally speaking, forest stand and ownership-wide development is placed on a trajectory that requires many decades to reach a desired condition. However, ownership patterns and management objectives may undergo more rapid change in response to changes in economics and social values.

The state forest system should be capable of periodically assessing these changes, and attempt to anticipate the necessary forest management response. This focuses the need for continuation of state forest advisory structures, as well as periodic review of management direction by the Board. The changing climate of forest management should be a matter of periodic discussion by the various advisory entities, and can serve as an important source of counsel and advice on management direction and research needs.

Advisory Committees

With potentially conflicting demands for research and demonstration, a process for identification of needs, prioritization, and allocation of funding is necessary. The Department has an existing Demonstration State Forest Advisory Group (DSFAG), which advises on State Forest Programs throughout the state. The Board of Forestry and Fire Protection has indicated that it will be re-establishing its Committee on Research, which has been dormant for some time. This latter entity has broad responsibilities with respect to review of ongoing research programs; advising the Board on research needs, priorities, and policy; playing a leading role in improving the coordination and cooperation of the various public and private entities engaged in forest research; and recommending a system of collection, maintenance, and

dissemination of forestry research project information. Additionally, the Department and Board are now establishing a new advisory body specifically focused on JDSF, as discussed previously.

These advisory bodies would assist and provide recommendations in regard to the long-term research goals and actions under the management plan, as well in regard to proposed significant management activities. They will provide overview and assist in the identification and prioritization of research and demonstration projects in order to provide appropriate representation for the public, timberland owners, resource professionals, educational institutions, state and local government, and state forest management staff.

Past research topic suggestions and recommendations from various entities are contained in Appendix III (Research and Demonstration Program).

Increase Research Capability

In order to maximize effectiveness in dealing with the key areas of a long-term research plan (see bullets above), the capability of state forest staff should be expanded to include expertise in a broad range of environmental fields. This expansion would provide greater capability to anticipate, facilitate, coordinate, and conduct research within the state forest system (see the tiered research, demonstration, and monitoring plan within this chapter for an indication of preferred expertise that could be added to the state forest system). In one step in this direction, a wildlife biologist position was added to the Forest in the 2006/07 fiscal year.

Cooperatives

The most efficient use of resources is frequently found through cooperative arrangements. These include research cooperatives with landowners and universities, and agreements with other agencies. The Caspar Creek Watershed Study is an example of an agreement with another agency, the USFS Pacific Southwest Experiment Station, Redwood Sciences Laboratory. The CACTOS and GSPACE cooperatives are examples of industry/university research coops in which CAL FIRE has participated. CALFORNET, a new concept of a joint effort by CAL FIRE and the three forestry universities in the State is another example of cooperation. This effort is attempting to coordinate research and demonstration projects between CAL FIRE and the university forests to maximize the effectiveness of available funds.

Additional efforts must be made to coordinate with other state and federal agencies. Particular efforts should be made to cooperate with fisheries and marine scientists at and near Jackson Demonstration State Forest. The pursuit of cooperative funding to leverage existing funds from CAL FIRE should be made where feasible.

Expand Forest Size and Forest Types Represented

To enhance capability to conduct effective forest management research, consideration should be given to expanding JDSF and the other state forests to enable research at the larger watershed or large stand level. In addition, consideration should be given to increasing the number of state forests in order to represent all of the major forest types within the various forest regions subject to regulation by the Board of Forestry and Fire Protection.

Research and Demonstration Needs

Competitive Research Grants

Beginning in fiscal year 1999, funds have been allocated from the Forest Resource Improvement Fund (FRIF) to support expanded research within the State Forest system. This money is available to researchers and others through a competitive grants program that is administered by the CAL FIRE Sacramento State Forest staff. A request for proposals (RFP) will be issued by the Department no more frequently than annually and will skip a year when available funds are insufficient to justify it. CAL FIRE, in conjunction with subject area experts, will review the proposals. CAL FIRE staff will implement a scoring system based upon criteria listed in the RFP. Proposals will be ranked, allowing extra points for certified small businesses or any other special consideration required by law. The top proposals are awarded until the funds are exhausted. Frequently, projects are multi-year and some flexibility exists to maximize the number of projects funded. A fund reserve shall be kept for miscellaneous projects that occur outside the RFP process. Contracts for approved projects are developed in Sacramento. State Forest staff will administer most contracts.

Future Funding Levels

Sacramento staff has responsibility for the coordination of research state-wide. They also have the responsibility to administer a competitive grant program available for State Forest research. The current authorized level of funding available for State Forest System research is about $1 million per year, including about $180,000 specifically earmarked for JDSF. Although authorized, this level of funds has not actually been available due to revenue constraints. Strong interest shown by both the numbers of individuals applying for research funding in the past, and by individuals and organizations inquiring about potential research results, indicates the need to increase funding levels substantially. An increase in annual funding to match the level of demand for forest research would be beneficial. When opportunities arise, staff will attempt to find funds for research proposals.

Research Scoping Criteria

State Forest staff has formulated a series of questions designed to establish the relevancy and priority for proposals suggested by staff or received from other sources.

- Is the research project consistent with the legislative mandate and with the policy set by the State Board of Forestry and Fire Protection?
- Is the research project consistent with the recommendations of Department and Board advisory bodies?
- How does the relative importance and urgency of the research project rank in the list of issues that should be addressed during the plan period?
- What are the expected applications and benefits of the research project versus the projected costs of implementation both short term and long term?
- How does the research project affect other programs on the State Forest and other projects or demonstrations with other cooperators?
- How well does the research project address multiple resource sustainability and environmental concern issues that may be associated with the treatments?
- How well does the research program address problems related to long term trends?

State Forest Identified Research Priorities

Using the process identified above, the Forest staff has identified a number of research priorities for the planning period that will be considered together with priorities identified by other sources. These include:

- Quantitative assessment of the effectiveness of the delineated upland and riparian corridors in providing habitat and expanding the forest occupancy for identified species of concern.
- Carbon sequestration as a management option, including the economic and social benefits in mitigating the greenhouse effects.
- Research on forest ecology, forest biological processes, and measurement of ecological health.
- Develop partnerships and fund research giving priority to information gaps such as below-ground carbon cycles, fog drip utilization by tree and understory plants, methods to hasten development of older forest structure, and climatic tolerances of species.
- Social science research on the structures, functions, processes, success, and failures of advisory entities associated with the management of JDSF.
- Research on the short-term and long-term costs and effectiveness of various forest resource protection measures.
- Fisheries studies that include channel habitat, population dynamics, and off site conditions.
- Young stand management that includes stocking level and precommercial thinning studies.
- Riparian zone wildlife habitat relationship studies that include topics such as stream buffer enhancement and maintenance, and relationships between forest cover and wildlife.
- Watershed management that includes sediment yield, stream discharge, sediment sources, road abandonment, watershed rehabilitation, and harvest reentry studies.
- Upland zone wildlife habitat relationships including modeling, forest fragmentation, edge effects, connectivity, forest corridors and population trends.
- Investigation of optimal element and spatial configurations of structural elements retained during timber harvesting activities.
- Approaches to accelerate or enhance development of older forest or late seral forest characteristics in second-growth stands.
- Role of basal hollows in improving habitat including methods to create these structures without fire.
- Silvicultural systems that include even and uneven-aged management systems.
- Vegetation management that includes control of invasive weed species, competition in plantations, and prescribed fire.
- Public education on forest resources, technologies and issues.
- Forest growth model development that includes gathering data for and improving existing models (e.g., CRYPTOS).
- Forest data systems development for creating, improving and maintaining a data bank on existing and new data that includes both database and GIS data layers.
- Examinations of a range of plant habitat and community interactions.

On-Going Current Research and Demonstration Projects

A number of ongoing research and demonstration projects that will require action during the planning period are listed and briefly described below.

Caspar Creek Watershed Project

This long-term watershed project was initiated in 1962 to monitor the effects of timber management upon various watershed processes. A new South Fork phase was initiated in 1999. The Caspar Creek Watershed study is monitored continuously. JDSF is responsible for infrastructure maintenance including roads, trails, field data collection sites, fish ladders, and the periodic cleaning out of the sediment behind the North Fork and South Fork Caspar gauging weirs.

Caspar Creek Cutting Trials (Control Area)

This unmanaged five-acre stand of second-growth was initially measured for timber stand characteristics, i.e. stocking level, in 1959. It has been periodically re-measured and was last measured in 2006. It should

be scheduled for another measurement in 2016 to assess the stands relationship to culmination of mean annual increment.

Caspar Creek Precommercial Thinning Study

This young stand of third-growth redwood was precommercially thinned to various stocking levels in 1980. The area has been measured periodically since that time, with the most recent measurement in 1998. This area should be measured again in 2008 or 2009.

Middle Fork Caspar Creek Advanced Regeneration Study

This mature second-growth stand was initially harvested in the 1960s. The second entry removed most of the overstory leaving suppressed trees as advanced regeneration. Plots were established in 1987 to monitor the growth of these trees and to compare with plots where these trees were cut to provide for new sprouting. A remeasurement is scheduled for this planning period.

Whiskey Springs Commercial Thinning Study

This stand of second-growth redwood was commercially thinned to several redwood stocking levels in 1970. The most recent measurement occurred in 2005-2007. Portions of this study may be manipulated for use in other studies investigating redwood-stocking levels. This stand should be scheduled for measurement again in 2015.

Hare Creek Sprout Stocking Study

This demonstration of stand development from a regeneration harvest started in 1986 has had two remeasurements since the installation, the last done in 1998. One remeasurement should be done in 2008.

Railroad Gulch Selection Silviculture Study

This demonstration of various selection cutting methods and levels was initiated in 1984 and was re-measured in 2003. Focused silvicultural analyses are currently being conducted by UC Berkeley. An analysis of the data, silvicultural prescription, and second entry timing will occur during the plan period.

Parlin Fork LWD Study

This demonstration of artificially loading stream channel sections with large woody debris to improve fish habitat was initiated in 1996. The most recent measurement occurred in 2006. Periodic remeasurements may be done during the plan period.

Hare Creek/Caspar Creek LWD Study

This demonstration is similar to the Parlin Fork LWD study in testing techniques to improve fish habitat. The main channel in each had LWD placed in 1999. The most recent measurement of the large woody debris occurred in 2006. Periodic remeasurement of wood debris in the channel and juvenile fish populations will occur during the plan period.

Asymmetrical Coast Redwood Growth Model Study

This study was initiated in 1986 to develop a process based coast redwood growth model and a mechanism to thin a stand to optimize stand growth and yield. Remeasurement of the thinned stand using the developed specifications was completed in 2006. Analysis of the data is complete.

A Long Term Precommercial Thinning Study in Coast Redwood

The study established in 2001 is a long term precommercial thinning trial in the coast redwood type which tests 1) a range of stocking levels; 2) the growth response over a range of environmental and management activities including broadcast burning, herbicide application, slope, aspect, age and site; and 3) the optimal stand age for conducting the PCT treatment. The study will also provide data which may be used to expand the CRYPTOS growth model for ages from zero to 20 years. The first remeasurement will occur during the plan period.

Road Surface Erosion Study

This is a pilot study measuring road surface erosion by David Tomberlin, National Marine Fisheries Service and JDSF. Initiated in 2004, it includes the manufacture and installation of ten collection devices on JDSF that capture water from ditch relief culvert outlets. JDSF is collecting data on coarse sediment, suspended sediment, and water quality. Initial findings have been evaluated and presented at a professional forestry conference.

Demonstration

Creating opportunities for demonstration of various silvicultural systems, forest structures, and wildlife habitats will be a significant focus of effort. Two demonstration areas, one on the west and one on the east side of the Forest, are proposed. Planning specific demonstrational features and development of these areas, with input from the public and the new JDSF advisory body, will occur during the planning period.

Timber stands that contain various habitat conditions can be both valuable demonstrational areas and provide opportunities for research on both riparian and upland species and associated effects of management actions. Topics relevant to sustainable wildlife habitat such as forest fragmentation, landscape connectivity and edge effects have a high priority for research in the planning period. Information needed for landscape connectivity assessment for example, includes species movement, response to patch structure, gap crossing ability, and dispersal distance, most of which is unknown for most vertebrate species.

All currently recognized silvicultural systems will potentially be available for demonstrational and operational purposes. Uneven-aged management is of great interest to non-industrial forestland owners, and a large land allocation on the State Forest will be devoted to silviculture systems which produce these kinds of stands. To a lesser extent, stand structures exhibiting even-aged silviculture systems such as clear-cutting, seed or structure tree and shelterwood will also be created and maintained, subject to the limitation specified in Chapter 3. All of these sites are transient in their ability to convey certain demonstrational qualities, so management efforts also have to emphasize maintaining all these kinds of stand conditions in different locations over time. It is also important to retain stands that have similar characteristics to other forest stands in other ownerships in the region so that relevant management techniques can be demonstrated. The effectiveness of demonstrational areas depends in part on the completeness of the information that is available to interested clientele.

Information packets may be developed and maintained which focus on the demonstrational qualities of a particular site. These packets are often used as one type of information transfer medium on tours and similar events. Keeping the information packets current requires periodic records updating relating to

management actions and stand development. Particular sites may warrant permanent informational or interpretive displays. Sites that are relatively secure in terms of potential vandalism and have high demonstrational value have a higher priority, i.e. The Railroad Gulch Silvicultural Study area. This site is adjacent to the Woodlands Outdoor Education Center and a permanent interpretive display may receive a high amount of use. A proposal will be made to the California Department of Parks and Recreation to jointly develop areas for forest demonstration that are adjacent to the Woodlands Center and to the Pygmy Forest Reserve.

Tours

As in the past, tours are given by request to a wide range of groups each year. Tours have been given to school classes ranging from kindergarten to college emphasizing natural resource education, ecology, and forest management. Other tours have been given to professional organizations such as The Society of American Foresters and to policy-making bodies such as the Board of Forestry and Fire Protection. Other clientele include visiting research scientists from across the world who are interested in specific research activities being done on JDSF. Other organizations such as the Western Research Forest Managers group who meet annually at one research forest have been hosted on JDSF. Timber industry foresters have been given tours on the forest so that management techniques that are used on the Forest can be passed along to the private sector. Both small non-industrial and industrial landowners and land managers have toured various sites within JDSF to examine stand treatment, forest development, and various recovery efforts.

As part of future activities, a regularly scheduled program of tours - 3 to 4 per year - is planned to show, explain and interpret the changing landscape and type of management that is being done on JDSF. It is our intent to enhance the public view of JDSF as an open house. This series of tours, each of which could be focused on different aspects of management or research, would complement the requested tours. Such scheduled tours will be well advertised with an agenda and handouts to supplement the discussion at various stops.

State Forest Data Bank

Developing a State Forest data bank for documentation of management activities will be a priority task during this plan period. Current computer technologies permit efficient electronic storage and retrieval of all types of resource information including graphics. A formal procedure for input of all types of research and operational data into the bank will be developed during this planning period. Researchers and forest staff will be able to access all information that has been documented and reported on through one system in a timely and efficient manner. Proper development of the data bank and its use will also be a tremendous asset in the monitoring and adaptive management part of the forest program. The system will help to prevent duplication of data collection and accelerate the process of progressing to the next step in specific research areas. This central data bank also minimizes the chance of data loss and serves as one form of institutional memory, especially important with long-term projects such as the Caspar Watershed study, which has a 100-year planning horizon.

Important components to consider in the development of this databank include a database of important statistical data associated with various management actions such as timing, before and after timber stand attributes or other associated resource information. Another is a database link between raw data and the associated reports that provide the data analysis and conclusions about management actions and studies. The photo coverage described above is an important element of the databank. A spatial link can be provided in the form of GIS coverage on all management areas and actions. This GIS environment is an excellent platform to tie all these resources together and will be an important component for continued development during this period. This will require the services of a dedicated GIS specialist on staff in coordination with state forest staff.

As part of a complete documentation of activities, a consistent and organized effort towards building a photographic record of state forest activities and forest development is needed. An attempt will be made to establish and maintain a set of photo points. The advent of digital photography and digital storage allows the relatively easy electronic storage of photos which can then be made available over the internet as part of the public education and technology transfer components of the program.

Internet Web Site

The exponential increase of Internet use as an information tool by all clientele groups makes it an important technology transfer and public relations medium. In coordination with the Unit and Sacramento, the current internet web pages which describe the State Forest system will be expanded to include forest descriptions and statistics in much greater detail. Access to publications is currently available on www.demoforests.net. This web site is being updated with materials from JDSF and is the first phase of the data bank. Over the planning period, additional types of publications will be made available for viewing and download. GIS information on many types of forest attributes will become available for viewing using free viewer programs such as ArcExplorer. Links to other related or affiliated organizations will be made part of the web site. Periodic updates to the page will be done as management activities change the status of forest conditions.

Publications

The Jackson Demonstration State Forest newsletter is a state forest publication designed to quickly transfer information regarding management, recreation, and research activities on the Forest. It is written, formatted, and reviewed by CAL FIRE Forest and Unit staff as a publication of the Mendocino Unit. It is currently printed using the Department of Corrections print shop facilities. This format started in the early eighties with almost fifty issues having been published and sent to a mailing list of over 400. It is the intent to publish a minimum of two newsletters per year. This will allow the timely transfer of information about current events and activities on the state forest. The Demonstration State Forests newsletter is a system-wide vehicle for outreach and is published out of the Sacramento office with contributions from the forests. These publications are available on-line.

The State Forests Research and Demonstration Newsletter, initiated in the spring of 2003, is produced by the State Forest Research Coordinator in Sacramento. It covers research and demonstration projects from all of California's state forests. The goal is to keep the public informed of the on-going commitment CAL FIRE has to increasing our knowledge-base and research data, and to share the findings these projects have produced with foresters, research scientists and the public. These publications are available on-line.

The California Forestry Note has been the CAL FIRE publication for state forest activities since 1960 (originally called State Forest Notes). More recently, the California Forestry Report series was created for more lengthy publications. Most research projects should produce at least one California Forestry Note or Report (see below). Reprints from other peer-reviewed publications may also be available. Sacramento staff serves as the editor and publisher of these series with technical assistance from State Forest staff. Research projects such as the Caspar Watershed Study, Caspar Cutting Trials, Railroad Gulch Silvicultural Study, Redwood Sprout Study, and Hare Creek Sprout Study have been reported on in this series. These publications are available on-line.

Forestry Reports are oriented towards a professional or research audience. The writing is more technical and lengthy than that found in the California Forestry Note. Generally, at least one of the authors is a State employee. Four reports were edited and published by Sacramento staff in 2004 and 2005. These publications are available on-line.

Most research contracts contain a report requirement. These reports are often summarized in a State Forest publication or are further developed by the researcher for submittal to professional journals. All

reports submitted since 2001 are available on-line. Earlier reports will be added to the Internet web site during the plan period.

Numerous professional journals offer the possibility of technology transfer to a wider audience than might be contacted through the internal CAL FIRE publications. The primary researcher may desire to submit an article that reports on research done on JDSF to a peer reviewed journal. This will be encouraged as long as it does not abridge the right of CAL FIRE to publish research results in a CAL FIRE publication. CAL FIRE may also submit research reports to professional journals in addition to publication internally.

Symposiums

Symposiums which cover a range of topics relevant to resource management in the coast redwood region will be planned for every five years to report on the results and status both from JDSF research and related external research. Smaller information transfer sessions will be conducted as an interim process to transfer information on a timely basis. Two major conferences and one update session have been presented within the last decade. The first was the Coast Redwood Ecology Conference that was presented in 1996 at Humboldt State University in Arcata. Over 600 participants from all over the world attended the 3-day conference in which speakers presented on a wide variety of subjects regarding coast redwood management and ecology from many different organizations. The second conference followed in 1998 and was focused on the results of the second phase of the Caspar Watershed Study. This phase was designed to address the issue of cumulative watershed effects given the set of management activities applied to the watershed. This one-day conference was presented at the Mendocino College in Ukiah and attended by over 500 participants from all over the country. A one-day field tour of the watershed study area was given in conjunction with the symposium. A one-day information transfer session was presented in the spring of 2000 that focused on results from a number of recent research and monitoring studies. JDSF also participates in symposiums sponsored by other organizations such as the 2004 Redwood Region Science Symposium coordinated by the University of California Center for Forestry. In fact, 31% of the presentations and 26% of the posters at that event were associated with research from JDSF.

Proceedings will be developed from every conference that the State Forest sponsors. Interim results from several of the major research projects on JDSF were published in the proceedings resulting from the last two conferences. These included reports from multiple sub-studies of the Caspar Watershed Study, the Railroad Gulch Silvicultural Study, the Whiskey Springs Commercial thinning Study, and the Caspar Creek Precommercial thinning Study.

New Research, Interpretive, and Education Facilities

The Department has for some time been interested in expanding its facilities and capabilities for supporting research, providing interpretive opportunities, and being able to offer educational programs such as classes. Until recently, much of this expansion was considered in the context of the site of the existing modest Forest Learning Center facility at Camp 20. This building, completed in 2003, serves as a dormitory facility for visiting researchers and as an informal meeting place for groups that appreciate a facility half-way between Highway 101 and the Coast.

Recently, as a part of ongoing discussions regarding the redevelopment of the former Georgia-Pacific mill site on the Fort Bragg waterfront, the City of Fort Bragg has invited the Department and the Board to join them in the exploration of the creation of what is being called the Noyo Center for Science and Education.” This new Center could evolve into providing exactly the kind of facility the Department has envisioned for providing research, interpretation, and education. JDSF and the Department will actively join the City in the consideration of this concept.

Additional funding and staffing would be required to accomplish any of the three items discussed in this section.

Forest Learning Center

The construction of a Forest Learning Center is planned for implementation during the coming decade. The desired facility will include a conference center, classrooms, resource and research library, Internet access, State Forest Data Bank access, research lab, video conferencing, and administrative offices as part of the complex. The research library will be created from existing libraries on the state forest and will be updated gradually over the planning period with literature on all subjects relevant to the effective management of the state forest. This activity will be part of the Education Forester responsibilities in conjunction with other forest staff.

There will also be institutional network access to other research facilities and research forests nationwide, including Soquel Demonstration State Forest, U. C. Berkeley's Blodgett Forest, California Polytechnic State University's Swanton Pacific Forest, and Humboldt State University's School Forest. This Center will provide the resources to do needed research in a productive and cost efficient manner. Group education sessions can be held simultaneously, taking advantage of the latest research results. This facility will be built on the State Forest in an area representative of the coast redwood/Douglas-fir ecosystem. Alternatively, there may be potential for the Forest Learning Center to cooperate or partner with the Noyo Center for Science and Education.

Access from Highway 20, as well as high speed Internet access, will be important considerations in determining where this facility will be located. The location of the Forest Learning Center should allow for the expansion of facilities over time, and may include space for the possible siting of a new State Forest headquarters as well. The Forest Learning Center will be located and designed in accordance with the CEQA process to not significantly affect day or night time views from campgrounds or residential areas. The operations of the State Forest and activities of the Forest Learning Center need to be closely connected. A long distance between facilities may impair the potential to integrate forest operations with the research and demonstration program.

JDSF Interpretive Center

The construction of a JDSF Interpretive Center will be planned for completion in conjunction with the Forestry Learning Center. This facility may be built near the historic schoolhouse located in the Camp 20 area. This site is adjacent to Highway 20. This location will be capable of serving the many thousands of forest visitors traveling through the State Forest each year. An opportunity will be provided for the public to learn about forest ecology, forest management, and the unique mission of the State Forest. Alternatively, there is potential for the Interpretive Center to cooperate or partner with the Noyo Center for Science and Education.

The Interpretative Center will provide museum space for early logging and prehistoric artifacts found on the State Forest as well as up-to-date displays of JDSF research and demonstration programs. Forest visitors will be able to obtain camping permits, maps, trail brochures, wildlife and vegetation lists, and firewood and mushroom collection permits. Other resources available to the public may include a bibliography of State Forest research, natural history books relevant to coast redwood ecosystems, and updated schedules of proposed tours and seminars. This Center will also include a classroom space for approximately 30 students, rest rooms, and outdoor picnic facilities. The State Forest would seek to develop a memorandum of understanding (MOU) with local school districts, Mendocino Woodlands, and State Parks to provide a comprehensive interpretative program for school-aged children and forest visitors on forest management and ecology issues. This MOU will include program space for CAL FIRE's Project Learning Tree, and will seek to develop a close working relationship with the Forestry Institute for Teachers and other educational programs.

Public and Professional Education

Forestry education is a vital component of the research and demonstration program. A JDSF Forest Learning Center in conjunction with the Interpretative Center at Camp 20 will provide the structure to facilitate a comprehensive education program. Alternatively, there is potential for the public and professional education function to cooperate or partner with the Noyo Center for Science and Education.

The clientele for this component of the program will encompass all grade levels of school up through postgraduate, forest landowners, resource professionals, and the public. Developing and using demonstration areas will be an important component of this program. A volunteer docent will help staff the interpretative center/museum that will have books relating to various resources found on the Forest. Tours can start from here, accessing the middle and eastern part of the Forest. Another effort will be in developing forest demonstration trails that serve both natural resource interpretive purposes and demonstrations of active forest management. A MOU with local school districts, the Mendocino Woodlands Center for Outdoor Education, and State Parks will help school-aged children and forest visitors develop a better understanding of a healthy managed forest. Personnel dedicated to public education would lead this outreach effort. All of these initiatives are examples where the demonstration and recreation programs can complement one another to maximize their potential benefits.

Mitigations and Monitoring for Research Projects

The varied nature of proposed research projects precludes applying specific mitigation measures to each proposed project. Rather, each project will need scoping and further assessment to determine the applicable mitigations needed.

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 our Program EIR that must forecast the impacts of actions resulting from policy decisions. Most often, programmatic or policy-level mitigation is either included in the DFMP or is provided as part of the accompanying EIR. Individual project level mitigation may be deferred to a subsequent impact assessment where the scope or site-specific details of the action are currently speculative, not fully known, or not analyzed to a sufficient degree in the EIR. In these cases, additional CEQA review is required once the activity is fully defined in terms of scope, location and other factors. This review, where necessary for identification of additional mitigation, will occur in the development of Timber Harvesting Plans, EIRs, or negative declarations that tier off of the EIR.

Chapter 3. Research and Demonstration

Summary

JAG proposes a comprehensive research-oriented management framework as a pathway toward moving JDSF toward a World-Class Research and Demonstration Forest. The framework is focused on transitioning the forest toward a more rigorous scientific basis consistent with other research forests in western North America. The framework views forest management as an opportunity to inform managers and policy-makers on the effectiveness of management, the validity of working assumptions, and the impacts on environmental resources. It would facilitate innovations in forest management policies and practices that would yield improved overall sustainability and stewardship of forest resources throughout the state in general and the redwood region in particular.

Our proposed research-oriented management framework would develop narrowly defined "Centers of Excellence" utilizing JDSF's unique strengths. The Centers would position JDSF as a hub for multi-disciplinary research addressing issues and challenges associated with redwood forest management. It envisions that each Center would leverage JDSF resources within a regional context by utilizing lands throughout the redwood region through collaboration with a broad consortium of stakeholders. Example topics of focus (subject to additional review) could include Centers on Coho Salmon Recovery, Upland Terrestrial Habitat & Forest Structural Relationships, and/or Sustainable Forest Management Practices.

Our vision has been presented to numerous stakeholder groups and has generally received broad support. We recommend that the next step should be to convene a Research Planning Team to develop much of the detail for this framework in the form of a professional research agenda focused around the Centers of Excellence. We anticipate that this team will need to comprise a group of professional scientific researchers and managers with the skills and tools necessary to develop a professional research agenda. We note that this team could be at a substantial disadvantage if it is staffed by volunteers, since it will require considerable attention to detail and professional due diligence to develop a quality plan. Our recommendations provide some initial thoughts about the scope of work for this Research Planning Team, subject to review and refinement by the Board and CAL FIRE staff to identify a scope that can be implemented within available resources.

The long-term implementation of the scientific, demonstration and adaptive management mission of the forest could best be guided by a semi-independent research-oriented organization (Redwood Research Group) that would be primarily responsible for the administration of all research, adaptive management, monitoring and possibly demonstration**.** This group would consist of the scientists, technicians and support staff responsible for various scientific programs within each Center of Excellence, and would leverage additional resources through universities, landowners, conservation groups, and other research organizations. The Redwood Research Group should seek to leverage funds from timber harvests with other funding mechanisms (e.g., grants, foundations, partnerships, conservation funding, etc.) both as a means of extending resources and ensuring that the forest is generating marketable value to a diverse group of stakeholders. The Research Group could also act as a facilitator for a broader regional collaborative (Redwood Regional Consortium).

I. Introduction

This document describes our vision for how JDSF could improve its status toward a **World-Class Research Forest**. Such a forest is fostered by its integrated research program and is realized by the ability of that program to drive forest management activities in a manner that is broadly recognized as a source of quality, rigorously tested, scientific knowledge. A World-Class Forest is one where:

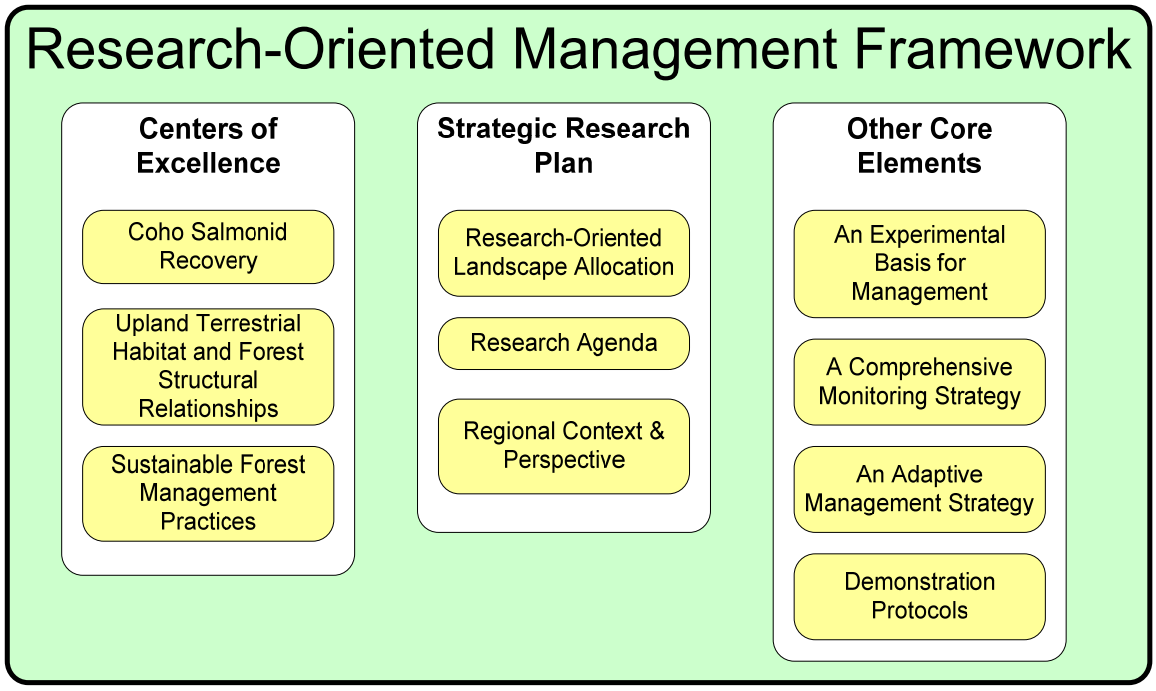
- The management plan and its landscape allocation create the opportunities for testing important hypotheses related to forest science, policy and management.
- Research efforts extend beyond the forest to integrate studies and lessons from, and inform management decisions on, other relevant forestlands.
- The forest uses opportunities, both on the forest and regionally, to seek answers that are relevant to a broad cross-section of stakeholders and other landowners.
- Research results are published and cited widely, in a breadth of professional and scientific journals, especially those highly regarded within and among disciplines.
- Techniques are actively developed that support sustainable forest management practices and knowledge-based policies, both of which are transportable to other landscapes and inform key issues.
- Data, maps, and history are well tracked and well maintained.

Together, these qualities will create a compelling set of conditions that will attract cooperative funding opportunities and diverse researchers investigating a broad array of subjects.

The following Research-Oriented Management Framework represents JAG's best effort to develop a management framework that would fit within the existing Management Plan framework and other JAG recommendations. It was compiled using the general principles described in Appendix 6A and was substantially informed by a 2-day Science Workshop summarized in Appendix 6B.

II. A Research-Oriented Management Framework

To put JDSF on a path toward World-Class status, we recommend that the Board adopt and implement a **Research-Oriented Management Framework**, as described in this document. The long-term objective for a Research-Oriented Management Framework on JDSF is to provide a transparent and objective scientific basis for forest management in California's redwood region. A scientific basis describes a rational system of technical information, models and other tools that inform policy and management, and collectively describes the methods for achieving sustainable economic, ecologic, and social stewardship of the forest.



The proposed Framework would integrate several key concepts (each described below) that together provide an organizational structure for testing and improving forest policies and practices both within JDSF and throughout the Redwood region (and perhaps beyond). This Framework should be organized around **Centers of Excellence** that describe the state-of-the-art science using models that range from simple conceptual models to more detailed empirical and/or quantitative models. Such models would provide organizational rigor that could provide a structure for scientists and would over time, improve the ability to predict impacts associated with management practices and enable management to achieve ecological goals.

The framework should also consider a **Strategic Research Plan** that leverages the Forest's resources to the benefit of core management issues. Such a Strategic Research Plan would integrate the efforts related to Centers of Excellence with the operational management of the forest. It would identify and implement a landscape allocation that better supports research activities, and would provide a structure for organizing relevant research at a regional and/or state-wide scale.

Over a period of a few years, this Research-Oriented Management Framework should lead to the development of formal management systems (combinations of regulations, policies, practices and Adaptive Management) that would provide important tools and management models for other landowners.

The proposed Research-Oriented Management Framework should be designed to provide more than sufficient opportunities to generate substantial revenues while meeting all the other goals of the forest (as described in both the Management Plan and these JAG recommendations). Additional Core Elements for the Research-Oriented Management Framework are described in greater detail within Appendix 6C.

III. Centers of Excellence

JAG recommends pursing **Centers of Excellence** that define a focused set of multi-disciplinary research programs for the Forest that help resolve critical issues facing forest management and forest resources within and beyond the Redwood Region. Such Centers of Excellence should

focus on informing applied forest management issues while recognizing that sustainable forest management is best ensured by an underpinning based on a fundamental understanding of ecosystem dynamics. Centers of Excellence should be drawn from issues that are politically and socially important and of likely continuing interest to stakeholders and researchers. Centers should be aimed at obtaining information that will help develop a greater understanding between important forest outputs and management by informing policies, practices, and associated consequences. The Centers of Excellence will be compelling, integrative, and exciting, drawing researchers from broad national and international professional networks. The Centers will also be durable, focused on solving complex challenges, the solutions to which will likely to be iterative and for which Jackson Demonstration State Forest, at the center of the redwood region, is well positioned to address.

To avoid spreading resources too thin, the number of Centers should be constrained, with an initial JAG recommendation tentatively set at three. In addition, Centers should be focused enough to prevent the largely ad-hoc approach to forest management JAG believes exemplifies R&D activities on JDSF to date. Additional criteria for selecting Centers of Excellence and other considerations are described in Appendix 6D.

We recommend that additional outreach and more detailed consideration by the Board of Forestry and Fire Protection and the Research Planning Team (see Section VII of this chapter) should help to define and/or revise the finally selected centers. JAG recognizes that adopting Centers of Excellence may have some undesirable consequences such as over-riding R&D on other important topics. Thus, JAG believes that allowances for these should explicitly be acknowledged in subsequent considerations by bodies discussed further in this document. With explicit recognition of other important research, these risks are offset by the value of the focus brought by the Centers of Excellence. Examples of Centers of Excellence discussed within JAG include:

- **Coho Salmon Recovery and Restoration of Aquatic Communities** – To rapidly recover aquatic communities by understanding the integration of watershed process and functions using both active and passive restoration processes.
- **Upland Terrestrial Habitat and Forest Structural Relationships** – To understand habitat and population processes and develop predictive models of animal/plant/ habitat dynamics of upland species on a continuum from younger to older forests.
- **Sustainable Forest Management Practices** – To understand and develop improved stand development pathways that integrate sustainable timber harvesting in the context of aesthetics, ecosystem management, timber growth and yield, forest product quality, carbon sequestration, and development of older forest conditions.

These example Centers of Excellence outlined above evolved from discussions within JAG, science workshop participants, and limited external outreach. We recommend elsewhere that the Research Planning Team should consider a more thorough development of these concepts before finalizing the Centers.

IV. A Strategic Research Plan

A Strategic Research Planning process would integrate an analysis of existing and desired future conditions using proven scientific methods with other key concepts and goals described in the Management Plan and JAG Recommendations. The primary components of our recommended Strategic Research Plan include:

- A Regional Context & Perspective that considers JDSF in the context of management regimes and practices available on other lands, so as to extend the Research Program's relevance to stakeholders throughout the entire Redwood region.
- A Research Agenda that works collaboratively with scientists and stakeholders to develop a list of key issues and management questions related to each Center of Excellence. The Research Agenda will provide a framework for identifying desired research projects, monitoring requirements, and management activities needed to support desired research projects.
- A Research-Oriented Landscape Allocation process that carefully and thoughtfully apportion the forest to support research on key issues outlined in the Research Agenda, as it will establish the context by which research is crafted and documented.

A. A Regional Context & Perspective

A landscape-based, cooperative approach to developing the Research and Demonstration Program increases the relevance of JDSF to many stakeholders. Also, the ability to influence management at regional scales is greatly improved by collaborating with other landowners throughout the Redwood region. An extensive evaluation of existing land bases, silvicultural systems, management systems, and information needs will inform this regional context, and will support allocation, landscape planning, and a more cooperative approach to research.

While considering this Regional context, a Research-Oriented Management Framework should also consider how to **Leverage JDSF's Unique Qualities** – both in terms of what is special to JDSF as well as what is common to other lands. Studies are possible virtually anywhere, opportunities for active manipulation on other lands are often incidental to and supportive of achieving economic goals. One of the unique qualities of JDSF is its capacity for Research and Demonstration that allow for manipulations that foster the goal of learning and teaching about forest management as opposed to a focus primarily on revenue generation. JDSF supports independent and / or geographically distinct areas for replicates of land management and associated studies. Other lands may be more tightly bound by Habitat Conservation Plans or conservation easement constraints, and have less stability of ownership and purpose. By providing a contrast to these land-bases, JDSF can expand the range and depth of experimental study designs that may yield new innovations in forest management. Also, focus on common features will encourage more interest by other landowners and will expand the influence of JDSF. Recommendations 5, 6 and 7 can be used to provide such a regional context and perspective.

B. A Research Agenda

A Strategic Research Plan requires that priorities be clearly assigned so that resources can be identified and integrated into the management plan and overall management infrastructure. The Research Agenda is an effort to compile the relevant issues and priorities for each Center of Excellence, in a manner that is supported by stakeholders, updated regularly, and accurately reflects knowledge gained (both within and external to JDSF research).

A Research Agenda works collaboratively with stakeholders and scientists to develop the programmatic focus for each Center of Excellence, including the key science questions/issues, monitoring needs, synthesis opportunities, methods of study, funding requirements, desired outcomes, etc.

C. Research-Oriented Landscape Allocation

A critical step in creating a Research-Oriented Management Framework is aligning the contemporary and future landscape allocation of stand-level characteristics (e.g., age, structure,

composition) in ways that provide a landscape that supports research and demonstration directed towards the Centers of Excellence. Equally important is the recognition of the Regional Context in which work at JDSF is conducted, which is to say JDSF is one of handful of large, consolidated ownerships where forest management experiments and adaptive management can take place in the redwood region.

JAG's recommendations for Landscape Allocation and Matrix Silviculture (see Chapter 2) provide a management system that will generate revenues needed to help fund the operation of the Forest, including portions of the Research and Demonstration Program, while preserving and advancing many of the unique stand structures within JDSF. JAG has compiled "Guidelines for Implementing Silviculture in the Matrix in Support of Research and Demonstration" (see Section D of this chapter) compiled *Guidelines for Interim Research* (see Appendix 6B: Key Themes and Take-Home Messages from the Science Workshop) that we believe these guidelines would provide appropriate constraints to ensure that silviculture for R&D is appropriately evaluated both before and after during the period required by the completion of the Strategic Research Planning process and the transition toward implementation of the overall framework. We anticipate that JAG's recommendations should be subject to appropriate scientific peer-review and comment, while respecting JAG's landscape recommendations and other values as described by the scope of work in Section VII (A) of this chapter and in Appendix 6E.

The existing allocation (Tables 1 and 7) described in the Management Plan describes silvicultural allotments designed to support an ad-hoc approach to research opportunities, and are not necessarily in alignment with the Centers of Excellence concept. The proposed revisions to the landscape allocation (see recommended landscape allocations in Chapter 2, Section IV(E) and Section V and Appendix 5C, Appendix Table 5.2) are a first step toward a landscape allocation that promotes all the goals of the Management Plan while preserving options for integrating a research focus more fully into forest operations. As described in the Research Planning Team Scope (see below), future iterations of landscape allocation should also be informed by JAG's Landscape Recommendations, the Strategic Research Planning process, and broader coordination with the Board's Research and Science Committee.

We recognize that a diversity of forest and stand conditions maintained and created over time is a common feature of research and demonstration forests and that such conditions are best created as a result of a well-organized, well supported, and focused research program described by this Research-Oriented Management Framework. Thus, we favor the adoption and/or development of stand classification systems that better describe the range of structural and habitat conditions that can support the research program.

The landscape allocation of forest stand conditions and silvicultural systems defines the research setting for the forest. Thus, it enables and constrains assumptions and hypotheses the research community can apply to evaluate ecosystem response to management activities. The allocation can also provide stability in stand structure that supports long-term research. A poorly considered or unstructured allocation substantially restricts potential research opportunities, and would compromise the Centers of Excellence.

While JAG's charter requests that we provide a spatial allocation of the forest, we were unable to complete this request. Development of the landscape allocation to support research on JDSF is a complex and highly technical task. Because the research focus is derived from pursuing scientific Centers of Excellence, we suggest that JAG is not the appropriate group to develop the final spatial allocation for JDSF. We therefore recommend that this task be done primarily by a Research Planning Team in cooperation and coordination with the JAG, the Board's Research and Science Committee, JDSF Staff, CAL FIRE, and other Stakeholders. Discussions of a scope of work and other guidelines for the Research Planning Team are described in Section VII of this chapter.

The preferred approach to develop spatial harvest allocations on large productive forestlands would use a planning process that requires considerable scientific and analytical effort including growth and yield modeling, spatial harvesting modeling, wildlife modeling, and cumulative effects analyses. The teams necessary to develop these planning efforts include biometricians, forest analysts, wildlife biologists, watershed scientists, operational managers, and others. Developing a "world-class" landscape allocation for JDSF with the intent of improving management practices in the redwood region should be consistent with this approach. A review of approaches used by other research forests, and other cooperatives would benefit this effort.

An approach for implementing a Research-Oriented Landscape Allocation is described in Section VII of this chapter.

D. Recommended Guidelines for Silviculture Variations in Support of Research and Demonstration

While the JAG agrees by consensus that the entire forest should be available for research and demonstration, JAG believes that guidelines are necessary to provide appropriate constraints to ensure that silviculture for research and demonstration is appropriately evaluated.

Silviculture other than that described in Chapter 2, Sections II(C) and II(D) (including even-aged management) is expected to be a continuing component of operations within the context of a professionally designed research and demonstration program. Initially, an evaluation of these proposed harvests will be made by JAG until alternative review processes are developed. The following guidelines should apply:

1. **Prior to Completion of the Strategic Research Plan**
   In the period prior to the adoption of the Strategic Research Plan, harvests that are inconsistent with the silviculture guidelines described in Chapter 2, Sections II(C) and II(D) and Sections IV(A) and IV(B) of this report will only be conducted in the purple-blue areas of 2008 JDSF Management Plan Map 5 and the designated brown, tan and red research areas with the exception of JAG-recommended three control areas on North Fork Caspar Creek (see Map B in Appendix 10), and only for research projects that meet the following guidelines:

   All proposed timber harvests in the Matrix not utilizing Matrix Silviculture will be presented to the appropriate advisory entities for review and recommendation prior to implementation. Criteria used by reviewing bodies should include:

   - Harvest is pursuant to a peer-reviewed research plan
   - The total area receiving the treatment is the minimum required for the scientific validity of the research involved
   - Purpose of project, area of sub-watershed or watershed (including replications), and duration of project
   - History of proposed project location in relation to age, structure, and past silviculture treatments
   - Potential conflict with overarching Centers of Excellence, ongoing research projects, neighbors, sensitive areas, designated special treatment areas, and recreation use

2. **After Completion of the Strategic Research Plan**
   After adoption of a Strategic Research Plan (and associated landscape allocations), harvests justified by research will be implemented only when there is reasonable confidence that the associated research will be carried out. Factors that will determine the level of confidence include:

- Approval of the research by a standing research committee as part of the Strategic Research Plan.
- A reasonable expectation that professional and financial resources needed to implement the project and associated work plan over the specified term will be available.
- Goals and specific contributions to an associated Center of Excellence are clearly identified

V. Demonstration in a Research-Oriented Management Context

Research and Demonstration are closely related and indistinct concepts. Both are related to knowledge needed by forest managers and policy makers. Research focuses on learning, while demonstration focuses on showing and teaching.

The JAG views demonstration as a primary component of an effective Research-Oriented Management Framework. Rather than referring to a "Research Projects" or "Demonstration Projects" we suggest thinking of them as elements of a more comprehensive Research & Demonstration Program.

Research on forest management will be more influential if it is associated with an effective demonstration component. Thus, demonstrations generally should be explicit complements to research projects. Evaluation of an activity for Research and Demonstration funding should give strong weight to the proposal's provisions for both research (what can we learn) and demonstration (what and how we can teach). Very few demonstrations should be made without a research complement.

Some basic research may not lend itself to demonstrations. Absence of associated demonstrations should not preclude important research from being funded. Similarly, some demonstrations may not have nor need a research complement. However, any research and/or demonstration activity that involves non-Matrix silviculture in the Matrix, or that would involve silviculture at variance with the silvicultural guidelines for OFDA and Late Seral Areas, will meet the management goals for these areas, and will be carried out only following review and approval by an appropriate review body. Any demonstration that departs from silvicultural guidelines should provide new information of significant value.

	Research (tends to be more)	**Demonstration (tends to be more)**
Intent	Learn	Teach, show
Design	Random allocation of treatments among replicates over space and time; BACI approaches; consideration of the sampling / extrapolation universe.	Few replicates to one instance, site access and availability important in locating treatment(s).
Data	More likely to be quantitative; Statistical tests.	More likely to be qualitative and visual
Presentation	Tables, Figures, Statistical tests	Photographs, videos, tours
Outlet	Professional and Scientific Society journals, conferences	Newsletters, fieldtrips
Subject	Ecological processes, timber economics, human dimensions, …	Financial considerations; logistics, techniques
Focus	Results, implications.	Methods and Equipment

Demonstration Protocols

JAG notes that standard Demonstration Protocols would help to build confidence that activities on the forest are implemented to benefit the broader forestry community. A demonstration program framework should outline how basic information will be compiled and reported for significant management actions on the forest. Such information could be developed into a series of brief reports (e.g., Forestry Notes and Forestry Reports) that would be available to the public via a website or other available communication media. The reports should be compiled for the following activities (including but not limited to):

- Harvest Treatments
- Reforestation and Restocking
- Road Construction, Maintenance and Abandonment
- Burns (both Prescribed and Wildfires)
- Restoration and Enhancement Treatments
- Invasive Weed Control

Demonstration is described within this framework as those management treatments that provide examples for forestland owners, managers and the general public. Demonstration information included in these Notes and Reports should typically include:

- Pre-treatment and post-treatment data
- Economic costs & value data
- Operational consideration information
- Effectiveness evaluations
- Location maps
- A discussion of the treatment design
- A description of the justification for selected management treatment
- Relevant treatment quantities (e.g., volumes, areas, lengths, etc)
- Planned costs and actual treatment costs
- Revenues generated
- A list of monitoring and/or research activities associated with the treatment
- Availability of more detailed data and resources

The Demonstration Program should consider subsets of Demonstration for which JDSF staff will develop more detailed information and educational resources.

VI. Other Framework Elements

Other core concepts that should be explicitly integrated into this Research-Oriented Management Framework include:

- An Experimental Basis For Management – is a management philosophy that views every significant management activity as an opportunity for research, experimentation, demonstration, and/or monitoring activities that can inform management practices and/or policies. All significant management activities should be reviewed for their potential to contribute to addressing the objectives and questions of the research, demonstration, and monitoring programs. An Experimental Basis is driven by testing as many hypotheses as

practicable, within a range of scientific rigor appropriate to the issue. An Experimental-Basis for Management improves the ability to predict responses to management activities by encouraging hypothesis testing at every opportunity, and providing the infrastructure to engage the resources to provide conclusive resolution to these hypotheses. An Experimental Basis supports repetitions of treatments and analysis over time can help minimize spurious results derived from short-term variability (e.g., climatic), and will be critical in long-term understanding of forest ecology/management in the face of novel environments (e.g., global climate change, new pests/pathogens, etc.). That is, long-term studies can circumvent problems with the more standard practice of substituting space for time.

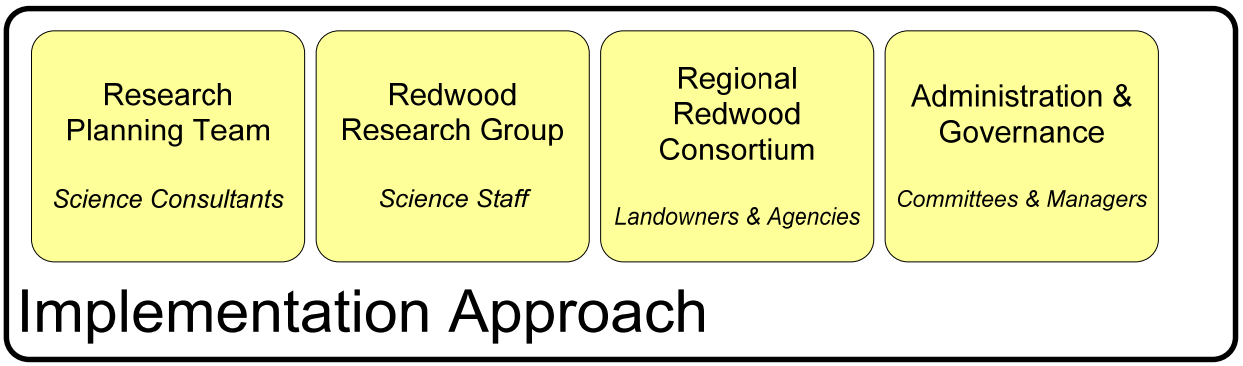
- A Comprehensive Monitoring Strategy – that outlines necessary monitoring approaches, protocols, staffing needs, access, etc., and is tightly coupled with Centers of Excellence, the Research Agendas, Landscape Management Planning, the Adaptive Management Framework, and the Demonstration program. The Monitoring Strategy should extend beyond timber stand measurements to include other important ecological and scientific data related to wildlife, water resources, air quality, carbon, etc.
- An Adaptive Management Strategy – that identifies performance measures, resource objectives, study designs, key questions, and other elements that integrate and direct monitoring and research activities within the forest (and beyond). The Adaptive Management Strategy is an integral component of the overall Framework and should inform practices both on JDSF and throughout the Redwood Region.

These are each described in more detail in Appendix 6C.

VII. Recommended Implementation Approach

We recommend that the Board consider implementing this proposed Research-Oriented Management Framework by:

- A Research Planning Team that will develop strategies for aligning the Centers of Excellence with the Landscape Allocation and Research Agenda
- A Redwood Research Group that would be responsible for developing the Centers of Excellence and overall research, monitoring, demonstration, adaptive management and outreach programs
- A Regional Research Consortium that promotes collaboration and outreach among all stakeholders, including landowners, conservation groups, agencies and academia, and
- Developing an Administration and Governance structure that fits within the existing resources of CAL FIRE and the Board of Forestry and Fire Protection



A. Research Planning Team

JAG recognizes that planning for a professionally developed research program is beyond the scope of the JAG membership, and thus we recommend that a Research Planning Team should be compiled to provide important technical review, analysis and recommendations that will help JDSF develop a Strategic Research Plan that will guide the transition toward a Research-Oriented Management Framework.

The purpose of the Research Planning Team is to provide professional recommendations to the JAG and Board of Forestry and Fire Protection regarding the allocation of forest structure, age and composition for the forest that is best suited to supporting the Centers of Excellence, consistent with the guidance provided by JAG and adopted by the Board of Forestry and Fire Protection.

JAG would note that the allocation classes described in the approved management plan have been amended substantially by the JAG to increase the quantity of old forest structure and enhance habitat connectivity. JAG's recommended landscape allocations are made based on the full range of Goals articulated in the Management Plan. The JAG advises the Research Planning Team to be cognizant of those Management Plan Goals when making its recommendations. The rationale for deviations from JAG's recommended allocations should be articulated in the Research Planning Team's report. Both the Research Planning Team recommendations and the JAG's recommendations regarding them should be delivered to the Board of Forestry and Fire Protection for consideration in determining the final allocation.

We would like the team to be as inclusive and collaborative as possible, given recognized constraints of the work being performed by an outside contractor. We would expect the team to engage the Board of Forestry and Fire Protection's Research and Science Committee, USFS Pacific Southwest Research Station, JDSF staff and JAG, among others.

The Team (working in coordination with the Board's Research and Science Committee, JDSF Staff, JAG, CAL FIRE, and other stakeholders) would be responsible for several tasks, which may include all or some of the following (subject to scoping by CAL FIRE):

- Synthesizing information for the existing landscape – using existing studies and data to begin to develop simplified (cartoon) conceptual models that could be used (over time) to build toward more quantitative models used to test what we think we know and don't know about the key relationships in each Center of Excellence, and how the forested landscape (both within and beyond JDSF) can be used to leverage our collective understanding
- Providing comments to and refinements for the Centers of Excellence – including a more complete description of the mission for each Center of Excellence, how it will look on the landscape, what the key research questions would be for each center, and the associated research activities.
- Populate and refine the areas of applied-research: for the community of applied and academic scientists and environmental professionals likely to use JDSF as a research platform, provide a more detailed definition for the Center's research focus in terms of our current scientific understanding, how the Center can improve our understanding, what tools may evolve from this effort, and how the Centers may impact redwood forest management.
- Formulating testable working hypotheses (including peer-review from cooperators) that could form the basis for a research program, including limiting factors models, desired future condition trajectories, experimental approaches etc.
- Develop simple and conceptual allocation models: using established and/or successful research forests allocations (e.g., H.J. Andrews Experimental Forest) as a reference point,

develop conceptual allocation models for JDSF that are tailored to the three areas of applied research and leverage models already established in the redwood region. The products should produce landscape development hypotheses in a manner that can be understood by both technical and non-technical audiences.

- Describe and delineate allocation classes: reconcile the landscape development hypotheses with the existing forest structure, special status management zones, growth and yield projections and harvest schedule. The goal of this analytical task is to represent management / allocation units that create, maintain or develop desired stand conditions necessary to support research on the prioritized research questions, with explicit reference to the special status management areas, forest productivity and harvest. The delineation of allocation classes should be consistent with core elements of the management plan and the JAG principles articulated in the body of this report.
- Developing a Research-Oriented Landscape Allocation: building on the approaches described within the Management Plan and JAG Recommendations, and providing rationale for deviations from these approaches, the Team should provide maps and/or criteria for allocating stands into management units that would support the Centers of Excellence and other goals for the forest (as described in the Management Plan).
- Informing and prioritizing key research questions for the Research Agenda within each Center of Excellence – by providing recommendations down to the level of working hypotheses based on the key questions within each COE and provide guidance on the research agenda. In addition, identify the scientific gaps.
- Comment on the financial requirements for implementing the research program – including any influences on timber harvest, and estimated costs for research recommendations
- Begin to outline a research agenda for the forest: by developing a prioritized list of research questions and working hypotheses for each of the Centers of Excellence. The prioritized research questions will serve as a primary input for the development of recommended allocations necessary to support research on these questions. In addition, comment on the appropriateness of these three areas generally, in terms of their feasibility and relevance for JDSF and the redwood region; suggest and justify any new or alternative categories of research if warranted.

Given the detailed technical rigor necessary for these tasks, this team will need to be sourced by professional staff, consultants and academics that can be paid for their efforts. A voluntary team will not be able to provide the amount of time and attention to detail necessary to complete these critical tasks. The Team's work should also be subject to appropriate review.

The envisioned Research Planning Team would integrate across existing conditions using scientifically based methods (e.g., Watershed Analysis & Landscape Ecology), stakeholder needs, a Redwood Region context, and the Centers of Excellence. The outcome will be a Strategic Research Plan that better supports the research associated with Centers of Excellence, and will have a broad base of support by stakeholders. We also expect the Research Planning Team to operate within specific sidebars so as to build on the work done to date and ensure that the goals of the Management Plan and JAG's Landscape Recommendations are recognized.

Our vision is that CAL FIRE would refine the scope of work (outlined below) such that the team could produce its deliverables within 6-9 months. We also prefer that JAG be provided some time to respond to the Planning Team's report before the Board acts on its recommendations. A key outcome of the Research Planning Team's work is the presentation of landscape allocation alternative(s) for the forest that if adopted, will create, maintain or develop the forest structures

needed to support an applied research agenda focused on the proposed Centers of Excellence over a planning horizon of approximately 40 years.[9]

The Research Planning Team should develop its detailed work plan in consultation with the Board of Forestry and Fire Protection's Research and Science Committee, JDSF staff and JAG. Before the analysis is initiated, the Research Planning Team will convene at least one 'immersion session' with JAG to understand this group's principles and recommendations. In addition, JAG and the Research Planning Team will meet when team has outlined the core elements of its analysis but before it initiates the analysis. Periodic status check-ins during the analysis and alternative development will be administered by the Chair of JAG and the Deputy Director of CAL FIRE.

Guiding Principles

The following is an excerpted list of guiding principles offered by the Jackson Advisory Group and a panel of scientists that JAG believes should guide the Research Planning Team in its deliberations related to the Research Planning Team:

- The basis for the landscape allocation should reflect to the degree possible, a more natural temporal distribution for forest characteristics based on principles of landscape ecology. Such principles include but are not limited to (a) the integration of old forest structure and conditions into matrix forest development, (b) forest gap dynamics including possibly shifting mosaics, and (c) pre-settlement disturbance regimes.
- The landscape condition should support the needs of a well-developed, programmatic adaptive management program that clearly identifies resource objectives, performance measures, etc. and considers the economic goals of the forest.
- The landscape allocation should reflect the diverse needs of key stakeholders, including researchers, landowners, conservation groups, the public, recreationalists, regulatory and resource management agencies, and policy-makers.
- Research and demonstration at JDSF with major commitments of land should have regional relevance; start with simple, focused hypotheses and increase the level of sophistication as knowledge develops
- Make maximal use of existing forest inventory data to test key assumptions, identify data gaps and develop working hypotheses.
- Focus recovering coho populations as quickly as possible. Focus on limiting factors and life-cycle models as a starting point.
- In developing and testing working hypotheses, focus on reliable, efficient and feasible measurements that are financially sustainable over time.
- The Research Planning Team should include in its report the guidelines, maps, and principles used to arrive at their recommendations so as to aid in JAG and the Board of Forestry and Fire Protection in further deliberations related to landscape allocations.

B. Redwood Research Group

The effective implementation of the Research-Oriented Management Framework and the overall Research Program should be led by an organization whose mission is to establish and maintain the Centers of Excellence through research, coordinated monitoring, advocacy, education, outreach, and policy advisement.

[9] Additional alternatives or variations may be produced and presented by the team as necessary to meet the purposes of their assignment.

We recommend that research, demonstration, and monitoring programs at JDSF should be managed, administered and staffed by a broadly based research organization that is affiliated with, but semi-independent from, CAL FIRE and JDSF operations. This will enable JDSF Management to focus on the day-to-day management and operations on the Forest, while developing the organizational infrastructure to support the Centers of Excellence and other research tasks.

The organization should consist of professional staff of interdisciplinary scientists dedicated primarily to a research and/or monitoring mission (e.g., interacting with, but not necessarily directly associated with, JDSF operations). It could be led by senior scientist(s) and/or an Executive Director team, and it would substantially benefit by seeking funds beyond JDSF revenue sources (e.g., research grants, foundations, partnerships, etc). The organization should seek to coordinate research activities beyond JDSF properties where it serves a Center of Excellence, and it should provide extensive outreach and educational roles to all stakeholders (including academic scientists). It should collaborate closely with academic researchers, but as an applied research organization, may benefit by being outside of an academic institution.

The roles of the Redwood Research Group could include:

- **Acting as Scientific Stewards for each Center of Excellence** – by developing internal staff and external research partners who can integrate expertise, develop models, and otherwise coordinate the "brain-trust" that will facilitate the development of each Center
- **Staffing and/or Coordinating Field Monitoring and Data Management Activities** – for JDSF lands, by providing the technical staff capable of collecting core monitoring data, developing standard protocols, maintaining data inventories, developing quantitative models, and other research-oriented tasks
- **Acting as a Facilitating Agency** – to ensure relevance to the broader forestry community by coordinating and funding research activities throughout the redwood region
- **Acting as Staff for Regional Cooperatives** – to help facilitate greater coordination of scientific and analytical tasks among landowners, agencies, and others
- **Administering Research on JDSF** – including grants to outside research organizations (e.g., consultants, academics, etc), development of requests for proposals, acceptance of projects, review of requests for research and demonstration, etc.
- **Leading Outreach Efforts** – which could include both educational and fund-raising functions that seek to build a broad base of support and resources from multiple stakeholders and partners, including foundations, grant agencies, universities, etc
- **Liaison with JDSF Operations** – to coordinate data exchange and scientific designs with timber operations (harvest design and layout, etc).
- **Leading Adaptive Management** – by acting as advocates for new practices and policies that are developed as a result of JDSF research, the Research Group could help the dissemination of new technologies, and working to advance those recommendations thru the appropriate administrative and/or collaborative bodies

This organization could exist in various forms (e.g., An independent 3rd-party entity, independent CAL FIRE center, within JDSF, within a University Extension, as a multi-agency cooperative, etc). The Board should carefully consider the advantages and disadvantages to these various structures.

We recognize that the implementation of the Redwood Research Group may take several years to occur. Thus several of the governance and administration functions may require additional oversight during the interim.

C. Redwood Regional Consortium (Long-Term)

Formation of a Redwood Region Consortium is an integral part of implementing the Research Framework. It positions JDSF within an integrative entity that unites efforts across the Redwood landscape by acting as a Hub for collaborative research that includes private and public lands. As such, this Consortium would differentiate itself from similar cooperatives by primarily drawing its participants from scientists employed by agencies, consultants, landowners, research scientists and other applied forestry practitioners (as opposed to strictly research-oriented organizations). Within the Consortium, JDSF's role can be a resource that provides data, funds and logistical support as well as part of the land base for research. Similarly, Consortium members can provide support for advancing research implications through adaptive management and policy revision efforts. In addition, members can provide financial support through in-kind services and additional funding. JDSF's lead in forming and sustaining a Consortium also increases the relevance of JDSF to stakeholders. Finally, the ability to manage and conduct meaningful research at landscape-scales is greatly improved by collaborating with other landowners throughout the Redwood region. CAL FIRE could look to Washington (e.g., Washington's TFW) and Oregon (H.J. Andrews Forest) for models of functioning Research Cooperatives that involve a broad group of stakeholders.

The consortium would differ from the Redwood Research Group in that the Consortium would exist as a collaborative group of stakeholders and partners, while the Group would consist of paid staff dedicated to implementing the Research-Oriented Management Framework.

D. Administration and Governance

The administration and governance of the Research-Oriented Management Framework could be developed in coordination with the Board's Research and Science Committee, as well as the groups described above. Additional JAG thoughts are discussed in Appendix 6E.

VIII. Research and Demonstration Consensus Votes

Research Votes

This recommended integrated Research and Demonstration Framework evolved over two-and-a-half years of active discussion. Elements of the Framework are based on principles formulated from a series of eight recommendations that were acted on in two groups. In some cases, significant revisions have occurred to the report subsequent to these votes, with JAG concurrence. These and the consensus votes supporting this approach are:

1. A research-oriented management framework should be developed that leads to JDSF being regarded as a World-class research and demonstration forest, as described in Section II of this chapter.

2. Up to Three Centers of Excellence should be established at JDSF as described in Section III of this chapter.

3. JDSF should develop a strategic research plan similar to that described in Section IV of this chapter that supports the Centers of Excellence and Research-Oriented Management Framework. (note: some modification of this section occurred after the vote).

4. Integrate all management treatments and methodologies within JDSF with the over-arching principles of hypotheses testing, monitoring, adaptive management, and demonstration as described in Section VI of this chapter.

Table 3.1.

Support				Disagreement			
Unqualified	Strong	General	Qualified	Qualified	General	Strong	Fundamental
	6	7					

For individual votes of members, see Appendix Table 9.10 in Appendix 9J.

5. Convene and support a Research Planning Team responsible for developing a working Strategic Research Plan as described in Section VII (A) of this chapter.

6. Establish and support a Redwood Research Group responsible for implementing the Strategic Plan as described in Section VII (B) of this chapter.

7. Establish a Redwood Research Consortium that integrates and leverages research and demonstration efforts across the Redwood Region and includes diverse land ownerships, agencies, universities, and research interests as described in Section VII (C) of this chapter.

8. The Board should establish appropriate administration and governance for the Research-Oriented Management Framework that integrates these recommendations within existing committees and structures as described in Section VII (D) of this chapter.

Table 3.2.

Support				Disagreement			
Unqualified	Strong	General	Qualified	Qualified	General	Strong	Fundamental
	9	3	1				

For individual votes of members, see Appendix Table 9.11 in Appendix 9K.

Demonstration Votes

Recommendations on the approach to demonstration as described in Section V of this chapter were supported as follows:

Table 3.3.

Support				Disagreement			
Unqualified	Strong	General	Qualified	Qualified	General	Strong	Fundamental
	11	2					

For individual votes of members, see Appendix Table 9.12 in Appendix 9L.

Research and Demonstration Votes

Consensus Vote of Overall Research and Demonstration Recommendations:

Table 3.4.

Support				Disagreement			
Unqualified	Strong	General	Qualified	Qualified	General	Strong	Fundamental
2	4	6	1				

For individual votes of members, see Appendix Table 9.13 in Appendix 9M.

NOTE: Appendix 9, Sections J, K, L, and M provides additional information and clarity on these recommendations.

To: Board of Forestry and Fire Protection **20 April, 2012**
RE: Strategic Research Plan for State Demonstration Forests

Recommendations

At your request, the Research and Science Committee (RSC) has considered how the Board may develop a Research Planning Team (RPT) and Research Plan for Jackson Demonstration State Forest (JDSF). As previously indicated[1], the RSC sees its best role is to '… provide overall guidance and advice in the development of a research planning process, to provide a peer review process on research priorities and goals, and to provide other research input as requested by the Board of Forestry'. Guidance and advice provided by the RSC regarding the state's largest demonstration state forest is consistent with the purposes of the RSC Charter[2]. The information contained herein may also be applicable to other research and demonstration forests provided there is coordination with appropriate staff and with consideration of local economic and social circumstances.

The Board of Forestry's (BOF) Strategic Plan (May 2007) identified several research items that may be at least partially addressed at JDSF, which are also consistent with the Board adopted recommendations of the Jackson Advisory Group. For example, the Board envisioned that state Demonstration State Forests will test and demonstrate watershed assessment approaches and restoration techniques[3] – a goal discussed at length in the Jackson Advisory Group's final report. The Board's Strategic Plan outlines an impressive set of strategies (over 100 in total), which are underpinned by thoughtfully constructed goals, objectives and indices. State Forests can only be expected to address a subset of the listed strategies but may figure prominently in management and policy discussions especially if specific research priorities are established and maintained. For most of California's demonstration forests (including JDSF) we lack specific research plans that link important research and demonstration questions to existing and future forest conditions. As a consequence, research topics come to the state forests in a rather informal manner and the long-term programmatic tradeoffs of funding particular stand-manipulating projects are not always clear.

The Research and Science Committee recommends the Board form a professional (paid) working group (Research Planning Team) to develop a strategic research plan for Jackson Demonstration State Forest. The group should consist of no less than three subject matter experts, one each proficient in the generalized topics referred to as 'Centers of Excellence' in the Jackson Advisory Group's final report. Additionally, the Research Planning Team (RPT) should have access to a qualified (paid) biometrician and advanced cartographer or geographic information system (GIS) analyst capable of generating and depicting harvest schedules, modeling management constraints and running management scenarios. We expect RPT members and technical support staff to interact intensively with CAL FIRE staff, relying on their intimate understanding of the existing data and on-the-ground conditions. The final member of the RPT should be a skilled watershed scientist or landscape ecologist with a proven ability to lead expert and stakeholder groups towards a set of tangible and actionable planning products.

We recognize that state funds at this time are extremely limited, but believe that the relatively small budget required for this effort (see below) is essential to accomplish the ambitious and broadly valued

[1] Research and Science Committee Letter to the California Board of Forestry and Fire Protection regarding a Research Plan for Jackson Demonstration State Forest. July 29, 2011.

[2] http://www.bof.fire.ca.gov/board_joint_policies/board_policies/committee_work/rsc_charter_050708.pdf

[3] Board of Forestry's 2007 Policy Statement & Strategic Program (Soil Conservation and Water Quality Goal, Strategy F)

agenda outlined by the Jackson Advisory Group and key element adopted by the Board. Success of the JAG and Board's shared agenda depends on an arm's-length distance between the science-based plan and other programmatic priorities, which would be created by the RPT as recommended. To keep lines of communication open and management scenarios realistic, we recommend the Board's Executive Officer and Cal Fire resource staff serve as a liaison with the Research Planning Team. We expect the needed funds to come from the timber sale program at JDSF and represent an investment in establishing a firm research and demonstration footing for the future.

Research Planning Team Guidance

To guide the formation of the RPT and its work, RSC members have surveyed, reviewed and discussed the key elements of successful research and demonstration forests/programs located in the U.S. and Canada. We note that JDSF is pursuing active commercial harvests that provide research and demonstration opportunities. Many other research forests do not have an active harvest, or demonstration component, or the associated societal sensitivities associated with their program. We maintain however that sufficient forestland exists at JDSF to *focus* research and demonstration priorities, particularly if project proponents are encouraged to use JDSF as a replicate in larger studies or demonstrations involving several sites in the redwood region. Examples of key elements of successful research and demonstration programs include but are not limited to:

- A range of stand types and conditions representative of the region where research and/or demonstration projects can be conducted on all stages of ecosystem development.
- A scientifically rigorous and competitive set of funding and access procedures, including clearly articulated research and demonstration priorities whose relevance will stand the test of time.
- Measurable relationships between the forest's physical processes and biological responses resulting from management, silviculture, restoration, and natural change.
- Interdisciplinary experiments that touch on the biological, social, policy, and economic dimensions of forestry. As an example, an experiment could evaluate the relative merits of even-aged vs. uneven-aged management approaches as they relate to biodiversity, water quality, carbon sequestration, and other attributes (e.g., soil microbial populations or atmospheric gas exchanges or gene flows), that underlie prudent land management.
- A long-term, intensive, and rigorous inventory of forest resources including but not limited to timber, fisheries, botanical and wildlife resources.
- Qualified staff, infrastructure and operational capacity to conduct stand-level manipulations and accompanying long-term monitoring, reporting and outreach tasks.
- A consistent governing body or committee that serves as a clearinghouse for research priorities and matches these to specific forests, funding opportunities and project requests/approvals.
- Shared responsibility and accountability for outreach to members of the public, those who use the forest, and the education of prospective resource managers and advocates.
- Highly organized information management systems and advanced decision support to anticipate and manage the competing research, demonstration, communications, and operational demands.
- A demonstration work plan that includes annual field days, conferences, and other opportunities for interaction with a broad array of potential beneficiaries, partners and collaborators.

The RPT's final work products should result in a prioritized and actionable set of research and demonstration priorities that can be at least partially addressed at JDSF, given a reasonable amount of coordination with landowners and managers throughout the redwood region. In addition, the RPT

should evaluate the professional capacities needed to support each topic and determine if a critical mass of interest and capacity exists or not. Two or more spatially-explicit land allocations (or scenarios) should be presented to the Board, members of the RSC, Cal Fire staff and the Jackson Advisory Group for consideration and discussion[4]. Each land allocation should enable scientists and land managers to cooperatively address the specified knowledge gaps over time, thereby improving the effectiveness and efficiency of forest practice rules and management policies.

Preliminary Budget

GIS/Modeling Work -	$80,000
Guiding Committee Work	$60,000
TOTAL	$140,000

Implications for Other Research Forests

Acknowledging that the other four state forests are considerably smaller than JDSF, a modified approach to the one just described should be considered by the Board for these and future state forests. Members of the RSC maintain that additional scientific and social value may be derived from these forests if management, research and demonstration planning are linked in a way that is grasped and valued by the public. From past successes at JDSF, Latour and Soquel Demonstration State Forests, we've seen a genuine interest in solving complex, broadly applicable forest resource management questions using a blended approach that includes social, economic and ecological considerations. Particularly for programs involving silvicultural manipulations, this approach should be science-based, include input from a broad set of stakeholders and of course be operationally/programmatically feasible. In furtherance of this goal, Research and Science Committee members recommit to the Board to provide scientific input, advice and peer-review for the Research Planning Team should it be formed and for other such groups as needed. Thank you for your time and consideration.

Cited Materials (in order cited)

Research and Science Committee Letter to the California Board of Forestry and Fire Protection regarding a Research Plan for Jackson Demonstration State Forest. July 29, 2011.

The 2008 Charter of the Research and Science Committee of the Board of Forestry and Fire Protection. May 7, 2008.

The 2007 Policy Statement and Strategic Program of the Board of Forestry and Fire Protection. May 1, 2007.

Jackson Demonstration State Forest Management Plan. 2008. California Department of Forestry and Fire Protection – The Resource Agency.

A Vision for the Future. The Report of the Jackson Demonstration State Forest Advisory Group. January 15, 2011. California Board of Forestry and Fire Protection / California Department of Forestry and Fire Protection.

[4] As the strategic research and demonstration plan is being developed, the RSC recommends that the land allocations in the approved 2008 management plan (as modified by Board adopted JAG recommendations) be maintained.

Work Plan for Carrying Out Board of Forestry and Fire Protection Direction for JDSF Advisory Group Recommendations on Development of Research and Demonstration Plans, Landscape Allocations, and Governance. Developed by CAL FIRE and Board Staff. WORKING DRAFT November 15, 2011.

CAL FIRE Implementation of Board of Forestry and Fire Protection July 13, 2011 Findings on the Recommendations of the Jackson Demonstration State Forest Advisory Group and Board of Forestry and Fire Protection Direction to the Department of Forestry and Fire Protection for Management of Jackson Demonstration State Forest November 2, 2011.