INTERNAL REPORT

Biomass Disposal and Utilization Assessment for Southern California

Progress Report 3
June 30, 2006

Period covered: January 1, 2006 to June 30, 2006

John R. Shelly, Cooperative Extension Advisor-Biomass Utilization
University of California, Division of Agriculture and Natural Resources
Richmond Field Station, Building 478
Richmond, California 94804

Project Funded by USDA Forest Service
Agreement No. 04-CA-11052021-051

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Background

Work continues on assessing the wood utilization opportunities in forested regions and surrounding communities of Southern California. The work reported in this progress report was developed as a strategy to address the questions and challenges identified in the initial biomass utilization assessment published in Progress Reports 1[1] and 2[2]. The current focus covered in the report period from January 1 to June 30, 2006 was on the following.

- Updating the biomass assessment data for the region,
- Providing technical assistance to the forest products industry,
- Educating professional, business, and lay audiences on the challenges and opportunities for a sustainable forest products industry in the region that is responsive to the demands of wise forest management.

The majority of the effort in the high elevation forests of San Bernardino, Riverside, and San Diego counties continues to be on the removal of hazard trees. As a wood resource this material is on the low end of the value scale and the opportunity for utilization remain limited. Local niche markets for specialty lumber products and low value biomass uses such as mulch, compost and biomass powerplant fuel remain the largest local consumer markets for the biomass material. Log shipments to "out-of-the-area" sawmills remains viable for the larger, higher quality sawlogs but this is contingent on the strength of the commodity lumber market. As the national softwood industry begins to enter a downtrend lumber prices are dropping and it becomes more difficult to ship logs the 150 plus miles to the closest sawmills.

Project tasks Completed During This Report Period

During this period three team meetings were conducted to develop a strategy for concluding the project and one field trip was conducted to collect current information on the resource and utilization markets, and project results were presented at an international conference in Southern California. In addition, assistance was provided to small businesses and government officials in San Bernardino and Riverside County staff working on wood utilization projects.

Specific tasks conducted during this time are reported below in Table 1.

[1] Shelly. 2005. Biomass Disposal and Utilization Assessment for Southern California: Progress Report 1, June 1, 2005. University of California Wood Resources Group. Internal Report. Richmond, CA.
[2] Shelly. 2006. Biomass Disposal and Utilization Assessment for Southern California: Progress Report 2, February 1, 2006. University of California Wood Resources Group. Internal Report. Richmond, CA.

Table 1. Tasks completed during this reporting period.

Date	Activity	Location	Attendance or Contacts
January 9 – February 1	Project planning meetings	UC Richmond Field Station	NA
February 1-3	Survey utilization field operations	San Diego and San Bernardino Counties	12 professionals
May 1 – June 15	Analyze utilization and market data	All Southern California Clients	NA
June 27	Discussions with Forest Products Commission and Consulting Forester	Newport Beach	NA
June 26	Poster Presentation	Forest Products Society Convention, Newport Beach	285

Summary of Current Observations

Interest among the forest resource managers in Southern California remains strong and government agencies continue to search for the best mechanism to encourage local biomass utilization. However the raw material quality and local market conditions remain major challenges to fostering growth of existing forest products and biomass-based businesses and to encouraging the development of new businesses. As the national softwood lumber market is entering a major downturn the availability of excess inventory of inexpensive lumber on the national market is causing many entrepreneurs to reevaluate their interest in producing lumber locally. In the present market it costs less to purchase commodity lumber on the open market than the cost of manufacturing the same product locally.

A parallel study being funded by the California Department of Forestry has failed to find any new market opportunities and has had only limited success in encouraging the expansion of existing operations.

A need to thoroughly educate the resource professionals and forest products community in the region has been identified and discussions have begun with the San Bernardino National Forest staff to host a focused conference in early 2007.

Tasks Remaining

1. Create web site for housing Southern California woody biomass information
2. Prepare report on wood property and wood quality issues related to the timber in the Southern California forests.
3. Develop and implement a conference to present information gathered in this report and discuss long-term opportunities.
4. Prepare final report

Appendix – Poster Presented at the 60th International Convention of the Forest Products Society, Newport Beach, CA. June 25-28, 2006.

Abstract:
Woody biomass accumulating in Southern California in response to a five year drought and insect induced mortality created a major wildfire hazard and public concern in an area that had little forest products infrastructure. Great strides were made in responding to this crisis in the number of dead and dying and hazard trees removed and the amount of biomass that found its way to a market. Initially the amount of woody biomass being removed far exceeded the consumption capacity of the current infrastructure and biomass industry in Southern California. Efforts to spread the word that there were salvage timber opportunities and public funding available to help defray the high costs of salvaging the wood led to the incubation of many new, small businesses and representatives from the forest products industry throughout California and neighboring states setting up operations in the region. This study was initiated to evaluate the potential for new biomass markets in the region. As a result, during the peak production period of the summer of 2004 about 20 utilization companies were operating in the 130 mile region encompassing the mountain-top communities of San Bernardino, Riverside, and San Diego Counties. It was estimated that 800 thousand green tons of sawlogs and woody biomass were removed, of which 47% was converted to lumber (about 65 million board feet), 11% was diverted to biomass powerplants, 2% was converted to firewood, and the remaining 40% was used as soil amendment, left on site, or disposed in landfill. Since the summer of 2004 all indications are that the numbers of tree removals and production of products has been decreasing. Many of the companies that were processing the largest quantities of trees have left the area. A new survey is currently being conducted to determine the sustainable production levels for the region.

The major conclusions of this study are that:

1. Long distance transport is feasible for high value sawlogs.
2. The projected long term sawlog resource (150,000 green tons per year) could support local mill capacity of 25 million board feet per year.
3. The projected woody biomass resource (200,000 green tons per year) far exceeds current consumption of forest-based biomass and could support a new 12 megawatt capacity power plant.

A copy of the poster follows on page 6.

Poster # 6

Biomass Utilization Reduces the Wildfire Fuel Hazard in Southern California

John Shelly, CE Advisor--Biomass Utilization
University of California, Berkeley
john.shelly@nature.berkeley.edu

Project Funded by: USDA Forest Service, Region 5, State and Private Forestry

ABSTRACT

Woody biomass accumulating in Southern California in response to a five year drought and insect induced mortality created a major wildfire hazard and public concern in an area that had little forest products infrastructure. Initially the amount of woody biomass being removed far exceeded the consumption capacity of the current infrastructure and biomass industry in Southern California. Efforts to spread the word that there were salvage timber opportunities and public funding available to help defray the high costs of salvaging the wood led to the incubation of many new, small businesses and representatives from the forest products industry throughout California and neighboring states setting up operations in the region. This study was initiated to evaluate the potential for new wood and biomass markets in the region. As a result, during the peak production period of the summer of 2004 about 20 utilization companies were operating in the 130 mile region encompassing the mountain-top communities of San Bernardino, Riverside, and San Diego Counties. It was estimated that about 800 thousand green tons of sawlogs and woody biomass were removed, of which 47% was converted to lumber (about 65 million board feet), 11% was diverted to biomass powerplants, 2% was converted to firewood, and the remaining 40% was used as soil amendment, left on site, or disposed in landfill. Since the summer of 2004 all indications are that the numbers of tree removals and production of products has been decreasing. Many of the companies that were processing the largest quantities of trees have left the area. A new survey is currently being conducted to determine the sustainable production levels for the region.

Sixty percent tree mortality in densly populated Mountain top communities such as Idyllwild, CA (shown here),result in an extreme wildfire hazard. This community of 500 houses is in the heart of a pine forest with thousands of dead trees.

BACKGROUND

Trees in Southern California? It comes as a surprise to many but the high elevation mountains of San Bernardino, Riverside, and San Diego Counties are home to 70 thousand acres of mature pine and cedar forests. More than 5 years of drought combined with extensive bark beetle infestations have resulted in catastrophic tree mortality, as high as 60% dead in some areas. This situation created a critical fire hazard in 2003/2004 of exceptional scale. The fears of many were realized in the late season fires of 2003 that burned about 750,000 acres of mostly chaparral, destroyed 3640 homes, and threatened the mountain top communities of Lake Arrowhead, Big Bear, and Idyllwild. The threats for repeat catastrophic fires remain, as the November 2003 fires impacted only a small percentage of the dense tree mortality. It is expected that nearly 5 million tons of dead and dying trees will be removed by 2008 to return the area to an acceptable fire hazard level.

The October 2003 fires of Southern California, fanned by hot, dry off-shore winds (Santa Anna winds) were within hours of encircling the community of Lake Arrowhead (pop. 10,000+) before the weather conditions improved and the fire intensity subsided.

Oct. 26, 2003 satellite image 2003 showing 150 miles of firezone from Los Angeles to San Diego

Oct. 28, 2003 the fire crested the mountain and raced towards Lake Arrowhead, destroying 300 homes in the unincorporated area of Cedar Glenn

OBJECTIVES

- **Assess Biomass Availability** - quantify how much wood will be removed and can be made available for utilization
- **Determine Wood Properties** - evaluate wood properties of available species.
- **Identify Utilization Opportunities** - assess existing industry and search for new markets or opportunities for local supply to existing markets.

Logging the wildland urban interface -- the mountain top communitiesin San Bernardino saw an average of 30 log trucks a day during peak harvesting times. This in a community that likely hadn't seen a log truck in their neighborhood for 30 years.

It is not uncommon to see ponderosa and sugar pine trees 4 to 5 feet in diameter. Unfortunatly the logs developed blue stain very quickly, which dramatically reduced their value

The lack of a primary manufacturing infrastructure meant that logs had to be hauled long distances to the sawmills of Northern California. These logs are being loaded on rail cars for transport to a sawmill In Chester, CA, 625 mills to the north.

In response to the crisis and the glaring lack of local infrastructure, many small companies moved into the area with small sawmills. This closed landfill site was quickly converted into a concentration yard for as many as 8 companies

RESULTS

The mixed conifer forests of the Southern California mountains are predominantly made up of eight coniferous species: 5 pines including ponderosa, jeffery, sugar, coulter, and pinyon; big cone Doug-fir; white fir; and, incense cedar. Of these, white fir and ponderosa pine suffered the highest drought-induced mortality rates. Incense cedar is immune to the bark beetle attacks that are fatal to the pines however it is still being removed as a component of fuel reduction thinnings and also as salvage from burned areas. The ponderosa, jeffery, and sugar pines along with the white fir and incense cedar are important commercial species (see figure to left). The highest grade ponderosa and sugar pine logs are very valuable. Unfortunately these species quickly develop blue stain in this environment, which drops the value of the logs by 38%. Incense cedar is the most valuable of these species because of the high demand for durable wood species and the strong house siding and fence markets in the west. Generally not used for lumber are: coulter pine, because of its inferior properties; pinyon pine, because of it's size; and big cone Doug-fir because of its limited supply.

Characteristics of Impacted Species

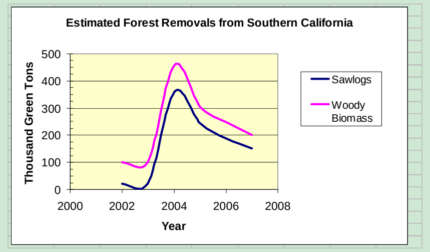
Species	S. G.	Estimated Market Value in 2004 ($ / MBF, FOB Landing): High	Paint Grades	Low	Percentage total mortality	Comments
Ponderosa pine *Pinus ponderosa*	0.38	480	300	120	19	highest grades commonly used for molding and millwork, lower value used for common boards and pallet stock
Jeffery pine *Pinus jeffreyi*	0.37	480	300	120		
Sugar pine *Pinus lambertiana*	0.34	480	300	120	8	
Coulter pine *Pinus coulteri*	*na*	60	60	60	10	low strength properties, brash nature, very little value as lumber
Pinyon Pine *Pinus quadrifolia*	na	na	na	na	10	small trees, important habitat species, no lumber value
Big cone Douglas-fir *Psuedotsuga macrocarpa*	0.45	na	na	na	6	~ 15% lower mechanical properties than *P. menziesii*
White fir *Abis concolor*	0.37	240	na	120	37	Structural lumber, studs, some fencing if preservative treated
Incense cedar *Libocedrus decurrens*	0.35	600	na	600	0	not impacted by drought/beetle, removed as fire salvage or fuel reduction
Other (minor hardwoods)	--	na	na	na	10	firewood is only hardwood market in So. Cal.

na = not available or no developed market exists

Utilization Challenges — From the beginning of this project it was clear that many obstacles had to be overcome to institute a successful utilization campaign to help manage the wildfire fuel hazard in this region. Chief amongst these obstacles were:

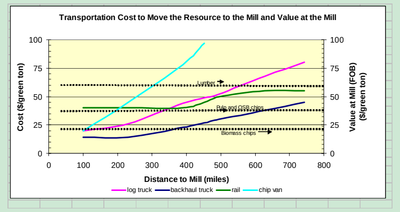
- Uncertainty of the resource availability (both short and long term)
- High cost of harvesting trees in a region with a mix of dense wildland/urban interface zones, remote locations, and steep slopes
- Transportation cost to move the wood resource to processors
- Strength of local markets for developing new facilities

Resource Availability — Estimates of the amount of wood expected to be removed over a four year period were based on interviews with public and private forestland managers and data collected from the California Department of Forestry and the USDA Forest Service. The amount removed, reported on a green ton basis (~6 GT = 1 MBF) to enable comparisons between wood forms, peaked in 2004.



The removal of 457 GT of biomass and 360 GT of sawlogs in 2004 corresponds to the height of the drought/mortality and the crisis response to the wildfire hazard. This level is unlikely to be ever reached again. Over the next 5 years removals are expected to level off at about 200,000 GT for biomass markets and 150,000 GT (25 million bf) of merchantable sawlogs.

Transportation and Markets — In the absence of local primary manufacturing facilities, the resource had to be transported long distances to reach commercial mills. The analysis of transportation costs (see figure on right) revealed that backhaul trucking (using trucks that would normally return empty to their home base) was the least expensive method. Railcar shipping of logs using dedicated 60-car trains could compete with log trucks if the haul was greater than 300 miles and would become the least expensive if the haul was more than 800 miles. From this figure we also see that the maximum distance the resource can be transported is limited by the value of the resource at the mill. Using 2004 data, high value sawlogs at an average value of $60 per green ton ($360/MBF, FOB mill) could be transported up to 500 miles by any method, however lower value sawlogs at $20 per green ton could not be profitably transported more than 50 miles. Transportation of logs to pulp mills or composite panel plants (e.g. OSB) could be profitable up to 320 miles by log truck or 600 miles by backhaul but unfortunately the closest such mill is more than 800 miles away. The breakeven point for hauling biomass chips to a power plant by chip van, at the average fuel chip value of $20 per green ton, is about 100 miles, which happens to be the distance to the closest power plant. When biomass chips are valued at the high end of their range ($25/green ton) transportation up to 400 miles by backhaul is feasible. From this analysis it was clear that once the high value sawlogs are dealt with the wood would have to be consumed locally.



Local Markets — The limits posed by long distance transportation to existing, but distant mills opened up an opportunity for small mills that could be set up quickly without the need for long term capital investment. Over a 3-year period, these small mills collectively converted nearly 500,000 green tons (90 million bf) into low value lumber products, mostly pallet stock. Local markets for biomass are very competitive, with most markets (fuel chips, landscape materials, etc.) being fully supplied by the urban woody material typically diverted from landfills. Opportunities for additonal forest-based biomass obtained from fuel hazard reduction to compete in this market are limited.

Southern California Forest Product and Biomass Markets	Resource Consumption by year and source (thousand green tons): 2003 Urban	2003 Forest	2004 Urban	2004 Forest	2005 Urban	2005 Forest	2006 Urban	2006 Forest
Sawlogs (transported out of region)	--	10	--	444	--	244	--	200
Local Lumber production	--	20	--	217.5	--	174	--	100
Composite panels	--	--	--	--	--	--	--	--
Firewood	--	1	--	10	--	7.5	--	6
Biomass chips	850	5	870	80	690	45	695	40
Landfill cover and Erosion Control	800	--	830	--	830	--	830	--
Compost/Mulch	150	--	197	--	200	40	200	40

Firewood production requires little capital investment, but softwood firewood is of low value and markets other than local were difficult to develop.

Tubgrinders were used to quickly convert woody debris, logs and whole trees into biomass chips and compost/mulch feedstocks.

Portable sawmills sprung up in many areas to produce lumber and timber for local markets.

A niche market developed for locally produced rustic siding produced from salvage incense cedar

The largest sawmill built in the area was designed to produce about 100 million bf/yr of white fir fence post stock for preservative treatment

CONCLUSIONS

1. Long distance transport is feasible for high value sawlogs
2. The projected long term sawlog resource (150,000 GT/yr) could support local mill capacity of 25 million board feet/year
3. The projected woody biomass resource (200,000 GT/yr) far exceeds current consumption of forest-based biomass, and could support a new 12 megawatt capacity power plant.