

The economics and politics of using underutilized wood, especially for building products

E.M. (Ted) Bilek

Western Region Wood Building Workshop

Salt Lake City

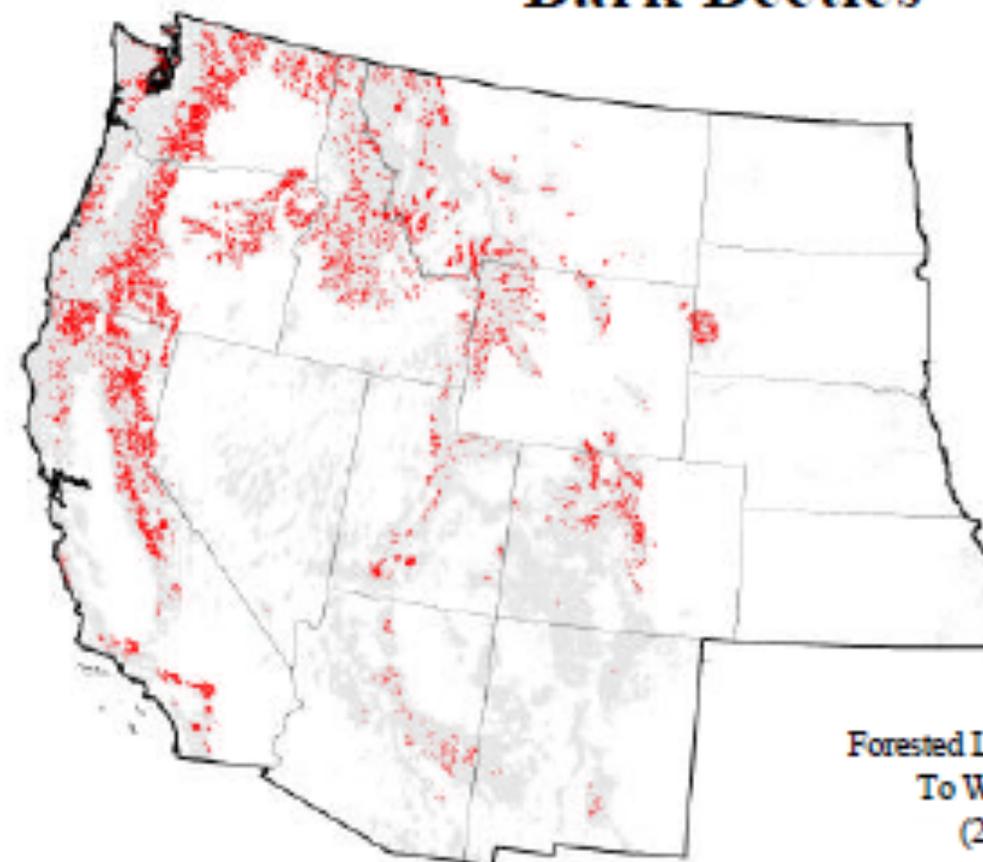
March 29-30, 2012

What is underutilized wood?

Why is there underutilized wood?

- It's becoming available faster than we can harvest it (faster growth or faster death);
- The species composition is not what is currently demanded;
- The size composition is not what mills can easily deal with;
- The locations are too expensive to harvest;
- There are policy restrictions on utilization.

Figure 1. **Forest Lands at Risk of Mortality to Bark Beetles**



Forested Lands at risk of Mortality
To Western Bark Beetles
(21 Million Acres)

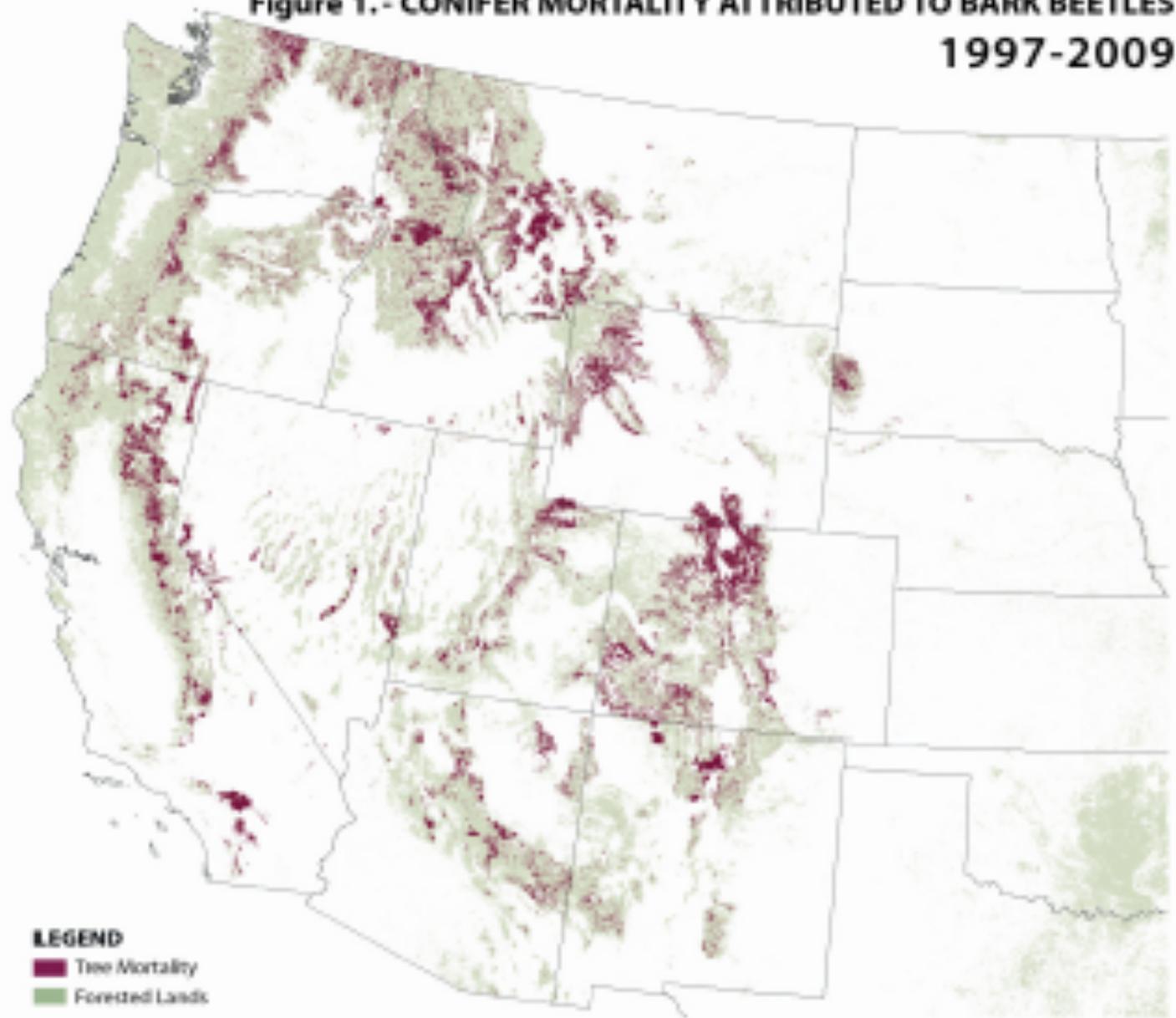
LEGEND

- Area at Risk of Mortality
- Forested Lands

300 0 300 Miles

Alaska not pictured for reasons of scale

**Figure 1. - CONIFER MORTALITY ATTRIBUTED TO BARK BEETLES
1997-2009**



Derived from Aerial Defoliation Survey Data

Why use underutilized wood?



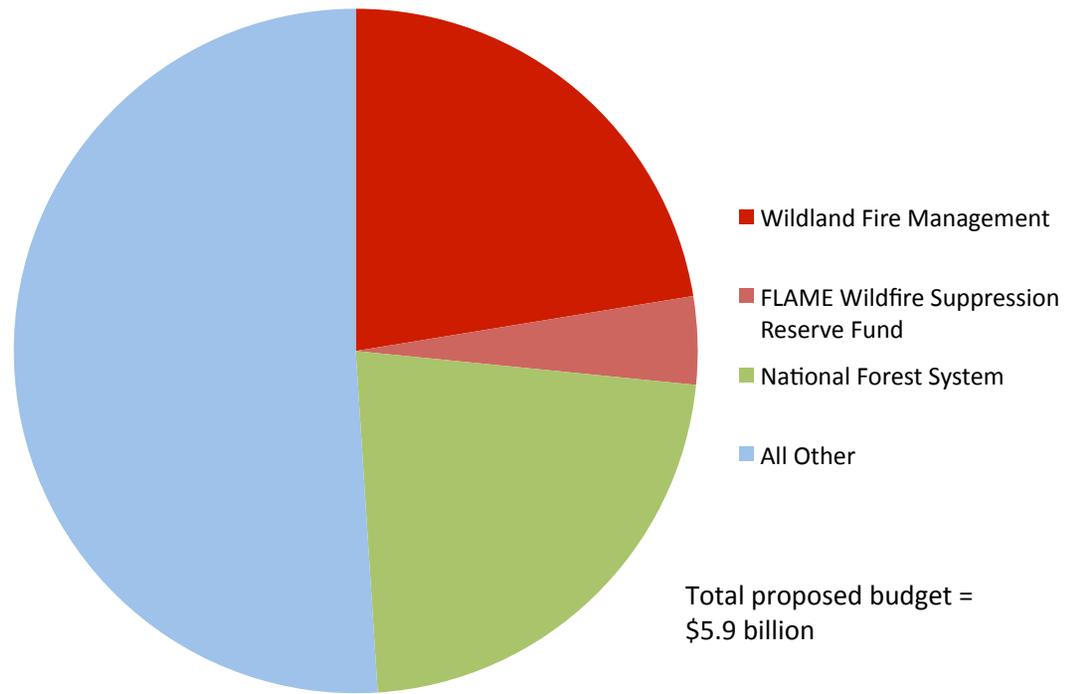
- It's cheaper;
- It's available;
- There's a lot of it;
- There may be environmental benefits.

What can we do with under-utilized wood?

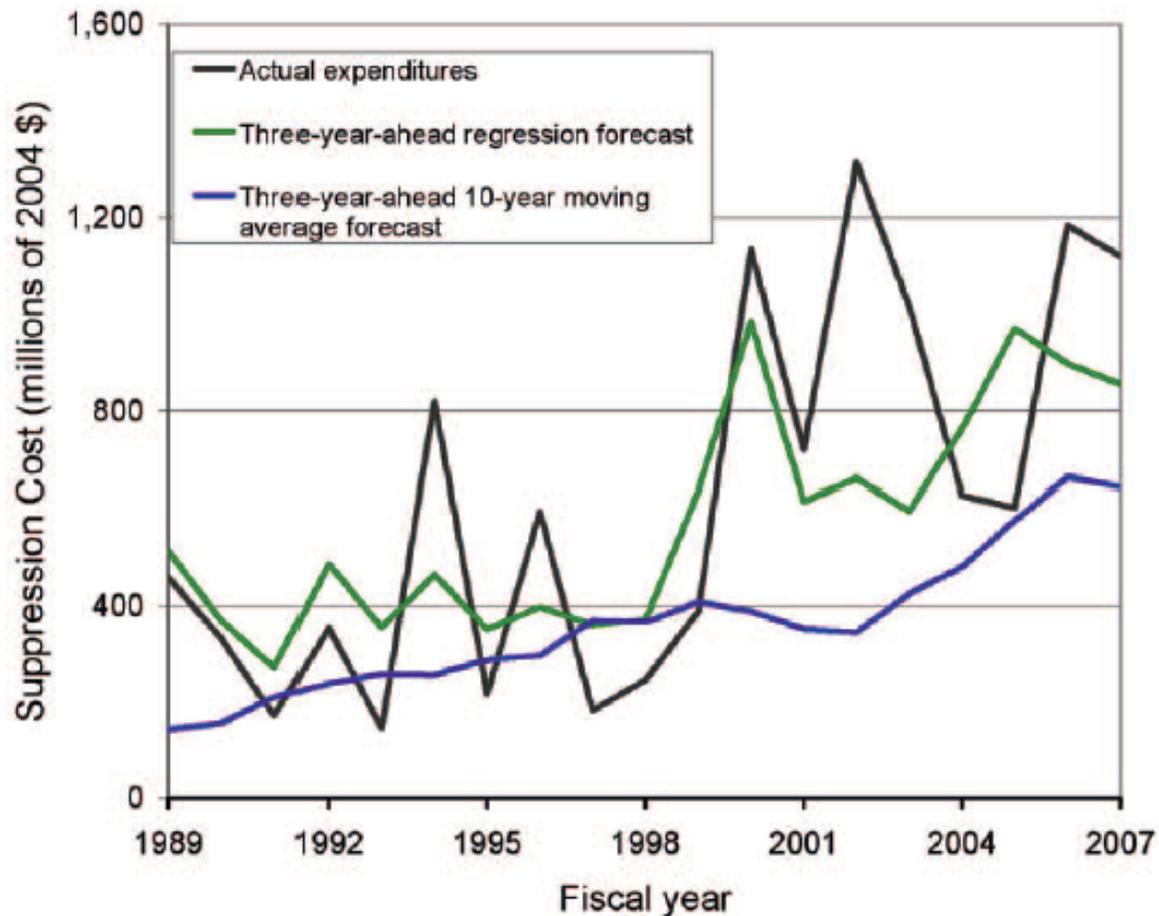
- Let it burn (or die, fall down, and rot);
- Wait for the market to recognize its value;
- Recognize the environmental and social cost of the laissez-faire action and do something about it;

President's FY2012 Proposed Budget for the Forest Service

- Total budget is down about 4% compared with 2011 estimate.
- Wildland fire management + FLAME = 34% of the agency's budget



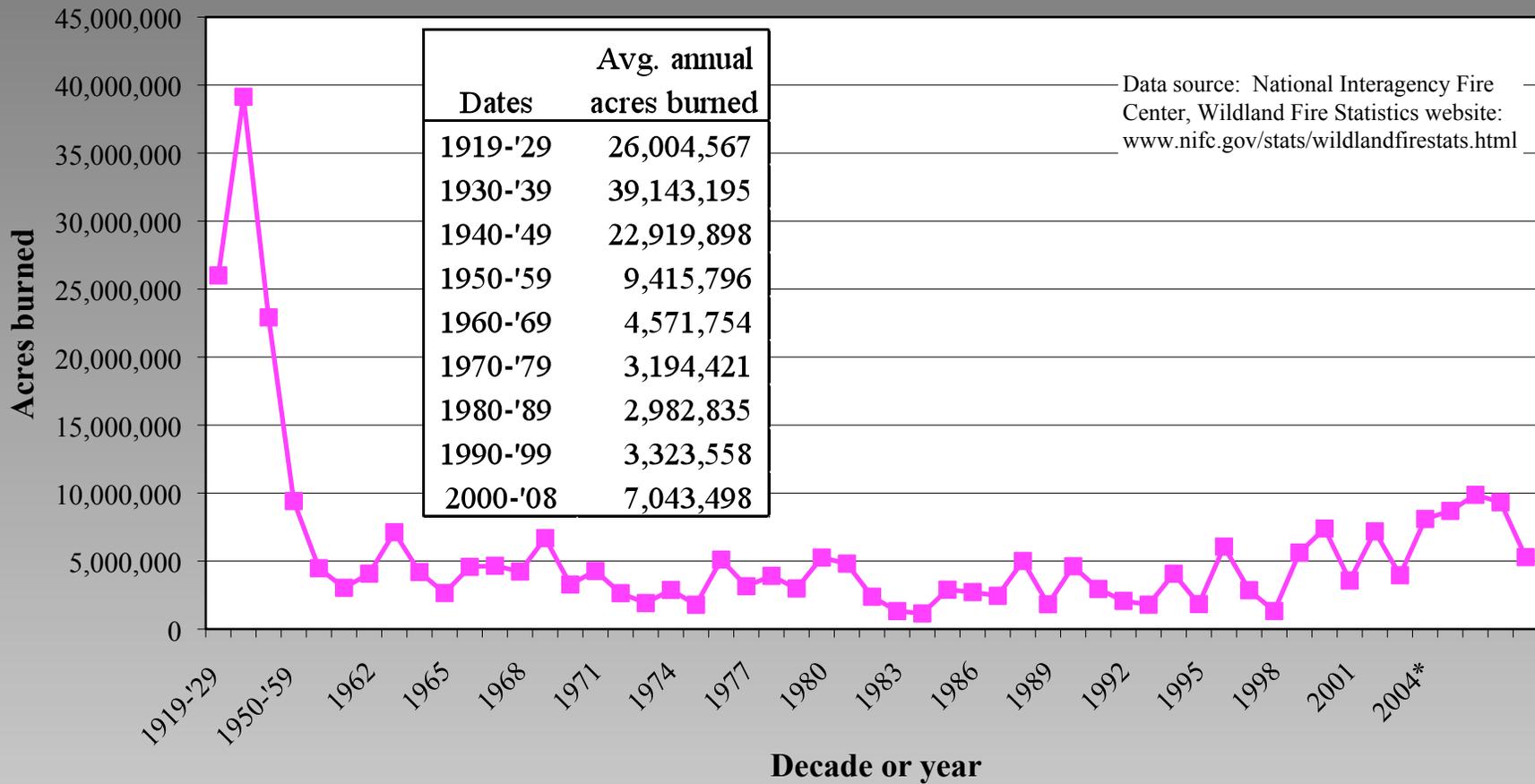
Statistical tools offer better ways to determine fire budgets



Source: Abt, Karen L., Jeffrey P. Prestemon, and Krista M. Gebhart. 2009. Wildfire suppression cost forecasts for the US Forest Service. *Journal of Forestry*. June. 173-178.

Figure 3. Comparison of actual expenditures to 3-year-ahead forecasts from the regression model and the 10-year moving average for FY 1989–2007.

Acres burned by wildfires in the United States, 1919-2008





U.S. Department of Agriculture

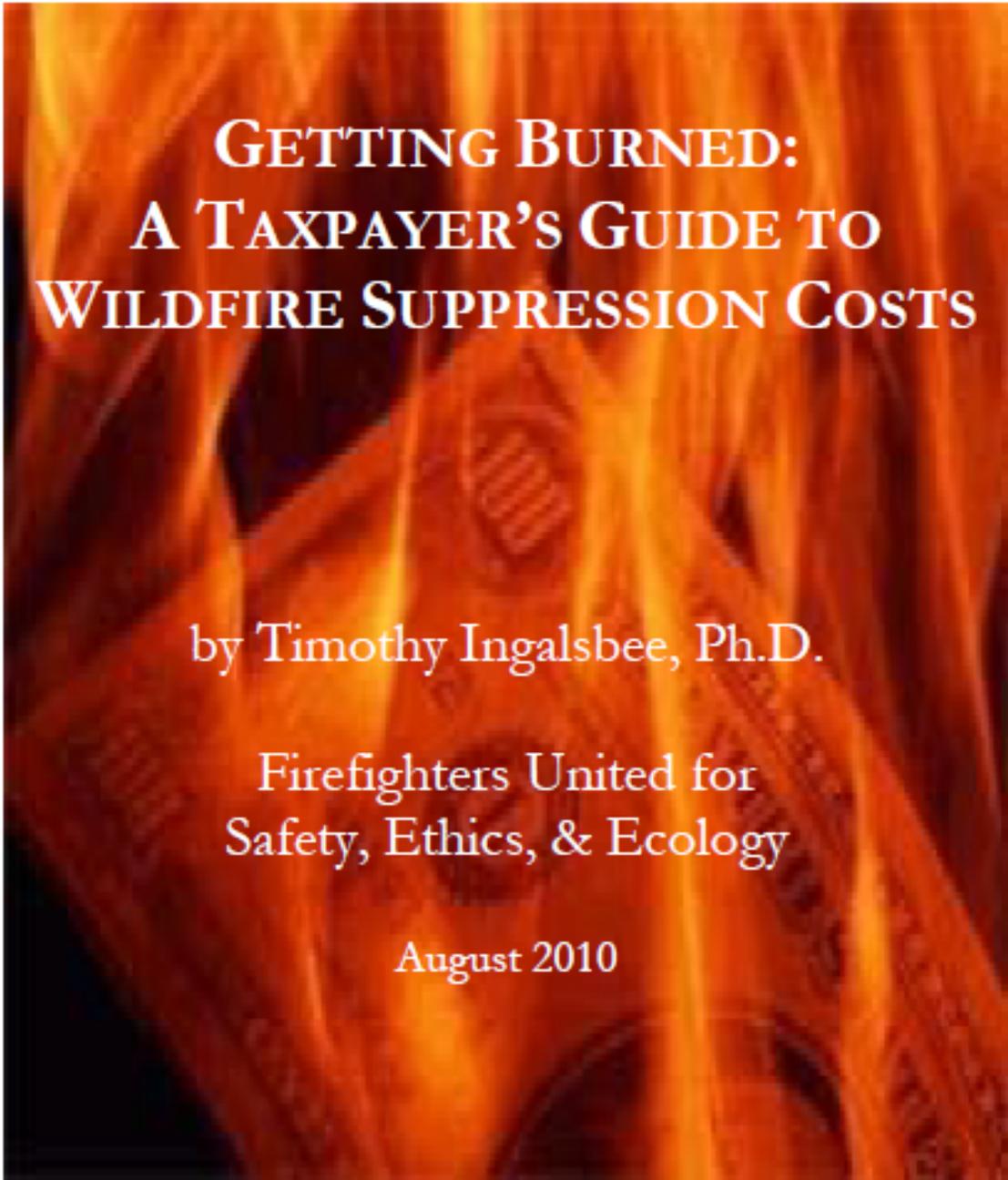


Office of Inspector General
Western Region

Audit Report

Forest Service
Large Fire Suppression Costs

Report No. 08601-44-SF
November 2006

The background of the entire page is a close-up, high-contrast photograph of several US dollar bills that are actively burning. The flames are bright orange and yellow, consuming the paper and creating a dramatic, fiery texture. The bills are slightly out of focus, emphasizing the fire.

**GETTING BURNED:
A TAXPAYER'S GUIDE TO
WILDFIRE SUPPRESSION COSTS**

by Timothy Ingalsbee, Ph.D.

Firefighters United for
Safety, Ethics, & Ecology

August 2010

The True Cost of Wildfire in the Western U.S.



Promoting science-based forest management that serves the values of society and ensures the health and sustainability of western forests.

*Original publication date April 2000
Conclusions and recommendations updated April 2010*



Wildfire costs

- Direct firefighting costs and site rehabilitation costs
- Property losses (insured and uninsured);
- Post-fire impacts (e.g. flooding and erosion);
- Air and water quality damage;
- Healthcare costs;
- Injuries and fatalities;
- Lost revenues (business disruptions due to evacuations and infrastructure shutdowns);
- Ecosystem service losses

Forest Service Strategy

July 11, 2011

Western Bark Beetle Strategy

Human Safety, Recovery and Resiliency

U. S. Forest Service



7/11/2011



The Western Bark Beetle Strategy identifies how the Forest Service is responding to and will respond to the western bark beetle epidemic over the next five years. The extent of the epidemic requires prioritization of treatments, first providing for human safety in areas threatened by standing dead hazard trees, and second, addressing dead and down trees that create hazardous fuels conditions adjacent to high value areas. After the priority of safety, forested areas with severe mortality will be reforested with the appropriate species (Recovery). Forests will also be thinned to reduce the number of trees per acre and create more diverse stand structures to minimize extensive epidemic bark beetle areas (resiliency). This is a modest strategy that reflects current budget realities, but focuses our resources in the most important places that we can make a big difference to the safety of the American public. This strategy covers Fiscal Year (FY) 2011 through 2016.

- Goals: Safety, Recovery, Resiliency
- 9 million acres available for treatment
- 500,000 acres WUI
- 1.8 million acres municipal watersheds
- 241,800 acres planned for FY2011

Cost guestimates

- Cut & scatter \$25-\$45/acre
9 million acres @ \$25/acre = \$225 million
- Pile & burn: \$275-\$1,500/acre
9 million acres @ \$1,500/acre = \$13.5 billion
- Guestimated average cost: \$125/acre
9 million acres @ \$125/acre = \$1.125 billion

What can we do with under-utilized wood?

- Haul & burn;
- Burn *in situ* or close to it;
- Convert to energy;
- Break down to fiber or chips & reassemble;
- Use it in-the-round;
- Manufacture building products.

Haul and burn



Photo credit: AIR BURNERS, LLC PHOTO GALLERY. 300 Series Fireboxes.
Source: http://www.airburners.com/ab-ph-s327_7.HTM

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Burn in situ, or close to it



Photo source: Utah Forest News.
Winter 2011.
Source: [http://forestry.usu.edu/files/
uploads/UFN/UFN1501.pdf](http://forestry.usu.edu/files/uploads/UFN/UFN1501.pdf)

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Simple Economics of Woody Biomass for Energy

Harvesting & Removal Costs

Stumpage fee	\$ 1.00	\$/green ton		
Harvesting cost	\$ 10.00	\$/green ton at the skid site		
Chipping cost	\$ 5.00	\$/green ton at the skid site		
Green chip cost	\$ 16.00	\$/green ton at the skid site		

Delivery to Conversion Plant

Green chip transport cost	\$ 0.20	\$/ton/mile		
Green chip transport distance	50	miles		
Total green chip transport cost	\$ 10.00	\$/ton		

Conversion Costs

Cost of green chips at conversion plant	\$ 26.00	\$/green ton		
Green chip moisture content	50%			
Equivalent cost of dry chips	\$ 52.00	\$/dry ton equivalent		
Conversion efficiency	95%	converted product/raw material		
Equivalent cost of converted chips	\$ 54.74	\$/dry ton equivalent		
Conversion cost	\$ 65.00	\$/dry ton		
Total cost of converted wood	\$ 119.74	\$/dry ton at the conversion plant		

Average Coal Spot Price per Short Ton, March 9, 2012

	Cost (\$/ton)	Energy content (Btu/lb)	Cost (\$/MMBtu)
Central Appalachia	\$ 65.85	12,500	\$ 2.63
Northern Appalachia	\$ 70.05	13,000	\$ 2.69
Illinois Basin	\$ 52.00	11,800	\$ 2.20
Powder River Basin	\$ 11.50	8,800	\$ 0.65
Uinta Basin	\$ 40.55	11,700	\$ 1.73

To be aware of...

EPA issues new rule on greenhouse gas emissions: Where does that leave coal?

- *The EPA proposed the first-ever US curbs on power plants' greenhouse gas emissions, saying next-generation coal plants should meet the restrictions. But the coal industry slammed the new rule.*

Convert to energy

- Hog fuel;
- Fuelwood;
- Pellets;
- Torrefied wood.

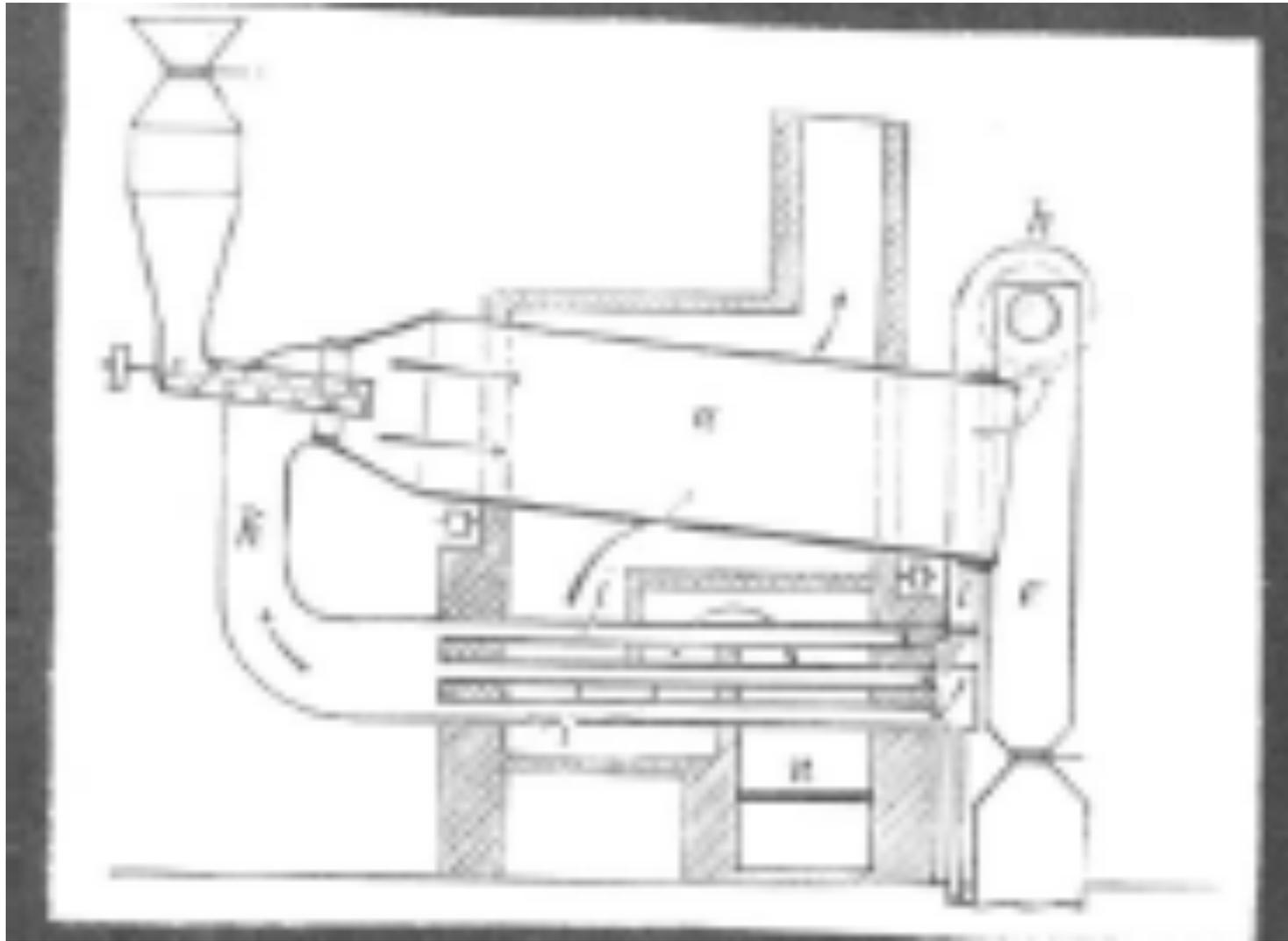
Torrefaction



Photo credit: http://www.alibaba.com/productshowimg/sweetsunnahmy-100557188-0/Torrefied_Wood.html

- Stiffens wood;
- Stabilizes its size;
- Reduces weight by about 30%;
- Increases its energy content by 5% to 10%
- Makes it very hard, sometimes to the point of brittleness;
- Makes it insect and water-resistant.

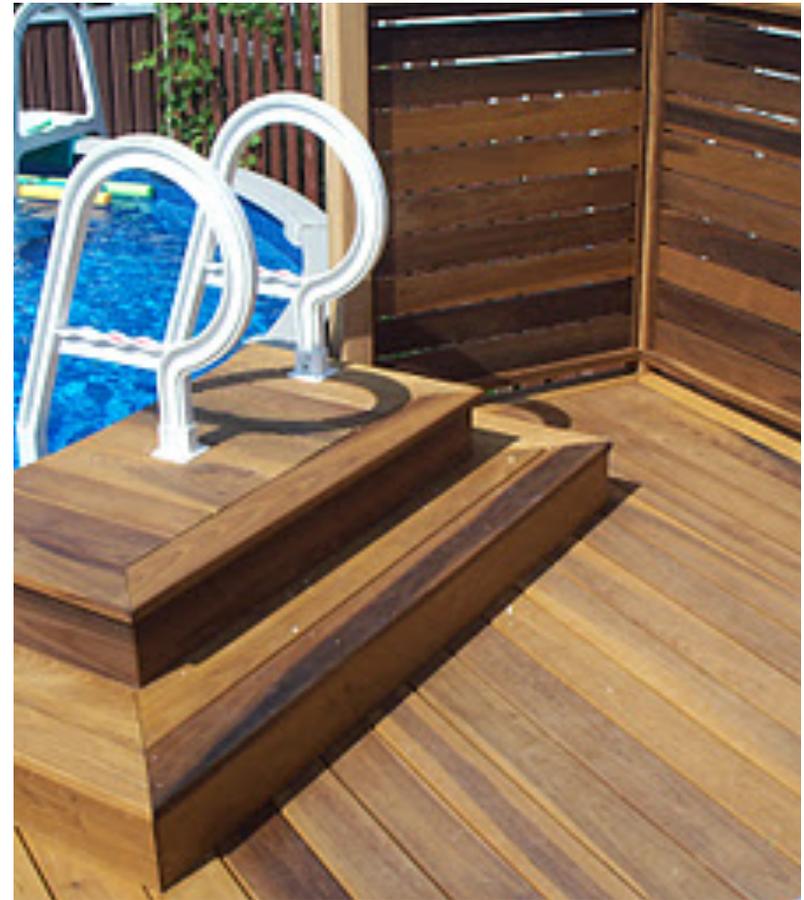
German patent No. 100287, December 5, 1897



Torrefied siding



Deck timbers



Other possible uses for torrefied wood

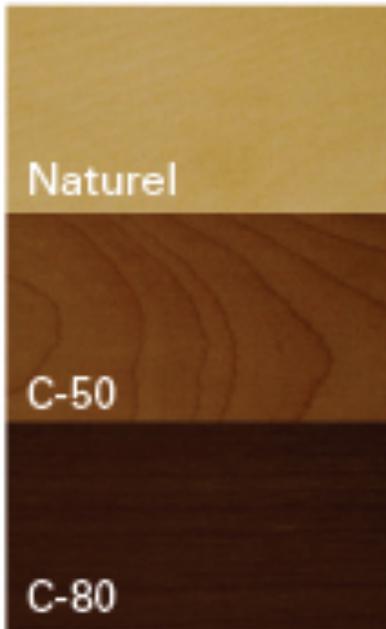
- Flooring
- Cabinetry
- Boat decks
- Outdoor furniture
- Specialty products

Picture source: <http://www.torrefactionplus.ca/torrefied-wood.php>

ASH



CHERRY



ASPEN



PINE



Other solid wood products



Gibson's torrefied
soft maple
fretboard

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Use it in the round



Peak 7 Log Cabin
by Powder
River Log
Cabins

Photo credit: [http://
www.buildsummit.co
m/log-cabin-
construction-
pictures/](http://www.buildsummit.com/log-cabin-construction-pictures/)

Use it in-the-round



Above: Woodland Hideaway. Kerry Martin, Will Gray.
Images by M Dickson

Photo source: Dickson, M., G. Hopewell, C. MacKenzie, H. Bailleres, J. Switala, and C. Thomas. 2011. A market assessment and evaluation of structural roundwood products from hardwood pulp plantations. Project no. PRA154-0910. April. Forest & Wood Products Australia.

- “...small-diameter logs could be used as structural elements with limited revision to current round timber specifications and design standards” (Wolfe and Moseley, 2000)

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- **Manufacture building products.**

Structural Building Products



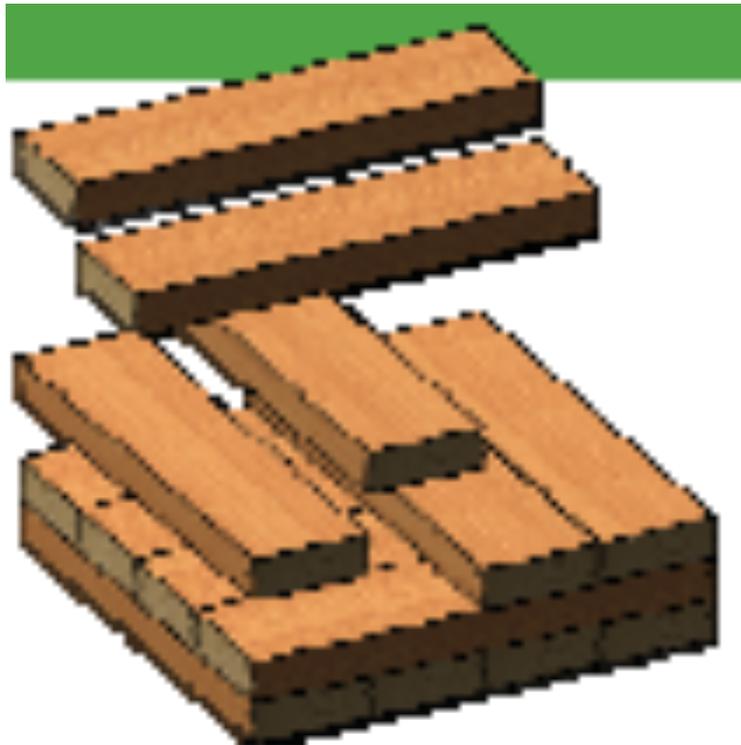
New Town Builders in Colorado is using beetle-killed lodgepole pine for structural use in new homes

Photo source: Inside Real Estate News.
<http://insiderealestatenews.com/2011/09/new-town-using-beetle-kill-in-homes/>

Colorado House Bill 12-1004

- Concerning requiring local building codes to allow the use of lumber milled from certain trees as building framing material.
- But the codes ain't broke
- It's a marketing issue

Cross-laminated timber (CLT) and its variants, Brettstapel and ICLT



- CLT = “Plywood on steroids”
- Developed in Europe in the 1980s
- Competes with concrete panels

CLT Panel Features

- Dimensional stability;
- The ability to transfer loads in multi-directions;
- Seismic stability;
- Good environmental credentials;
- Rapid construction with reduced costs;
- Buildings with increased air tightness;
- The option to be pre-finished;
- More...

...The ability to be erected on challenging sites



Austria's Olpererhütte

Photo credit: Heinrich Kreuzinger
http://www.ewpa.com/Archive/2010/june/Paper_027.pdf



...Beauty





Photo credit: <http://www.treehugger.com/sustainable-product-design/interlocking-cross-laminated-timber-could-use-square-miles-beetle-killed-lumber.html>

The competition: precast concrete panels



- Permanent, solid quality for less money
- Stronger structure
(Resists wind shears up to 160 mph)
- Lighter weight (up to 60%) panels are easier to work with
- Panels can be cut with standard skill saw
- Panels can be nailed
- Energy efficient
- Sound Resistant
- Fast, Year round construction
- Fire proof, Termite proof
- Will not rot, freeze, crack, warp or split
- Lower maintenance

Policies and tools

- Collaborative Forest Landscape Restoration (CFLR) Program
- 2012 Forest Planning Rule
- Integrated Resource Restoration (IRR) Program
- Federal Land Assistance and Management Enhancement (FLAME) Act
- Stewardship Contracting (exp. FY2013)
- Domestically-harvested wood in new Forest Service buildings

Thinning treatments

- How many trees to leave?



United States
Department of
Agriculture
Forest Service
February 2012

Increasing the Pace of Restoration and Job Creation on Our National Forests



thinkstock.com

Jobs

If underutilized trees could vote...

(Would they be Democrats or Republicans?)

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- The case for Republicans
 - Conservatives and conservation;
 - Sustained yield

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- The case for Democrats
 - Mutual support;
 - Public good benefits provided at no cost

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(Would they be Democrats or Republicans?)

- The case for Republicans
 - Conservatives and conservation;
 - Sustained yield
- The case for Democrats
 - Mutual support;
 - Public good benefits provided at no cost
- The country would be a better place
 - The Forest Service Budget would be boosted;
 - There would still be burning issues, but health would not be the divisive issue it is today.

Questions?