California Department of Forestry &
Fire Protection (CDF)

State Forests Research & Demonstration

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Special points of interest in this article:

- California Conservation Camps provide manpower for the State Forests
- CDF and CDC jointly manage the program to their mutual benefit
- Projects include forest thinning, trail maintenance, road brushing
- The crews keep fire risk low

Conservation Camp crews have helped to maintain culverts, water bars, raadside ditches and other erosion control structures at the Jackson Demonstration State Forest.

Inside this issue:

Conservation Camps and the Demonstration State Forests

Parlin Fork Conservation Camp Crew Brushing Right-of-Way

CDF currently operates 41 Conservation Camps statewide that house nearly 4,000 inmates and wards, forming up to 198 fire crews per year. These camps are jointly operated by CDF and the California Department of Corrections (CDC) to manage these year-round /minimum security corrections facilities (i.e. no fences). Camps provide the manual labor to respond to various emergencies such as wildfires, floods, search and rescues, and earthquakes. When not responding to these emergencies, the crews are used to perform various conservation or community services, including various maintenance activities for the demonstration state forests. This issue will discuss how our largest state forest is working with the Camp Program. The next newsletter will discuss two other state forests and camps.

Jackson Forest/Chamberlain Creek and Parlin Fork Camps

By Brian Barrett

JDSF is fortunate to be a prime benefactor of a variety of service projects. Camp crews are particularly adept at brush removal on the over 300 miles of state forest roads. It is amazing to see the skill and production provided by five crews of seventeen inmates trained in the use of fire tools such as chainsaws, pulaskis, and

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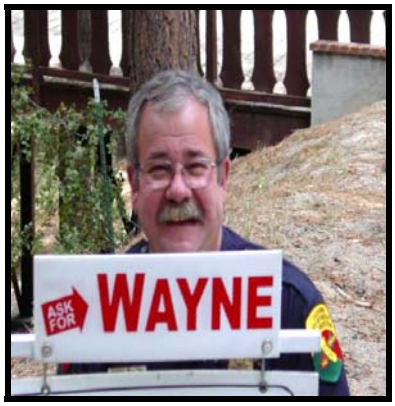
Boggs Mountain State Forest Has New Website and Forest Manager



Stewards of Boggs Mountain State Forest have developed an extensive website. It contains information such as history, maps, calendar of events, a flora/fauna species list, current events/issues and more. You can reach the site at: http://www.boggsmountain.org.

Norm Benson, CDF Forester for 31 years including Boggs Forest Manager for the last 3 years, retired recently. If you are at Boggs Mountain be sure to stop by and say "hello" to our new Forest Manager, Wayne Connor, who has been with CDF for four years and a Registered Professional Forester since 1982.

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McLeods when put to use in road brushing. Due to the abundant growth of vegetation, this is an endless (but not thankless) job. Crews also provide assistance to our road maintenance program by assisting in periodically checking and clearing erosion control structures such as culverts, waterbars, and roadside ditches.

Additional projects include the maintenance of recreation facilities such as campgrounds and trails. This includes trash pick-up that seems to be an increasing problem, and the occasional breaking-up and disposal of recreational trailers that are illegally dumped on the Forest. The crews have also been used for prescribed fires of harvest areas and fire hazard reduction by burning slash piles after completion of timber sales.

The crews have been extremely valuable in assisting with the Caspar Creek Watershed research project that is located on JDSF and operated jointly by CDF and the U.S. Forest Service. They have helped to build thirty flumes and equipment sheds that are the foundation for collection of water quality and yield data to study the effects of timber harvesting on watershed processes. The latest phase began in the early 1980's with the construction of thirteen wooden flumes in the North Fork Caspar Creek of which eight have been replaced. Construction continued through the year 2000 with the installation of nine flumes in the South Fork phase of the Caspar Creek Project. The key factor in this project is the ability of the crew to transport building materials in steep terrain over distances up to two miles. One recent project had a crew transport 120 bags of concrete at 80 pounds each – with all smiles!

Both camps have special skills that contribute to the JDSF mission. Parlin Fork Camp has a sawmill that produces primarily redwood and Douglas-fir lumber, with many of the logs supplied by JDSF. The lumber is used on a variety of projects such as recreational facilities and trails, and also foot bridges that create access to research projects such as the Caspar Creek Watershed Project. They also mill species such as tanoak, madrone, and chinquapin to help demonstrate that they can be successfully used for products such as furniture. Chamberlain Creek Camp has a cabinet shop that uses wood from Parlin Fork in the production of furniture pieces for use in state facilities. Some of their work is located in offices statewide to help demonstrate that California hardwoods can be used for quality products.

JDSF is fortunate to have 10 fire crews located on their property. Their close proximity and quick response help to minimize damage from wildfires . A quick look at fire history data (1982-2002) on JDSF shows that of 108 total fires, only three fires have been ten acres or greater with the largest at 12 acres. It seems certain the fire crews are a large part of the successful protection of JDSF from wildfires. With their variety of abilities and talents, the conservation camps are an extremely valuable partner to help achieve the JDSF mission.

Research Presentation on Casper Creek

Liz Keppeler of the US Forest Service - Redwood Sciences Lab presented research from the Caspar Creek Watershed Project, located on Jackson Demonstration State Forest, at a conference titled "Advancing Fundamental Sciences - A Conference for Forest Service Physical Scientists". There were approximately 500 scientists from throughout the United States that attended the conference in San Diego during October, 2004. Liz presented results from her from her research "Understanding the Hydrologic consequences of Timber Harvest and Roading: Four Decades of Streamflow and Sediment Results from the Caspar Creek Experimental Watersheds". The conference also gave Liz a chance to meet researchers from around the country and pick-up ideas that can be useful at Caspar Creek.
To find out more, see http://www.stream.fs.fed.us/EarthScience/aboutconf.html

Liz Keppeler collecting water samples on the Caspar Creek watershed on JDSF.

Carbon Sequestration Project at Jackson

Scientists have projected global climate changes due to rising concentrations of greenhouse gases (GHG) which trap heat in the atmosphere. This heat is anticipated to have far-reaching impacts including harming California's water, forest, and wildlife resources. There is an anticipated increase in: plant demand for water, frequency of large damaging fires, and pest and insect epidemics in California forests. California needs to find new ways to significantly decrease CO_2 production and increase its storage (sequestration).

A series of bills provided the authority and structure for a GHG program:

-SB 1771 established a nonprofit corporation, the California Climate Action Registry, that will record greenhouse gas emissions inventories which California entities voluntarily report to the Registry. A future rulemaking shall establish processes to identify and qualify third-party organizations that the State approves to provide technical assistance and advice and/or certify the emission results of entities that participate in the Registry. The formal rulemaking phase established regulations to implement the Energy Commission's responsibilities regarding the California Climate Action Registry.

- SB 527 requires the Registry to assist and enable entities to voluntarily record their GHG in a consistent and certifiable format. It also requires the California Energy Commission (CEC) and other state agencies to provide technical guidance in the development of GHG emissions reporting and certification protocols. (A protocol is a written document that describes procedures, guides, rules of engagement and provides a consistent method for all parties to act in fulfilling a common goal.)

-SB 812 (Statutes of 2002, Chapter 423), directs the Registry to develop protocols for reporting both entity-wide and project-related GHG emissions and inventories for forest entities (e.g. commercial timber companies and private forestland owners, or others owning at least 100 acres of trees that wish to participate in the Registry).

Forests have the capacity to emit and store CO_2. When disturbed, either through fire, disease, harvest, or woody material decay, a forest's stored CO_2 is returned to the atmosphere. In contrast, tree growth absorbs CO_2, thereby removing it from the atmosphere.

Over the last year, the Registry convened the Forest Workgroup consisting of forest experts and state agency representatives. The Workgroup drafted forestry protocols (rules) by which a forest entity would estimate, calculate, report, and certify their biological carbon stocks, baseline and GHG emissions for entity-wide and project inventories. Forest Protocols were approved at the Registry's Board of Director's meeting on October 21, 2004, and are now available for use at http://www.climateregistry.org/protocols/fp/

The California Department of Forestry and Fire Protection's (CDF) role is to support reduction of carbon gases and the Registry by:

- improving the carbon storage capability of California's forest land
- assisting private forest land owners with carbon storage through reforestation
- maintaining a Vegetation Management Program to reduce the frequency of large, catastrophic fires which release large amounts of carbon dioxide and threaten resource values, life and property maintaining a Fire and Resources Assessment Program to monitor change in vegetative cover and timberland for the purpose of assessing carbon storage capacity.

The Collaborative Carbon Initiative requested CDF's assistance to estimate carbon sequestration benefits when using

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clear-cut versus group selection forest management. A study was conducted in February 2004 using the coast redwood stands at Jackson Demonstration State Forest (JDSF). The calculations will be used to establish carbon stocks. Although the results reflect the unique species mix of the plots examined, larger impacts can be extrapolated using the measurements on JDSF's extensive network of permanent plots. Forest tree litter, understory vegetation, standing dead wood and soil carbon were included in the measurements to predict forest biomass accumulations (carbon pools) with changes in forest management and stand age. Growth curves for coastal redwood were generated using existing empirical yield tables. Field measurements drove the calibration of models predicting the accumulation of dynamic forest carbon pools including litter and downed dead wood stocks. These curves were used to project biomass volume in and around clearcuts and group selections. The results were:

- no appreciable changes were shown for standing dead wood, understory vegetation, and soil carbon
- significant differences were found in post-harvest regeneration growth for group selection and clearcuts
- similarly significant differences were found in post-harvest residual-edge tree and interior-matrix tree growth for both group selection and clearcuts.

Over one rotation of the modeled scenarios for JDSF, even-aged management with group selections yielded slight increases in total forest carbon versus clearcuts. These results were sensitive to:

(1) the magnitude of the edge tree growth response,
(2) the duration of the edge tree growth response,
(3) the area of residual forest experiencing edge tree conditions,
(4) the magnitude of the growth decrease of regeneration in the group selections, and
(5) the duration of the growth decrease of regeneration in the group selections.

The Chicago Climate Exchange (CCX) recently announced it has approved the Registry's new rules tracking carbon reductions from forest protection projects and new accounting rules measuring the carbon emissions and reductions of forest conservation, management and restoration projects.

You can expect future articles on carbon sequestration. Any questions on this program should be directed to Doug Wickizer at 916-653-5602 or doug.wickizer@fire.ca.gov.

New Site Index Report for California's Forests

This study evaluated the existing site productivity models, collected all available data for California into one database, and produced state of the art site index and site class models. This study was conducted as part of the State Forest's competitive research grants program. The Department appreciates the effort (that went well beyond the financing) and dedication of Dr. Bruce Krumland in accomplishing this challenging project. We also appreciate the cooperation of the forest landowners, agencies, and researchers in sharing their data to produce the best site models possible. Active X components and a demonstration software program to use the new models are available from the State Forests Research Program in Sacramento.

A couple of definitions may be useful to the reader. Site index is a measure of the average total height of a stand at a particular age. Site index and class (ranges of site indices) are used to describe the productivity of a stand and as input to growth models and yield tables. Also, site class is used in the Forest Practice Regulations for stocking purposes.

Over the last 80 years, more than twenty site index models have seen some form of service in California. These models have been borrowed from nearby regions or developed specifically for individual species or groups of species within the State. While seeming to comprise an extensive knowledge base, there are several problems with existing site index models that limit the effectiveness of the concept in contemporary young-growth forest manage-

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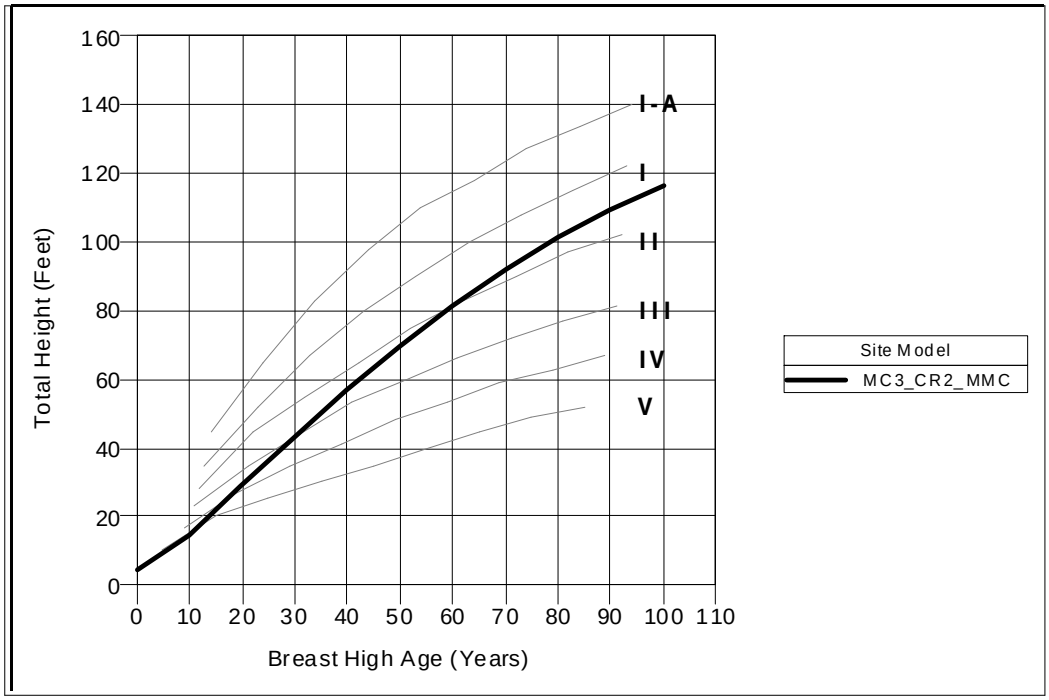
ment applications in the State. The analytic techniques to fit these curves vary from using manual curve fitting techniques to inflexible mathematical approaches that make assumptions and simplifications about curve shapes. These techniques were appropriate for their time, but with the personal computer power that we now have, more advanced approaches are feasible. Tree ages may have been based on total or breast-high age and the index age has varied from 50 to 300 years. Site model variability over geographic regions for a given species was unknown. In general, there are problems in the application of the site indexconcept in California that affect its precision and usefulness as a forest management tool.

A consolidation of the site index knowledge base for the practical benefit in applications was the primary goal of this study. The analysis had four other objectives:

1) Provide the best set of young-growth site index models for major conifer and hardwood species in California with consistent age basis and base age definitions.
2) Develop intra-stand site prediction models for different species so the site indices of unsampled species can be estimated from species whose site index has been sampled.
3) Evaluate site tree sample selection rules and provide recommendations that provide the most consistent and stable basis for a stand site index definition.
4) Propose a general young growth site classification (I-V) basis for different regions in the state with a common 50-year breast-high index age basis.

The study relied on existing sources of data using virtually all of the data used in the development of pre-existing stem analysis base site index models, over 2,000 additional stem analysis records, and over 10,000 site trees from permanent plots. Additionally, the new site models developed in this study use the Generalized Algebraic Difference Approach (GADA) recommended by Cieszewski and Bailey (2000). The methods used in this study produce base age invariant models that use breast high age for trees 10 to 100 years old.

The figure below shows a comparison of the new site curve (bold line) overlain on the Dunning curves (lighter lines). Only one site is shown for the new site since a direct comparison is not possible due to the dramatic difference in curve shape.



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Summary of Results

The following recommendations are made by species. When the new models are not found to be different from the old model shapes there may be other reasons for using the new models such as base age invariance and ease of computation.

Redwood: The new models were not appreciably different from the Wensel and Krumland (1986) models.
North coast Douglas-fir: A new model is recommended but on higher sites it is not much different than King (1966). The older curves of Schumaker (1930) and McArdle and Meyer (1961) should be avoided.
Grand fir: A new model is recommended but care should be used over age 60.
Mixed conifer: The new model is the best regional model for ponderosa pine, interior Douglas-fir, and sugar pine.
White fir: The new model is best for state-wide application although Biging and Wensel (1985) and Dolph (1987) are reasonable for certain ages.
Red fir: The new model and Dolph (1991) are practically the same.
Incense-cedar: The new model appears the best, but Dolph (1983) is a reasonable alternative. The mixed conifer model should not be used for incense-cedar.
Jeffrey pine: The new model presented by this study is the only one available for this species. The mixed conifer model also works well.
Lodgepole pine: Either the Jeffrey pine or the mixed conifer model Is recommended.
Red alder: The new model or Porter and Wiant (1965) could be used although the latter requires an adjustment to total age.
Madrone: The new model or Porter and Wiant (1965) could be used although the latter requires an adjustment to total age.
Tanoak: The new model or Porter and Wiant (1965) could be used although the latter requires an adjustment to total age.
Black oak: The new model or Powers (1972) could be used although the latter should not be used outside the recommended age and site range.
Other oaks: The new model developed as part of this study is recommended.
California laurel: The new model developed as part of this study is recommended.

When selecting site trees to sample the general conclusion was to avoid rules that select the 'best' trees. Use a system that selects the top 20-40% of the largest diameter dominant and codominant trees.

The following site classes are recommended. These were based on the distribution of the combined state-wide data.

Proposed 50-year breast-high age basis site classes for North Coastal forests.

Site Class	Redwood	Douglas-fir
	Site index range (feet)	
I-A	150 +	170+
I	130 – 150	150 – 170
II	110 – 130	130 – 150
III	90 –110	110 – 130
IV	70 – 90	90 – 110
V	50 – 70	70 – 90
VI	<50	<70

Proposed 50-year breast-high age basis site classes for mixed conifer forests.

Site Class	Site Index Range (feet)
I-A	120 +
I	100 – 120
II	80 – 100
III	60 – 80
IV	40 – 60
V	<40

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Conclusion

Active X components and a demonstration software program to use the new models are available from the State Forests Research Program in Sacramento. Please see the full report for reference citations and full description of the models and recommendations. Requests for the report may be made using the form on the last page of this newsletter or by email request to tim.robards@fire.ca.gov.

Sources

Cieszewski, C.J. and R.L. Bailey. 2000. Generalized algebraic difference approach : theory-based derivation of dynamic site equations with polymorphism and variable asymptotes. Forest Science 46:116-126.

Krumland, B. and H. Eng. 2005. Site index systems for major young-growth forest and woodland species in Northern California. Cal. For. Report No. 4.

Staff Changes

State Forests Program Manager: Former Manager, Chris Rowney, returned to his home in Ukiah and has filled the Administrative Officer's job at the Mendocino Unit. Helge Eng has been promoted to fill the Manager vacancy. Helge has been with CDF since 1992 and moves from the State Forests Biometrician position. Helge received a M.S. and Ph.D. in harvest scheduling from Oregon State University. He received his B.S. in Forestry from the University of British Columbia.

LaTour State Forest: Bruce Beck was promoted to Forest Manager, replacing Scott McDonald, who recently changed positions to the Special Operations Manager for the Shasta-Trinity Unit based out of Redding. Bruce has extensive experience as a California licensed forester and most recently for the CDF forest practices program in the Humboldt-Del Norte Unit. Vic Williams has filled the Assistant Forest Manager position, which was vacant. Vic has been a RPF for over 20 years with an extensive career in the timber industry and as a forestry consultant.

Jackson State Forest: Within the last year the Forest has hired Fred Postler as a Forestry Assistant I and Eric Wahl as a Forestry Assistant II.

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Please send the following publication(s):

___ The Research and Demonstration Newsletter, published quarterly
___ List of CA Forestry Notes. No. 1 – 117.
___ List of Tree Notes #1 — 28, from CDF Forest Pests Program
___ CA Forestry Report #1, Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood, and Sediment
___ CA Forestry Report #2, Precommercial Stocking Control of Coast Redwood: A 17-year Status Report
___ CA Forestry Report #3, Growth & Yield for the Whiskey Spring Redwood Commercial Thinning Study: A 29-year Status Report
___ Individual legacy trees influence vertebrate wildlife diversity in commercial forests—Reprint
___ CA Forestry Report #4, Site Index Systems for Major Young-Growth Forest and Woodland Species in Northern California (new)

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