

Dead Tree Utilization Assessment

Completed for CALFIRE & California Tree
Mortality Task Force

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Objectives

Identify the most viable options for increasing the utilization of dead trees in high hazard zone areas

- Phase 1 - Interview forest products industry members about current and possible dead tree utilization business opportunities
- Phase 2 - Develop and use a dead tree business opportunity screening matrix
- Phase 3 - Identify entrepreneurs/developers potentially interested in dead tree utilization business opportunities

Perspective: Scale of the Dead Tree Problem

1. 102 million standing dead trees at end of 2016
2. That is the equivalent of:
 - 65 Billion Board Feet (BBF), or
 - 175 million bone dry tons (1 MBF = 2.73/BDT @ 35% Average Moisture Content)
3. Compares to CA sawtimber harvest in 2015 of 1.6 BBF.
 - ~40 years of harvesting at 2015 harvest rate (65 BBF divided by 1.6 BBF)
 - 19% of 2015 Global roundwood harvest (1,848 million cubic meters)*
 - 68% of 2015 North American roundwood harvest (520 million cubic meters)*

*Source: FAO 2015 Global Forest Products Facts and Figures.
- Excludes roundwood harvested for energy
- Assumes 1 cubic meter of wood = 0.5 BDT

Perspective: Conclusions about Scale

Full utilization of all dead trees is improbable because of:

- Huge volume
- Limited “shelf life”
- Oversupply markets
- Accessibility: roads & policy related

Therefore:

- Focus utilization efforts on highest priority areas in Tier 1 and Tier 2 Zones
- Focus utilization efforts on opportunities that utilize large volumes and serve large markets
 - Maximizes amount that can be utilized
 - Minimizes market glut effect

Phase 1 - Industry Interviews: Methodology

1. Interviewed ~ 20 forest products industry members
2. Interviewees were a combination of BECK industry contacts and contacts provided by CALFIRE/Tree Mortality Task Force
3. Attempted to cover multiple technologies, regions, types (timberland owners, logging contractors, manufacturers, etc.)

Phase 1 - Industry Interviews: Results

Current Dead Tree Utilization:

1. Sawmills utilizing an estimated 475,000 BDT of dead trees/year as sawlogs
2. Estimated 250,000 BDT/year of dead trees could be utilized as landscape material, soil amendments, animal bedding, etc.
 - These markets could likely be more cost effectively supplied from mill residues rather than from dead trees
3. Up to 1.1 million BDT/year of dead trees utilized/year under BioRAM

Phase 1 - Industry Interviews: Conclusions

BECK's conclusions from industry interviews

1. Keys to successful dead tree utilization
 - Quick response
 - Capitalize on existing infrastructure (contractors, supply chains, conversion facilities, markets)
2. Perceived Obstacles to dead tree utilization
 - Market Constraints: supply will overwhelm markets
 - NEPA: slow response + limited shelf-life = low value & limited utilization opportunity
 - Trucking Capacity: limited ability to move material from forest to market
 - Permitting: Air quality permitting problematic
 - Log Specs: too many short logs

Phase 2 - Screening Matrix: Methodology

1. Screening Matrix
 - ~ 50 forest products technologies considered
 - Categorized into two groups: 1) Low Capex/Low volume; and 2) High Capex/High volume
2. Built off prior screening matrix developed for USFS
3. Scoring system developed to give preference to technologies that:
 - Utilize large volumes of material
 - Service large, well-established markets & favorable market outlook
 - Utilize existing equipment, sites, or other infrastructure
 - Utilize existing/proven technologies
 - Have low CapEx & can quickly start-up
 - Are mobile or semi-permanent facilities
 - Can utilize tree species most affected
4. BECK staff/associates completed scoring for each technology

Phase 2 - Screening Matrix: Results

Low CapEx/Low Volume Group

Rank	Technology	Screening Score
1	Firewood - Bundles	65
2	Firewood - Bulk	62
3	Decorative Bark	60
4	Decorative Chips	59
5	Extractives (Essential Oils)	56
6	Animal Bedding	55
7	Mulch & Soil Amendment	52
8	Biofilter Media	50
9	Small Biomass CHP (Combined Heat & Power)	49
10	Post and Pole	47

Phase 2 - Screening Matrix: Results

High Capital/High Volume

Rank	Technology	Screening Score
1	Low Capital/Simple Product Mix Sawmill	63
2	Semi-Mobile Sawmill (Hew Saw)	58
3	Log Exports	55
4	Whole Log Chips for Pulp/Paper and Energy	50
5	Large Scale Biomass Power	44

Phase 2 - Focus on Selected Opportunities: Log Exports

Large market opportunity & several existing exporters

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
MMBF (all)	514	574	632	596	908	1,280	1,030	1,237	1,101	799	867
MMBF (CA)	10	13	13	13	24	42	31	17	42	31	23
CA as % of all	2.0	2.2	1.9	2.2	2.6	3.3	3.0	1.4	3.8	3.8	2.6

Increasing CA to ~ 115 MMBF/year = about 350,000 BDT/year utilized and still only about 10% to 15% of U.S. West Coast log export market

Phase 2 - Focus on Selected Opportunities: Log Exports

Obstacles

- Cannot export logs harvested from state or federal lands
- Process for waiver set forth in: 36 CFR 223.185 to 223.203
 - Possible criteria for granting exception:
 - State of Emergency for specific zone
 - Only logs harvested from emergency zone can be exported
 - Allow exporting only on timber sale by timber sale basis
 - Demonstrate no domestic log purchasers
 - Oversight from appointed group
- Port infrastructure
 - Log debarking capacity
 - Container loading versus bulk shipment

Phase 2 - Focus on Selected Opportunities: Whole Log Chip Exports

Advantages

- Large market opportunity: historic average of about 1.25 million BDTs of pulp quality chips exported annually from OR and WA to Asia.
- Estimated that CA could export up to 250,000 BDTs chips per year
- Existing chip exporters in CA
- Developing energy chip market in Japan
- Existing pulp chip markets in Asia
- Dry material reduces transportation cost and more desirable for energy use (more energy recovered from drier chips)
- Japanese energy wood chip buyers would reportedly give preference to salvage of dead trees over harvest of live trees

Phase 2 - Focus on Selected Opportunities: Whole Log Chip Exports

Obstacles

- Highest mortality dead tree areas are distant from largest current CA exporting activities
- Ports nearer to dead tree areas have limited draft depth (Stockton 35' and West Sacramento 30'). Fully loaded chip vessels require 38' to 39' draft
 - This problem can be mitigated by only partially filling vessels, but this would add to cost
- Need additional investment in whole log chipping equipment and additional trucking capacity to move material from forest to port areas, or possibly investment in infrastructure at export terminals

Phase 2 - Focus on Selected Opportunities: Low Capital/Simple Product Mix Sawmill

Advantages

- Relatively low capital investment per mill
- Simple product mix eliminates need for lumber grading
- Products (pallet stock and concrete forming) do not require high quality
- Relatively quick start-up
- Possible opportunity to develop multiple sawmills
- If 7 sawmills developed it would equal estimated utilization of 210,000 to 315,000 BDT/year (30,000 to 45,000 BDT/mill/year)

Phase 2 - Focus on Selected Opportunities: Low Capital/Simple Product Mix Sawmill

Disadvantages

- Markets envisioned for lumber products are overseas, therefore sales realization at sawmill exposed to currency exchange rate risk (stronger U.S. Dollar limits purchasing power of foreign countries)
- Some skepticism about ability of conceptualized equipment configuration to achieve expected production capacity (60 MBF/8 hour shift)
- Some skepticism about being able to demonstrate to financiers a secure log supply
- Log quality degradation will become an increasingly important issue over time

Phase 1 & 2:

General Recommendations

- Focus utilization on the highest priority areas within Tier 1 and Tier 2 High Hazard Zones
- Focus utilization on large, existing forest products markets such as lumber, chips for pulp or energy, logs, and biomass heat/power
- Complete research to better understand the rate of degradation associated with the standing dead trees, which will affect their utility for various utilization options
- Identify policy mechanisms for expediting the salvage and utilization of dead trees on publicly managed lands, especially national forests

Phase 1 & 2:

General Recommendations

- Analyze log trucking capacity in the Southern Sierra region, and if a shortage exists, explore options for expanding trucking capacity (e.g., reducing regulatory obstacles, incentives for business formation, etc.)
- Streamline regulatory process for biomass boiler installation (e.g., create a mechanism for allowing permitting agencies to consider how biomass heat/power would reduce emissions from trucks and other fossil fuels and open burning of logging slash and allow for more cost-effective forest management.
- Assess whether dead tree utilization might be improved through education efforts aimed at assuring that tree service contractors are aware of log markets and sawmill log specifications
- Establish programs to provide incentives, grants, low interest loans, etc. for tree service contractors, so that they can more fully capitalize their businesses with equipment for efficiently handling large long logs

Phase 3

Forest Industry Contacts

- BECK contacted 10 forest products industry members about utilizing dead trees in California
- All industry members were interested in possibly developing businesses in California to utilize dead trees
- BECK has provided CALFIRE with the contact information for the 10 forest products industry members

Private Equity Contacts

- BECK contacted principles at 10 private equity investment firms about the possibility of investing in California businesses aimed at utilizing dead trees
- 5 responded that they were interested and wanted to learn more, 1 responded that they were not interested; and 4 did not respond
- BECK has provided CALFIRE with the contact information for the 10 private equity investment firms.