

Markets and Processing Options for Small Diameter Trees

Central Oregon Intergovernmental Council

Final Report

July, 2002

Introduction:

In May, 2002, the Central Oregon Intergovernmental Council (COIC) as part of their Central Oregon Wildfire Risk Reduction (COPWRR) project retained Corvallis-based Mater Engineering, Ltd. to evaluate potential new market options for the processing of non-saw-timber biomass provided from fuel reduction and forest restoration efforts in Central Oregon. The study was primarily focused on Crook, Deschutes, and Jefferson counties (hereinafter referred to as the “region”). Mater Engineering - a forest products engineering and markets research firm that has serviced worldwide clients for over 50 continuous years – provided a project scope of work to COIC that encompassed:

- Compiling the best available data on the historical and current small diameter biomass volume and sales patterns in the region;
- Evaluating existing infrastructure in the three county area;
- Identifying new smaller-scale processing technologies likely to impact processing and attract investment to the region focused on product development from small diameter trees;
- Providing a general markets overview that may impact product development from small diameter trees in the region; and
- Recommending an economic framework for the region based on the results of the above.

This study focused primarily on the utilization of small diameter timber (5”- 9” dbh), which makes up the majority of the underutilized, non-timber biomass volume and has the greatest potential for cost effective utilization in commodity and value-add markets. One of the Council’s goals is to attract investment for innovative technologies and equipment upgrades in existing businesses that will enable profitable utilization of small logs from small diameter timber (5” to 9” dbh). For smaller biomass, several options are being addressed through other projects such as energy generation, compost, or in-field treatments. Of the technologies discussed, Sorbilite could utilize some of the smaller biomass along with residue from processing of the small timber.

The results of resource, processing, and market reviews undertaken for the project suggest there may be an opportunity to create the framework for a more consistent, stable small diameter wood flow from the region’s forest by creating higher value markets for small diameter timber sales. Options evaluated for creating higher value markets included assisting existing or new industries by stabilizing timber supply;

upgrading existing or developing new operations that can profitably process small logs; introducing new smaller-scale value-added process technology for manufacturing product from solid wood and residue derived from small logs; and capturing additional market opportunities resulting from growing product trends and changing trade policy between the US and Canada.

Methodology

An extensive set of published and non-published data was used to obtain baseline information of small log volume: U.S. Forest Service (USFS) harvest and employment data for the Deschutes, Ochoco, and Winema-Fremont* National Forests came from the USFS Pacific Northwest Research Station's "Production, Prices, Employment, and Trade in Northwest Forest Industries"—this publication also included harvest volume by ownership for public and private lands; three year historical data on National Forest timber sales including bidders, volume, species, and diameter compiled by Timber Data, Inc.; and supply and production information collected by Larry Swan, USFS in February 2000.

Timber vs. Log Measurement

Timber or trees are measured on the stump. A 9" tree is 9" in diameter at breast height (54") (dbh). This diameter includes bark.

Logs are measured for diameter and taper. A 9" log is typically measured as 9" at the small end diameter (sed), inside of the bark. If the log has a taper of 1.5" in 16 ft. then the large end diameter (led) would be approximately 10.5" if the log was 16 ft. long.

A 12" dbh tree may have two logs, one >9" sed and one < 9" sed depending on taper.

Up to date information on public forest timber volume was obtained directly from staff in the Deschutes, Ochoco, and Winema-Fremont National Forests and the Prineville BLM offices. Information on timber resources (or the lack thereof) on other public lands was obtained from the Oregon Department of Forestry, Department of Transportation, and Division of State Lands. Anecdotal information regarding timber on private lands was obtained from interviews with non-industrial forest owners who are members of the Oregon Woodland Owners Association.

Information on new technologies for small log processing and innovative small-scale manufacturing technologies for wood products was obtained directly from the firms that produce these technologies. Information on recent tests on processing small log Ponderosa pine with the new technologies discussed was obtained directly from test facility reports.

Employment and labor statistics for Central Oregon Counties and other related economic statistics were obtained from the Oregon Employment Department.

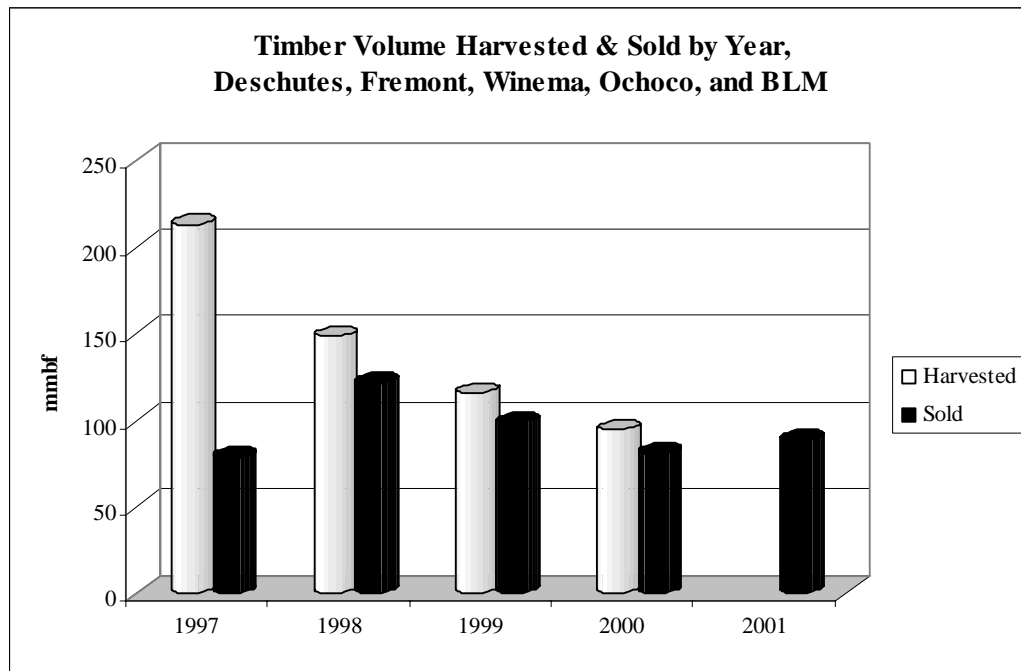
Information and statistics on growth markets for wood products and new product types was obtained from numerous statistics centers, their respective published information, and forest industry news sources such as "Business Wire"; "Home Channel News"; U.S. Census Bureau; National Association of Homebuilders; the Joint Center for Housing Studies – Harvard; Western Wood Products Association; various green building websites and newsletters, etc..

* *Management of the Winema and Fremont National Forests has recently been merged and they are often referred to as the Winema-Fremont National Forest.*

Task 1: Compile the Best Available Data Regarding Small Diameter Biomass Volume

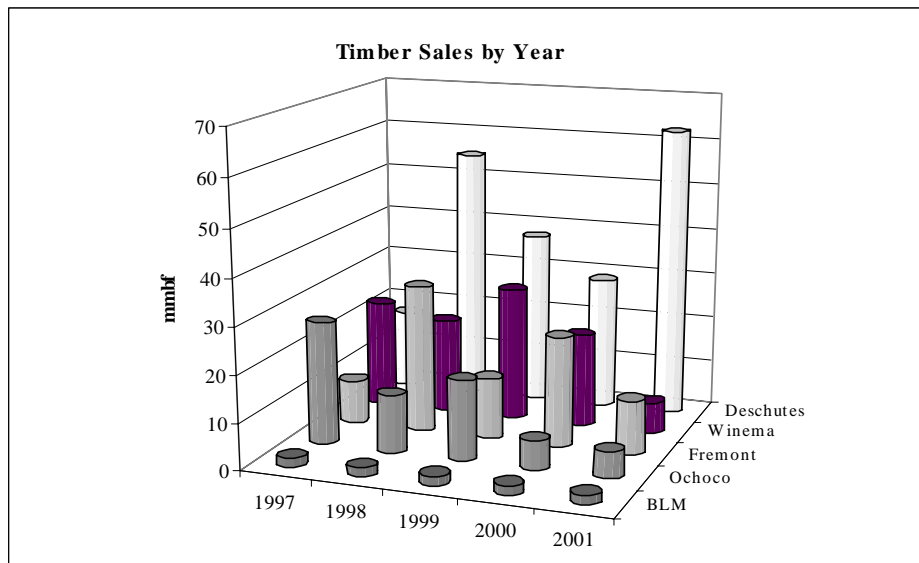
Forest Resource Availability:

The following chart is a 5-year picture of timber harvests and sales on public forestlands in Central Oregon. The chart appears to illustrate a leveling off of sales in the 60 to 80 million board feet (mmbf) per year range for 2000 and 2001.



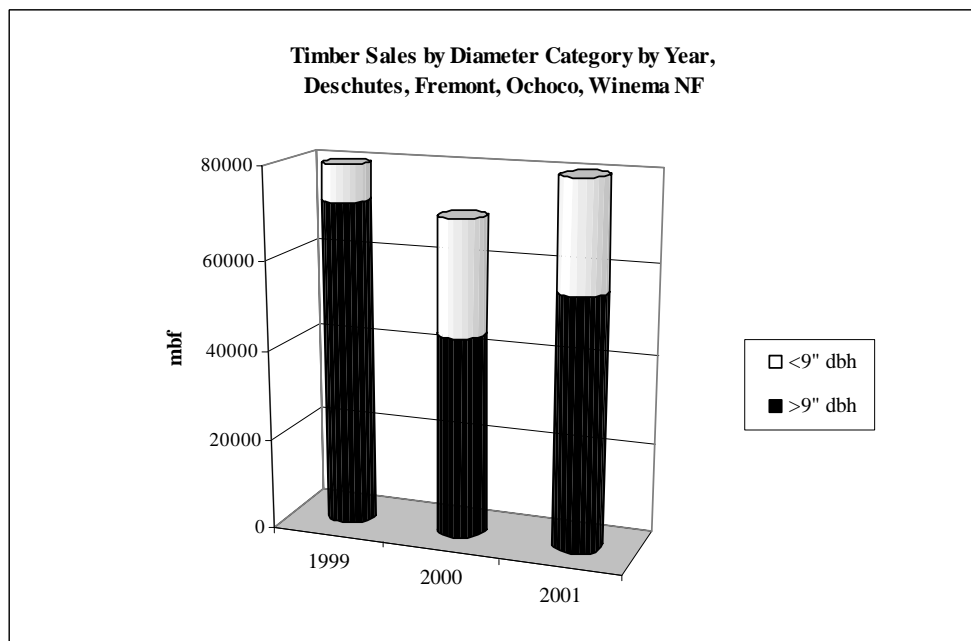
Source: D. Warren, Pacific Northwest Research Station, Portland, OR, 2002; and Timber Data Inc., Eugene, OR, 2002

Of the three National Forests and single BLM district, **the Deschutes National Forest is the major timber resource in Central Oregon** as illustrated by the following chart. Note that the sales data used in this chart does not account for the tonnage of biomass removed or burned due to the National Fire Plan. **(Biomass tonnage information is not available for calculating fiber availability; this information is only recorded as acres-treated.)**



Source: D. Warren, Pacific Northwest Research Station, 2002

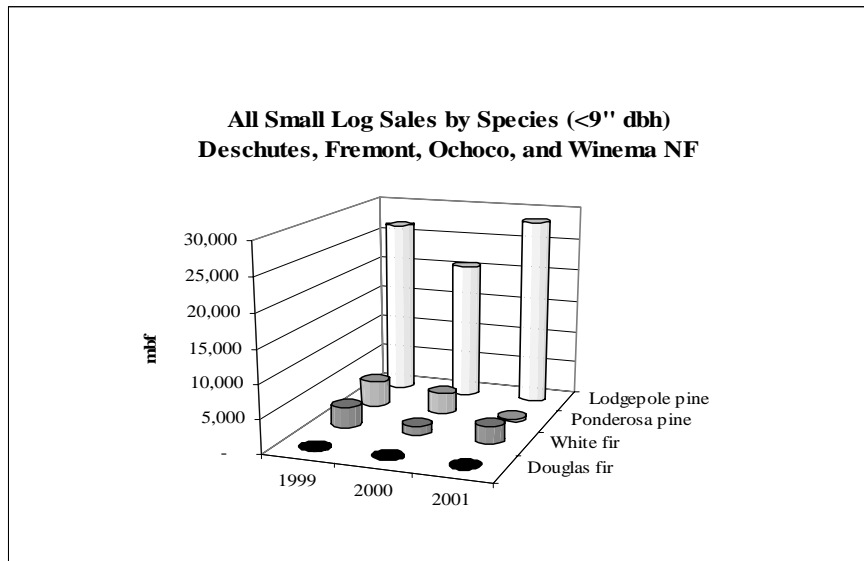
Despite the perception that small diameter timber has not been a significant part of sales because it has no economic value, the data shows otherwise. Since 2000, small diameter timber (<9" dbh) has comprised just under half of all timber volume sold, falling in the range of 25 to 35 mmbf per year.



Source: Timber Data Inc., 2002

Note: BLM sales are not included in this chart since they do not break out sales volume by diameter. However, overall BLM sales rarely exceed 2 mmbf per year in the region, so their small diameter timber volume contribution is insignificant compared to the other Forests in the region.

Small Diameter Tree Species:



Source: Timber Data Inc: 2002, BLM data excluded because diameter information was not available.

Ponderosa pine and White fir are considered a high priority for fuels removal because of the high risk they pose for wildfires, but almost all of the small diameter timber removed to date has been Lodgepole pine—White fir is a very distant second. This supports the following claim that the goals of removing targeted species are not being pursued.

“Although much has been said about the need to thin dense White fir and Ponderosa pine stands, no strong evidence of additional White fir or small Ponderosa pine is evident in an analysis of timber sale composition over the last 5 years.”

Larry Swan, U.S. Forest Service, 2000

Future Resource Availability:

For the sustainable commercial use of timber, it is important to work ‘ backwards’ and size the technology to fit the forest, building only enough processing capacity, specifically selected for the resource, as can be provided for by the resource.

A level, consistent flow of timber is critical to any effort to sustain a regional forest products industry. **A business needs a predictable, reliable, annual volume in order to sustain their operation.** This becomes even more critical when trying to attract new investments into the region.

From the Deschutes National Forest:

According to Dennis Dietrich, timber contract officer for the Deschutes National Forest, timber sales are initiated as needed, cruised, and then “designed to have positive economic value.” The chart appears to confirm that the **sales offered for bid by the National Forest are in line with bidders’ abilities to purchase timber on an as needed basis.**

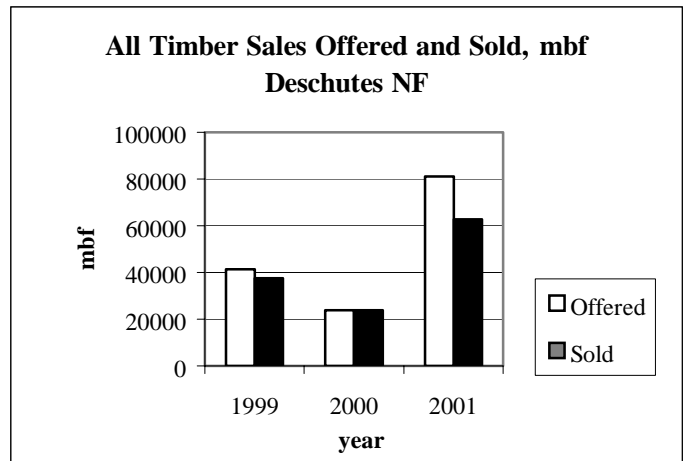
Mr. Dietrich said that he receives many inquiries regarding future timber availability, but “it’s very tough to know what’s available... I have no information to know what’s a steady supply.” The Deschutes National Forest **does not plan timber sales beyond the current fiscal year**, and the National Fire Plan activities are not coordinated with the timber contracting side of the administration. Mr. Dietrich said that sales **units with only small diameter timber are not usually offered, but “since the rules are changing, more small material will be included in new sales.”**

Small Logs vs. Sawlogs

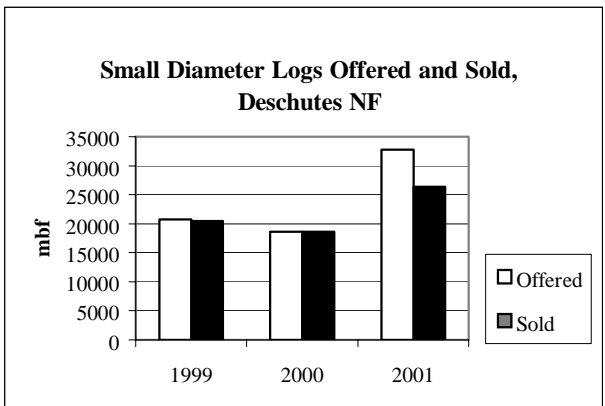
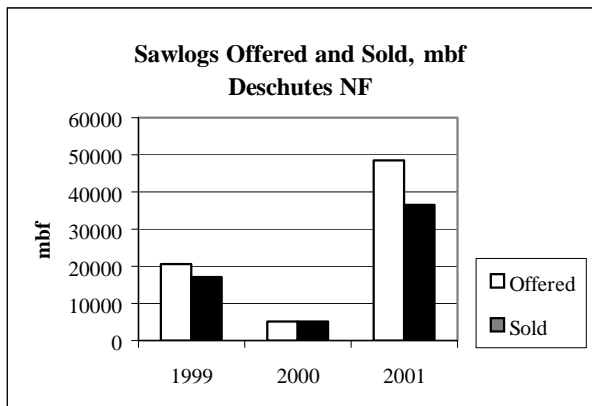
In preparing and tracking timber inventory and sales the Forest Service typically refers to timber or trees less than 9” dbh as **small logs** or pulp.

Timber or trees equal to or greater than 9” (dbh) are typically referred to as **sawlogs** even though the top of the tree may produce a small log with a sed of less than 5”.

A recent history of timber sales offered versus sold off the Deschutes National Forest is shown in below:



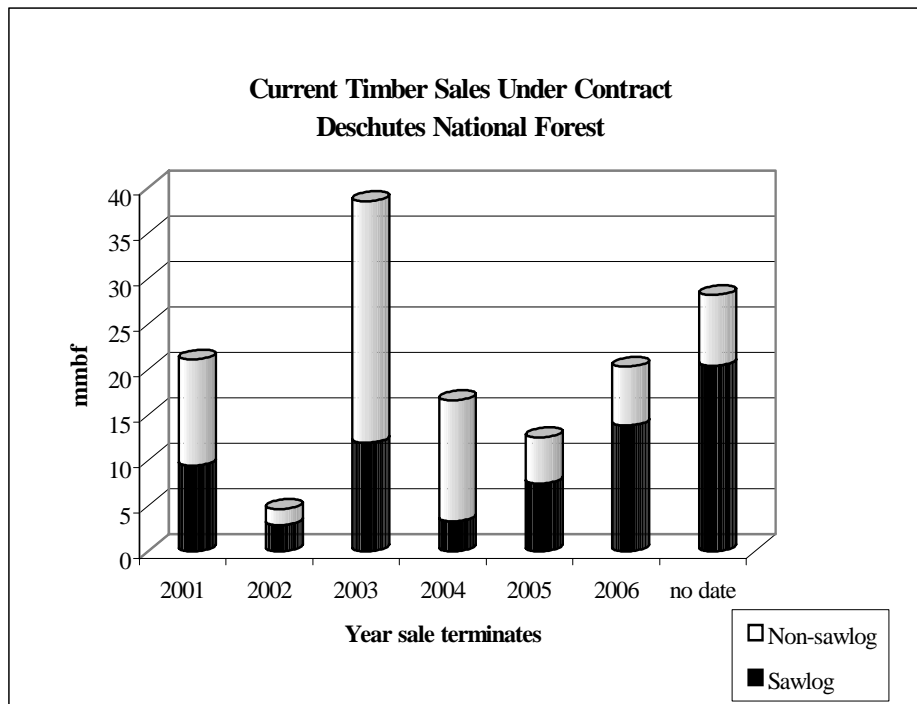
Year 2001, shows a slight decline in the percentage of timber sold versus offered compared to the prior years, and this is consistent for both sawlog size (>9” dbh) and small log size (<9” dbh) material.



John Stewart, National Fire Plan Coordinator for the Deschutes NF, stated that the **current policy is to treat excess fuels on 40,000 acres per year** by mowing, using prescribed burns, and removing understory trees. The **majority of acres to date have been treated by mowing**, and 35% of all treatment projects are done with independent service contracts. According to several Forest Service staff that were contacted, **service contract funds are insufficient for understory thinning and timber stand improvements and it is not possible to meet the acres-treated-per-year-targets** with this more expensive form of fuels reduction.

Mr. Stewart maintained that **the Forest has a goal of treating 80,000 acres per year by 2004**, but he cautioned that this might slip because of planning delays.

Future planned timber sales from the Deschutes National Forest are not available, but the following chart below provides an indication of expectations of future wood flow based on unexecuted existing contracts and contract termination dates:



Source: Dennis Dietrich, Deschutes National Forest, 2002

- Notes: - Sales listed as currently “under contract” are either not completely harvested or harvest has not yet begun.
- “Non-sawlog” sales are sales of small diameter timber less than 9” dbh.

From the Ochoco National Forest:

According to Vicki Kemp, timber contracting officer for the Ochoco National Forest, **the only sales and contracts awarded lately have been for personal firewood use.** However, she said that two large timber sales of approximately 10 mmbf each were coming up before the end of FY 2002, (September 30) and that 2 mmbf to 3 mmbf of this volume will be small diameter timber of 9” dbh and under.

<i>Ochoco National Forest Wood Flow Trends</i>				
<i>Disposition of Resource</i>	<i>FY 1999</i>	<i>FY 2000</i>	<i>FY 2001</i>	<i>FY 2002'</i>
Commercial timber sale offers, mmbf	17.6	6.4	14.2	20
Timber harvested, mmbf	17.6	14.4	10.6	
Timber stand improvement (TSI) ² , acres	8,787	8,074	1,083	
Hazardous fuels treatment ³ , acres	n/a	?	7,003	7,551
National Fire Plan ³ , acres	n/a	?	<u>4,960</u>	
Total:		10,730 ac.	11,963 ac.	

Source: Virginia Kemp, personal communication

Notes:

¹ *Planned sales*

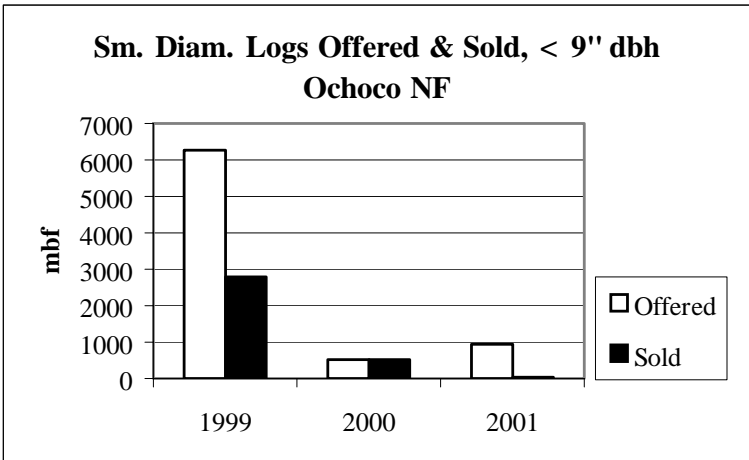
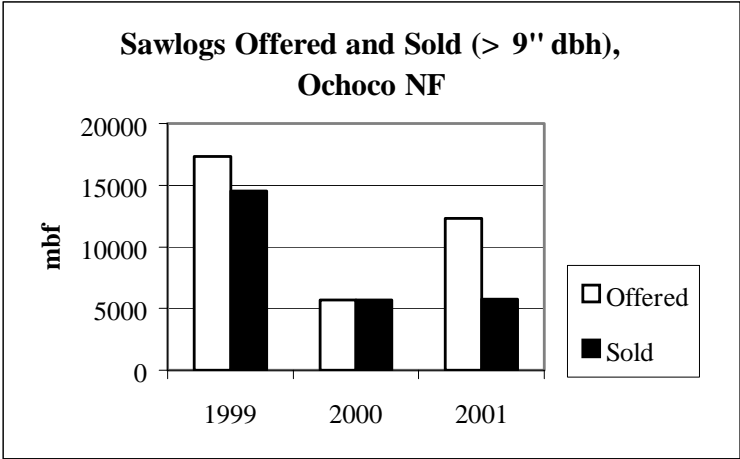
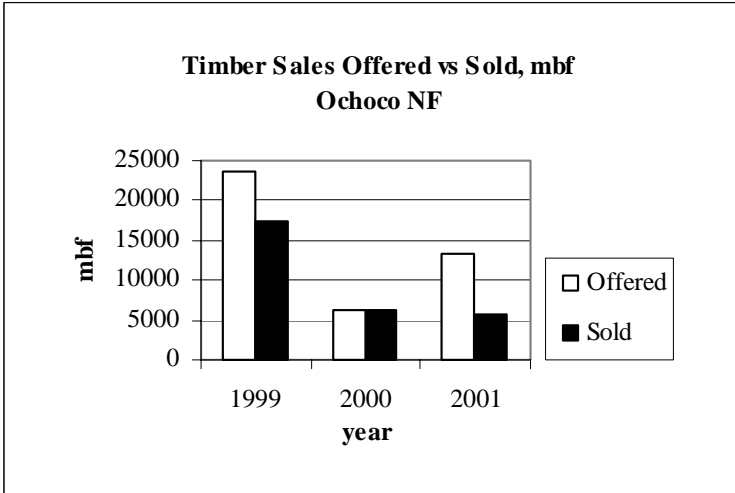
² *Thinning trees that are <9” dbh*

³ *Mainly under burning, some hand or grapple piling then burning*

Ms. Kemp said that **timber sales are planned on a month-to-month basis because of limited funding and a lack of buyers, but timber sales were formerly planned one year in advance.** She said, “sales have been driven by diameter,” so as to make them profitable.

Ochoco National Forest’s National Fire Plan **goals for 2002, are to treat 3,322 acres of urban interface forestlands, and 4,229 acres of wildlands, but records show none of this was accomplished as of April 2002. Treatment consists of prescribed burning and grapple pile burning.** Thinning down to 5” dbh for Timber Stand Improvement (TSI) is expensive but much needed according to Ms. Kemp; “We get only 10% to 20% of our budget for TSI” (that can be used for thinning service contracts).

Small diameter timber is not a big seller on the Ochoco National Forest, but little was even offered for years 2000, and 2001.



From the Winema-Fremont National Forest:

Norm Michaels, Forest Silviculturalist for the Winema-Fremont National Forests said that the number of small diameter trees removed (for pre-commercial thinning and fuels reduction) is only estimated on a per acre basis so **solid small diameter volume information is not available**. He added that all small tree removals for any National Fire Plan project would be accomplished through either a service contract designated for PCT (pre-commercial thinning) or through a regular timber sale contract.

Mr. Michaels provided the following information on timber sales and fiber removals for fiscal years 2002 and 2003:

<i>Timber Sales, Winema-Fremont National Forest</i>	
<i>FY2002</i>	<i>Estimated FY2003 and beyond</i>
<p>Total sales volume: 54,000 ccf</p> <ul style="list-style-type: none"> ○ 39,345 ccf timber, 9"+ dbh ○ 3,855 ccf in tops ○ 5,400 ccf in 7" – 8.9" dbh ○ 5,400 ccf in <7" dbh 	<p>Annual sales volume: 40,000 ccf</p> <ul style="list-style-type: none"> ○ 30,000 ccf timber 9"+ dbh ○ 10,000 ccf small diameter log volume; (includes everything under 9" dbh and tops) <p>Precommercial thinning volume, 5" – 9" dbh, is estimated at 1 ccf per acre, and 1,500 to 2,500 acres are estimated to be thinned per year.</p>

(ccf = hundred cubic feet)

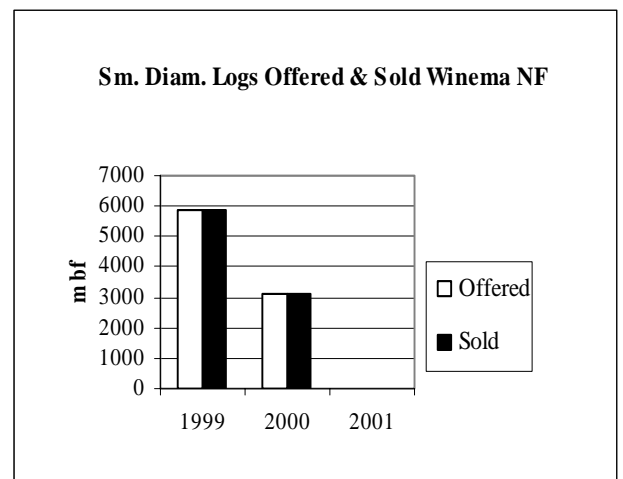
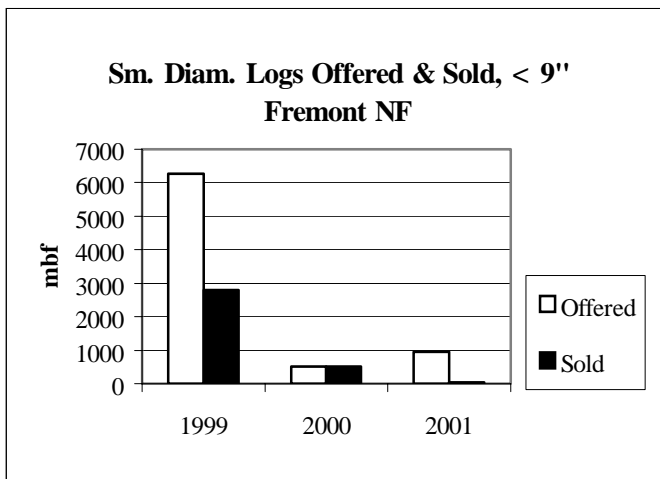
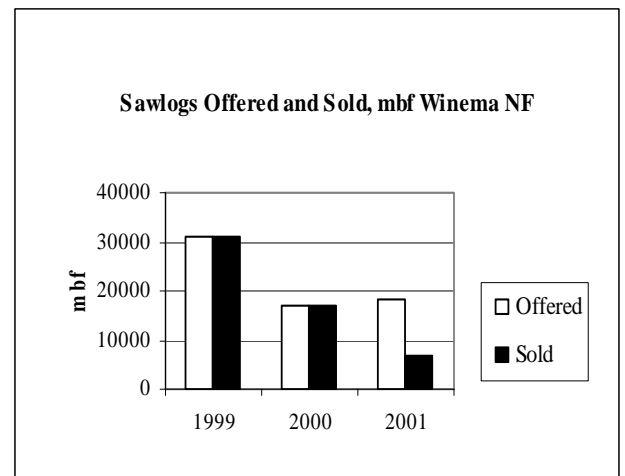
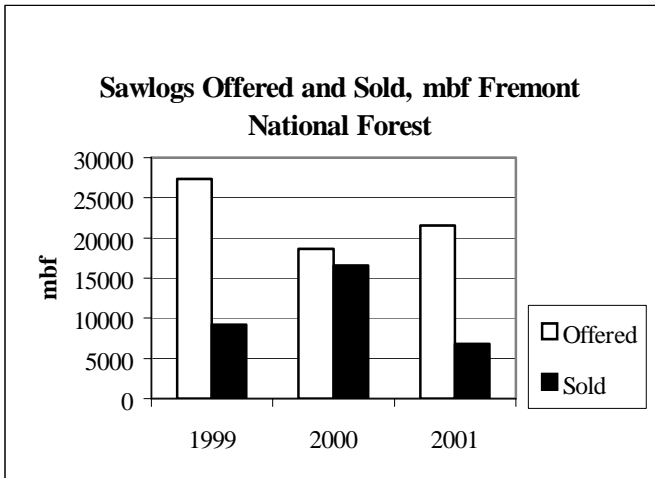
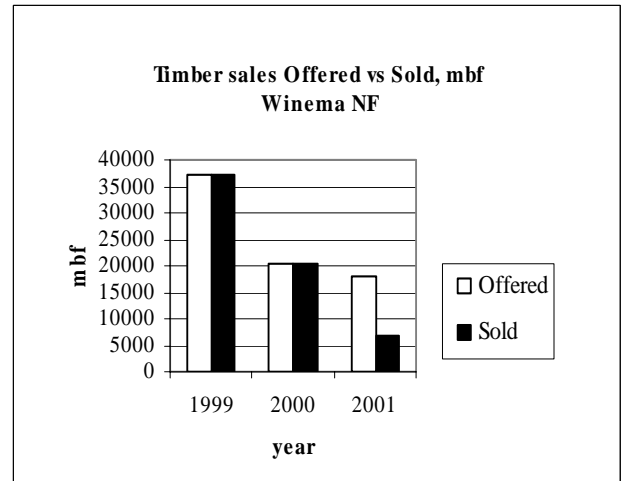
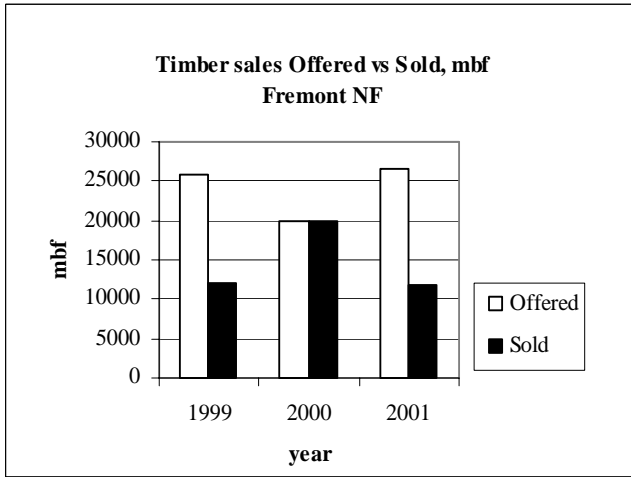
Source: Norm Michaels, Winema-Fremont National Forest

Regarding precommercial thinning (PCT) and its application to small diameter tree removal: Mr. Michaels said that the Resource Advisory Committees in the region may elect to fund PCT treatments with "Payments to Counties" monies (i.e. Secure Rural Schools and Roads Act). He speculated that **with the additional funding the thinning might produce up to 8,000 ccf of small diameter timber per year**. Note: A NEPA analysis has not been done of the effects of removing this amount of volume, so a NEPA process would need to be reinitiated.

Mr. Michaels added that any timber harvested in the Lakeview Sustained Yield Unit must be processed in that unit, and the only existing mill is Collins Pine. Unprocessed timber can only be removed if there is no market for it within the

Board Feet vs. Cubic Feet
<p>In the past, the Forest Service measured timber volume in board feet (bf), a method of estimating the volume of product that can be produced from the log. Common reference to this measure is million board feet (mmbf) or thousand board feet (mbf).</p>
<p>In recent years, the Forest Service has converted their practices to measuring timber volume in cubic feet (cf). This method is based on mathematical formulas that calculate the actual volume of solid wood in a tree or log. Common reference to this measure is 100 cubic feet (ccf).</p>
<p>The conversion between the two methods of measurement varies with the scales used and the size of the tree. Typical conversion in would be 4 to 6 mbf per ccf, depending on log size.</p>

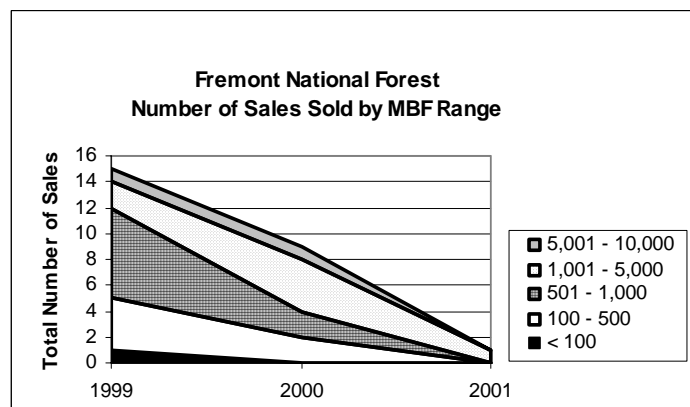
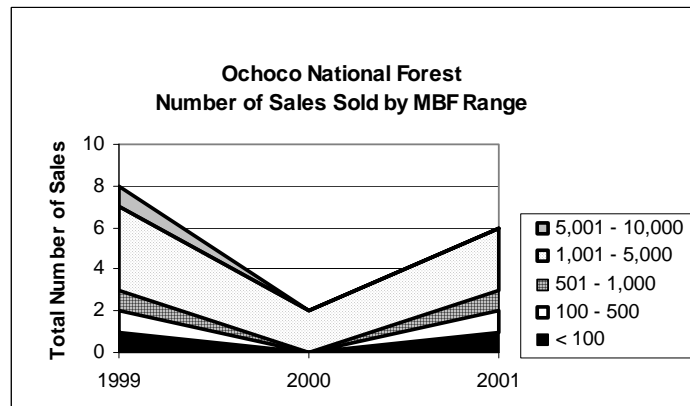
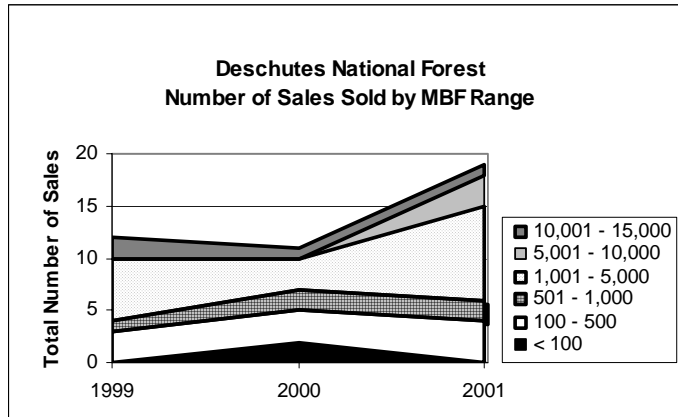
Unit (encompassed by the Lakeview and Paisley Ranger Districts and small parts of Bly and Silver Lake Districts).

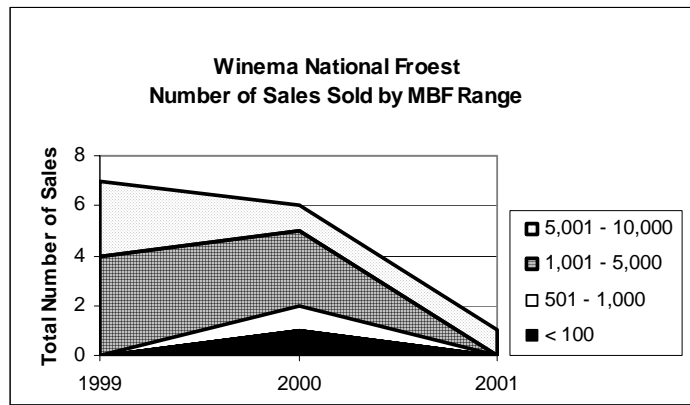


Diversity of Sale Sizes and Buyers

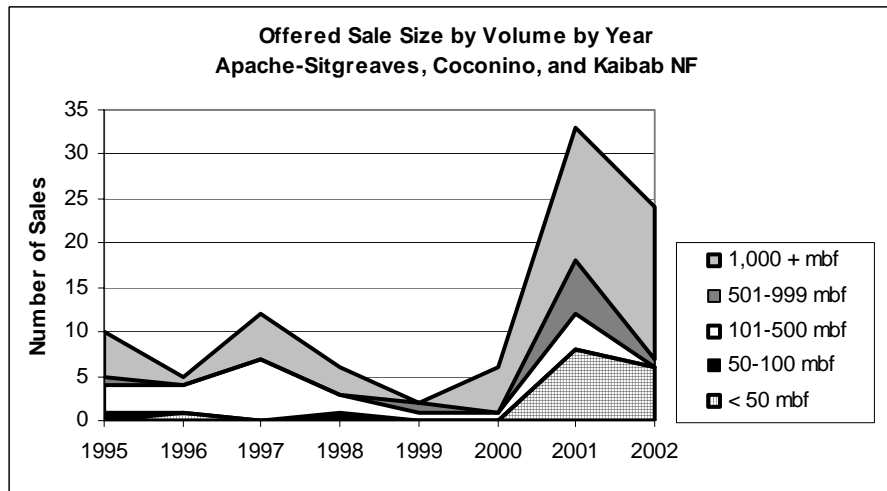
A diversity of sale sizes allows small to medium to large sized firms to buy timber, thereby supplying diverse operations based locally, regionally, or nationally. The availability of differently-sized sales with differently-sized buyers points to an existing industry infrastructure in Central Oregon with the potential for making a variety of value-added products that utilize small diameter timber.

As shown in the following graphs, **timber from the Deschutes, Ochoco, and Winema-Fremont National Forests are purchased by a wide variety of firms**, with a fairly good balance between size ranges.





For comparison, the following graph from a recent study of Arizona National Forests: Apache-Sitgreaves, Coconino, and Kaibab, shows a history of inconsistent sale sizes.



Comment: The lack of long-term consistency in sale sizes for this region contributed to the decline of local forest industry firms in Northern Arizona. Only well-funded or large firms have been able to bid on sales, many from out of state. By 2001, there is a notable increase in smaller-sized sales offers as a result of Fire Plan initiatives—but mid-range sized sales are being squeezed out by 2002, leaving only very large (>1 mmbf) and very small (<50 mbf) timber sales offerings.

Coordination of the Forest Resource:

In order for the COIC and its partners to attract investment in upgrading manufacturing facilities for cost effective utilization of small diameter timber, **it is essential that timber volume, mix, and flow be levelized**. Levelizing the resource supply does not equate to requirement for more supply, but rather provides for a *coordination of resource offering* within the region's supply picture over time. **Levelizing** is achieved by determining what resources may be available from the forest based on appropriate silvicultural management practices and then addressing the timing and location of resource removal to stabilize the supply available. This coordination requirement then works to complement an effort to re-engage in longer-term resource management planning.

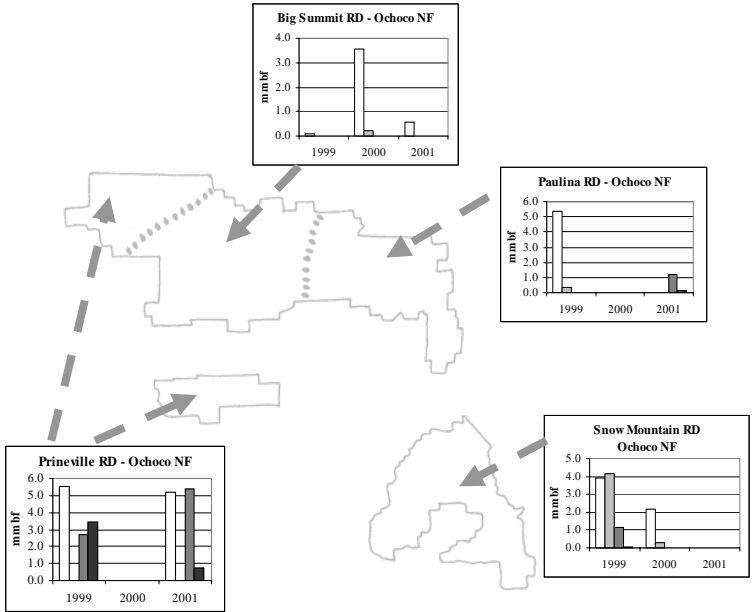
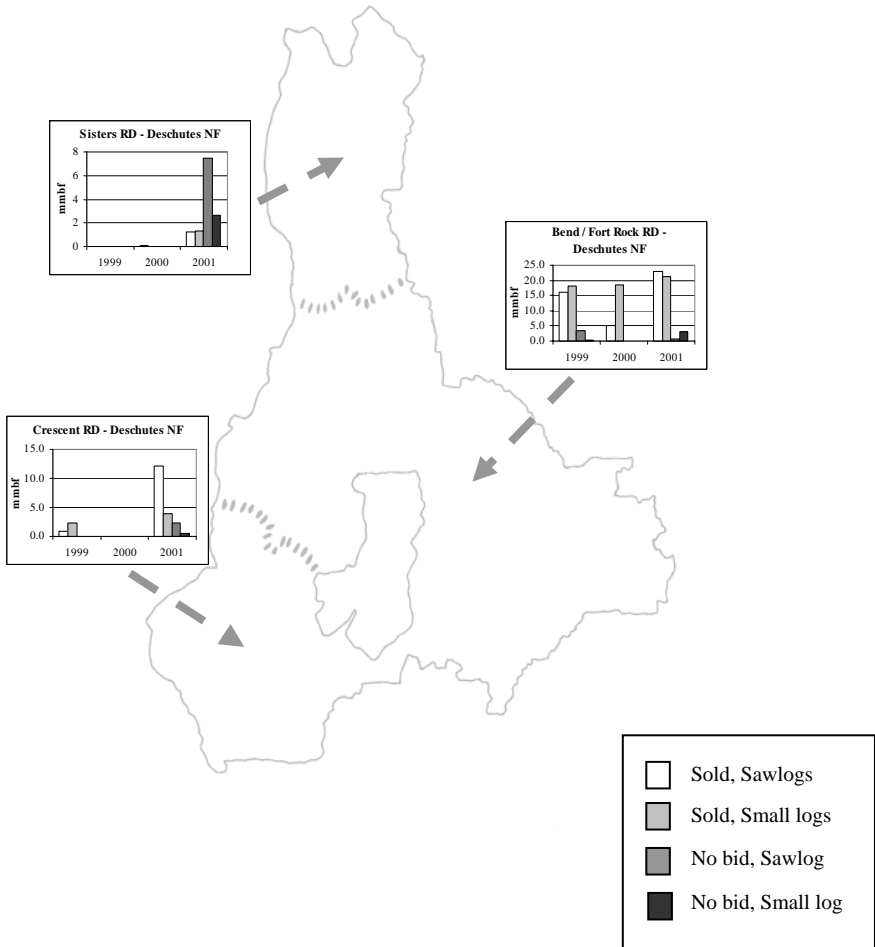
To provide an historical picture of resource offering between ranger districts in the study region, Mater Engineering undertook a supply mapping exercise for the region. Each Ranger District with timber sales in each of the three National Forests was mapped to show the distribution and size of timber sales offered and sold over a three year period. As is evident in the four attached combination map/graphs, **there appears to be no pattern to timber sale offerings that might allow a firm to plan ahead** and anticipate its need for cash for future bids or increased inventory, or successfully responding to markets for either large or small logs. **Timber access is diffuse in timing, volume, and location, posing a challenge to any forest products firm needing to plan for where and when their log supply will come from**. This lack of coordinated resource offering often creates three unintended results for forest-based communities:

- ✓ Diminishes *community benefits* and *increases community economic instability* due to timber flow leaving the region with no value-added;
- ✓ Diminishes the number of contractors *within the region* who are able to secure regional timber sales (regardless of where the timber flow goes); and
- ✓ Diminishes the number of contractors *within the region* who are able to secure procurement contracts (stewardship contracts, PCT contracts, etc.)

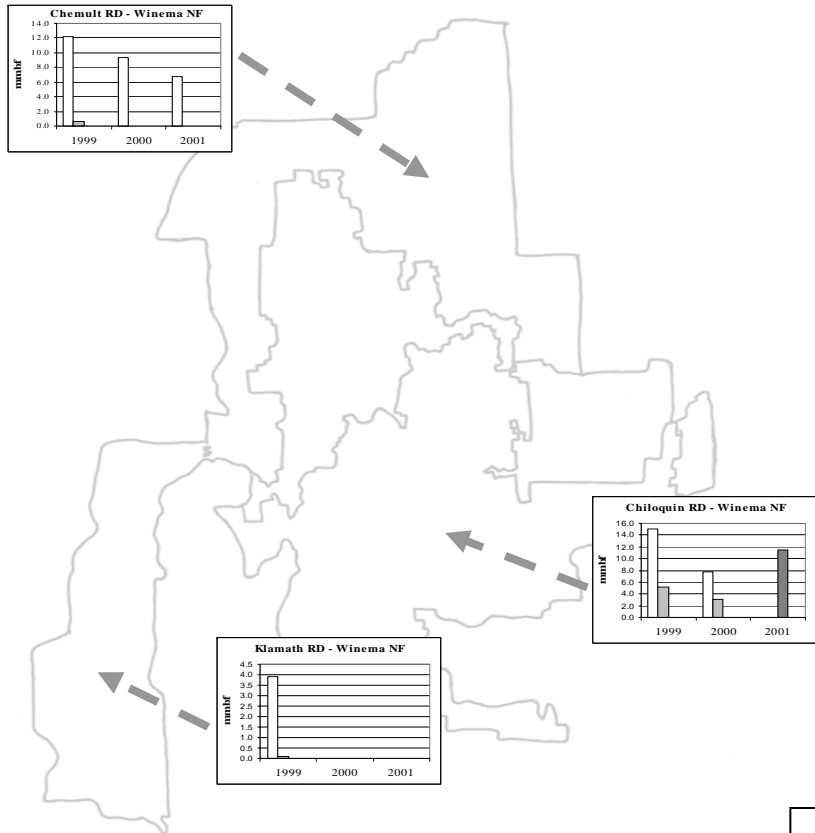
By implementing an intra-regional resource offering protocol in the region in both timber sales and procurement contracting, the National Forests Systems could *levelize* the flow of regional timber, creating a predictable, stable resource supply that could bring investment back into the region and rebuild community benefits.

DESCHUTES NATIONAL FOREST

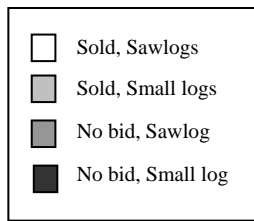
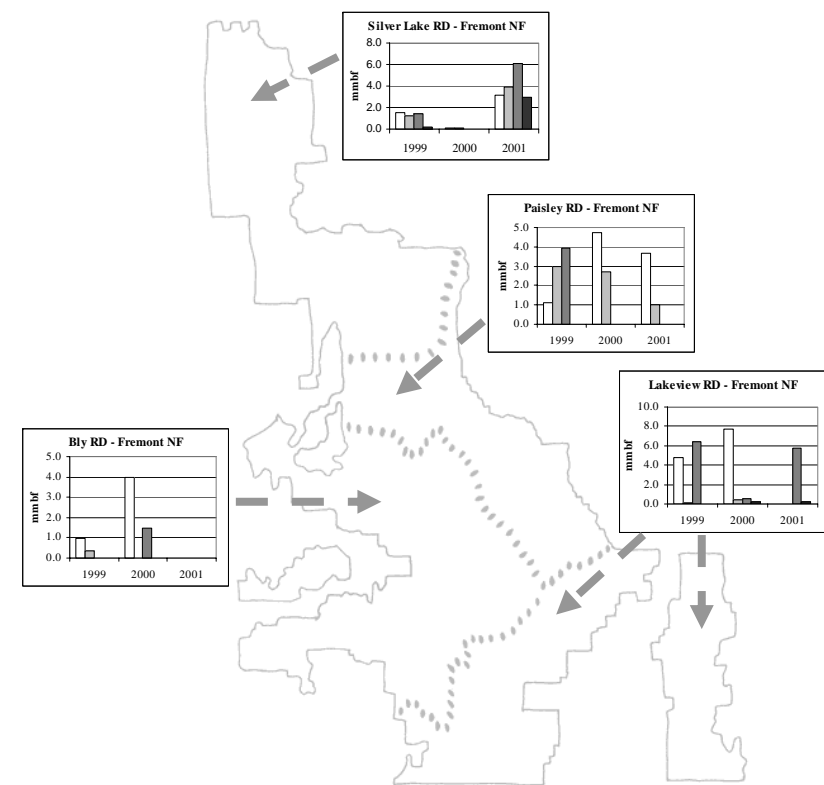
OCHOCO NATIONAL FOREST



WINEMA NATIONAL FOREST



FREMONT NATIONAL FOREST



Opportunities for Sustainable Use of Forest Resources in Central Oregon: Coordinating the Resource - Coordinating the Partnership:

As is true in any region, the largest challenges to moving biomass to its greatest value-add potential rests in three main categories:

1. Understanding the resource and the reliability of accessing that resource over time;
2. Understanding the markets that direct options for resource value-add; and
3. Determining the appropriate manufacturing capacity and technologies that can efficiently and profitably process the resource into value-add products.

While other sections of this report focus on the markets and technology, the largest constraint (and opportunity) to shaping a biomass-to-value-add future for Central Oregon rests with *levelizing* regional supply based on forest restoration efforts and sustainable forestry practices on both public and private lands. For Central Oregon, the focus of this section will primarily be on public lands. Only about 13 % of wood supply has historically been generated from private forestlands (the majority of this volume from tribal lands). The Forest Service manages approximately 60% of forestland in the region, and another 4% is managed by other public agencies such as the BLM and State Forestry.

Based on the research conducted by Mater Engineering for this project, several key areas of opportunity exist for Central Oregon. Many of the following recommendations will likely require additional public and private funding. The elements, when viewed as a consolidated, *interdependent** project effort, present benchmark pilot project potential that could successfully attract added public and private funding: (**Interdependent*: all elements must be offered together as the intended impact of each element fails without successful implementation of all elements.)

1. ***Re-initiate longer term (3-5 year) timber sale and procurement contract planning to offer investors a longer-term resource planning basis for small diameter timber.*** This is often viewed as a “chicken-`n-egg” dilemma. Longer planning efforts take time and money to generate. Sales offered can often result in unsold timber due to diminishing or non-existent production capacity in the region (especially for small diameter timber, save whole log chipping), and changing markets. Technical information can often miss the mark in identifying real solutions. As an example, preliminary production analysis for the Central Oregon region in 1999-2000, suggested that approximately 164 mmbf in raw material was needed for the existing small log capacity within a 100-mile radius of Bend (119 mmbf for local sawmills in 7-12” diameter small end; 40 mmbf for chipping operations that ran 4-8” small end diameter (sed); 5 mmbf for the pole industry). However, direct interviews with milling operations in the region conducted by Larry Swan of the USFS between 1999-2000, documented that the *economical* average piece size for the region’s sawmills (vs. chipping operations) was around 9” sed, underscoring the fact that region never has had small log processing technology specifically-designed to economically process from 5”-9” sed. Such technology exists but has not been employed in Central Oregon (see *Technologies* section of this report).

As a general rule of thumb, these small log processing centers typically need a minimum of 20-30 mmbf of resource on a consistent annual basis to make the investment in technology feasible. For Central Oregon, documenting longer-term resource capability in small timber offerings can potentially invite needed technology investment into the region. Interviews conducted by Mater Engineering personnel with timber contracting officers for the region’s National Forests suggest timber sales are now often planned only on a month-to-month basis (compared to one-year planning

employed in the recent past). Administratively, the USFS has existing precedent to undertake sales and contract planning up to five years, were funding made available and community support evident. Longer-term resource planning by the USFS is a pivotal requirement for inviting new investment into the region.

2. ***Initiate an intra-regional resource offering protocol within state, USFS, and BLM agencies to levelize resource offering on both an annual basis and over time.*** This effort would not only apply to traditional timber sales/procurement contracts *between* Ranger Districts and the BLM, but would extend to coordination of planned acres treated under the National Fire Plan (see below for further discussion). Currently (as noted in the **Resource** section of this report), there is no effort within the region to coordinate resource offerings (timber sales, procurement contracts, etc.) between ranger districts within a National Forest, and between National Forest systems. This lack of *intra-regional* resource coordination fundamentally:
 - ✓ creates resource uncertainty for existing and potential new investors;
 - ✓ accelerates industry flight from the region;
 - ✓ creates heavier demands on reliance of larger log sales to make timber sales and procurement contracts viable to the agency; and
 - ✓ can greatly diminish overall agency benefits to local communities as timber sales and procurement contracts are increasingly likely to be awarded to contractors outside the region

Development of an intra-regional coordinated resource protocol for Central Oregon would not only be a policy benchmark project for the region, but would also be a policy benchmark on a national level. Lessons learned in the development of a Central Oregon model could be applied to many other regions across the US. Once the protocol is created and the inventory coordination is complete, data must be made easily available to the public.

3. ***Initiate a research project focused on inventorying the projected volume and characteristic of biomass to be removed, burned, etc. for fuels reduction under National Fire Plan mandates within the region.*** Currently, there is no tracking of biomass volume or characteristic removed or burned in fuel reduction treatments on public lands in the region. This makes it impossible to evaluate whether removed fiber can be utilized in efficient small log processing centers or for use in other value-added processing using green residual fiber. The current fuel treatment activities undertaken by each agency are not only uncoordinated within the region, but typically uncoordinated with timber sales and procurement contracts within each agency. Other USFS regions in the nation have already successfully initiated this level of inventorying on planned fuel reduction sites. Once volume and timber characteristics (suggested diameter breakouts: <5"; 5"-9"; >9" dbh) from fuel load reduction sites are determined and policies are clearly laid out regarding annual goals for acres treated, coordination of resource offering within an intra-regional protocol should be initiated. Funding to support inventory efforts that can support long-term regional economic benefits to community development projects *and* attract investment to the region is worthy of consideration.
4. ***Initiate technology investor outreach campaigns*** based on a) processing small logs, b) increasing the value of lumber processed from small diameter logs, and c) processing residuals into value-add

products. As noted in the technology section of this report, new smaller-scale production technologies have been introduced into the US that have potential for investment in Central Oregon. Technology manufacturers are often eager to help finance the establishment of their new technologies in targeted regions, but often require due diligence in two areas: identifying markets for the value-added products, and documenting consistent availability of wood resource. Many of these same technology producers also partner with communities to test wood resources in product manufacturing. Central Oregon has an opportunity to develop a technology investor outreach campaign once coordination of regional resources can be demonstrated.

5. ***Initiate a community benefits tracking program*** based on evaluation of timber sales and procurement contracts (including Fire Plan treatment areas) to clearly document who gets the work and evaluate whether local communities benefit from current public agency contracting practices. The purpose of this effort is to re-establish the often-lost expectation that establishing benefits to local communities is a two-way street. Local communities may have as much responsibility in helping to ensure local benefits from surrounding forests as the agencies that manage the forests for the benefit of the public. There is a growing body of research that suggests communities need to assume a more visible partnership with public land managers in tracking who secures the timber sales and contracts, monitor and evaluate income and employment effects of sales and contracts; and collectively evaluate potential modifications to existing statutory and administrative policies to facilitate community capacity-building through sustainable forest management and land stewardship activities.

6. ***Establish viable resource linkage with industrial/NIPF landowners in the region*** to develop a resource-investment plan for the entire region. This effort should also include agricultural landowners who have made or are making investments in tree plantation development, including hybrid poplar farms. Interviews with NIPF landowners in the Central Oregon study region conducted by Mater Engineering personnel confirm that many private landowners need removal of small diameter timber for restoration and wildfire prevention on their lands, but lack of economical processing facilities for the small logs in the region prevents this from happening. NIPF landowners lack sufficient volume to invite technology investment to the region and are reliant on public agencies to open those market opportunities. Some landowners indicated they would need a price of \$60/ton for logs of 9" dbh and below before thinning was economical, and they forecast that prices at or above this threshold would promote many private owners to thin their stands and draw out logs.

7. ***Coordinate resource offering protocol efforts with The Confederated Tribes of the Warm Springs.*** Acknowledging the importance of other regional players can produce excellent results for the region. As an example, based on interviews conducted by Mater Engineering personnel, the Confederated Tribes of the Warm Springs are currently evaluating their small diameter volumes coming off their own forestlands and may be quite interested in partnering with other regional interests to bring efficient small log processing technology to the region.

Task 2: Evaluation of Existing Infrastructure in the Area

For this task, Mater Engineering was to provide an overview of four issue areas within the Central Oregon region with the view towards accommodating both small log processing in the area and value-add product manufacturing for solid wood and residue. The four issue areas were:

- ✓ existing available production capacity,
- ✓ potential facility siting options,
- ✓ regional investment incentives, and
- ✓ labor resources

Overview results are as follows:

Existing Available Production Capacity: As noted earlier, most if not all of the existing production capability in the Central Oregon region appears to not be suited for cost effective processing of a steady diet of small-diameter logs (5"-9" sed). While all three primary processing mills in the region process smaller logs along with larger logs, recent interviews with the mills conducted by the USFS indicate that existing processing technology can only economically process down to a 9" sed log on a steady volume basis. Smaller diameter logs (< 9" sed) can be processed through these operations, but the costs to do so is often subsidized by the processing of larger diameter logs, especially in times of relatively low lumber and chip prices or high transportation costs.

Outside of new sawmill construction to process small diameter logs (likely a less attractive option for primary production), there are potentially three existing production options that might be considered by COIC for efficient small log breakdown:

- ✓ **Ochoco Lumber:** Recently closed operation in Prineville, but according to interviews with Mater Engineering personnel, may be currently considering re-opening with radiata pine resource being shipped in from offshore. Recent efficiency improvements at Ochoco Lumber in Prineville have improved the recovery potential for smaller logs however, they are still not equipped to cost effectively process a steady diet of 5" to 9" sed logs given today's timber supply situation and market prices. May consider option to further upgrade production capacity to cost effectively accommodate small diameter log processing along with larger log processing on site.
- ✓ **Warm Springs Forest Products:** based on interviews with Doug Manion-Tribal Forester, and Larry Potts-mill manager, the Confederated Tribes of the Warm Springs are currently evaluating their options for installing capacity at their Warm Springs mill to efficiently process small diameter logs generated from their own forestlands (as a guaranteed supply) and through outside resource purchase. The tribe has provided Mater Engineering with an projection of timber volume by diameter class to be harvested from tribal lands over the next few years. Projected annual small log harvest is 10 to 12 mmbf per year.
- ✓ **Crown Pacific – Prineville facility:** The Crown Pacific mill in Prineville was closed in October of 2001, but the dry end of the mill has just reopened to process green lumber shipments from the Gilchrist operation. The sawmill remains shut down and officials within Crown Pacific state that, *assuming a stabilized timber supply could be achieved in the region*, mill revisions to efficiently handle smaller diameter logs could be made at the Prineville operation. (Crown Pacific also

operates a sawmill in Gilcrest, Oregon, which is outside of the study area but does utilize some timber from within the region. This mill has equipment at their Gilchrist operation capable of processing smaller logs down to approximately 7.5" sed.)

Potential Facility Siting Options: The region has many siting options for the potential primary and value-add processing options identified. The following is a partial list of sites identified during the study:

Suitable "Greenfield" options:

Baldwin Industrial Park: Part of the City of Prineville's newly development industrial area, the Baldwin Industrial Park offers easy access to Hwy 126. The site is 17 minutes from the regional airport in Redmond and less than a half hour to Bend. Total acreage available is 40 with lots ranging from $\frac{3}{4}$ of an acre to over 5 acres. Currently one newly constructed 10,800 SF single or multi-tenant building is available as well as another new existing structure of 22,000 SF (5 + acre lot) in the same area. The owner/investor/builder team will also consider build-to-suit options. ***Advantage:*** *This area has recently been designated an Oregon Enterprise Zone offering property tax exemptions.*

Cascade Business Park: Located in Madras, adjacent to Hwy 26, and North of the co-owned mainline of Union Pacific and Burlington Northern/Santa Fe, this 60 acre light to heavy industrial park is 95 miles from the Port of the Dalles, and just over two hours drive from Portland. ***Advantage:*** *Madras is a designated Oregon enterprise zone, which offers 100%, 3-5 year property tax exemptions on new, qualified investment in plant and equipment.*

La Pine Industrial Park: La Pine's 327 acre Industrial Park offers access to the Burlington Northern/Santa Fe Railroad mainline as well as Hwy 97. Located 30 miles south of Bend and 15 minutes south of Sunriver. Light, medium and heavy industrial uses are permitted within the park on parcels ranging from $\frac{1}{4}$ acre to 40 acres. ***Disadvantage:*** *La Pine is an urban unincorporated community, and is not one of Oregon's designated Enterprise Zones which offer property tax exemptions.*

Suitable developed property options:

D & E Wood Products, Prineville: 4.91 acres. Industrial property for sale or lease, the main building (15,000 sf) has a 60' clear span and 20' of additional aisle space on each side. It is 150' long and has a 700 sf office and a 50 x 120' storage building. The zoning is M2/heavy industrial and is not in the city limits. The property is serviced by well and septic and heavy power is available.

<i>Industrial Building, Redmond:</i>	19,180 sf. Industrial property with strong regional tenant. 2.55 acres next to Lyon Lake. Lease back with regional tenant for office/warehouse use. Zoned M2 (heavy industrial).
<i>Craig Ironworks Bldg., Prineville:</i>	22,750 sf 5.5 acres (room for expansion). New steel construction, four 20 x 20 garage doors, 28' –30' clear, city water 7 sewer, two 45' crane ways, four twenty ton crane capacity, 2000 amps, 440 three phase, leases considered.
<i>Mid-Columbia Lumber, Madras:</i>	28,000 sf., 140' wide by 200' long 20' to lower eave, clear span, metal clad, fully insulated, skylights, sprinkled dry system.
<i>Cascade Forest Products, Bend:</i>	28,100 sf. manufacturing/warehouse building with direct access to BNSF rail spur. Property is zoned light industrial but is surrounded by limited commercial zoned property.
<i>Industrial Land, Redmond:</i>	9.33 acres. South of Airport Way and railroad, easy sewer and water access, zoned M-1.
<i>3-T Industrial Park, Redmond:</i>	12+ acres. New road and utilities with sidewalks, includes sewer, water, power, and gas.
<i>Redmond Industrial Land:</i>	18.85 acres. Zoned M-2.
<i>Redmond Industrial Complex:</i>	73.09 acres. M-2, 3-phase, 1200 amp service.
<i>Prineville Industrial Land:</i>	268+acres. 268+ acres of industrial land near state highway 26, city railroad and natural gas mainline.

Jeld-Wen in Redmond also appears to have underutilized building and land capacity, and Ochoco Lumber in Prineville has land that could potentially accommodate added development.

Available Regional Investment Incentives: The Central Oregon region has many investment incentives that can be favorably leveraged to bring outside investors into the region. Many of the communities are designated Enterprise Zones and are classified as rural and distressed areas in Oregon highlighting them for added financial assistance from state and federal economic development dollars. Investment incentives are not the limiting factor for the wood products industry in Central Oregon. Consistency of timber supply is. If timber supply can be leveled in the region then there is a good potential to attract both public and private investment incentives.

Labor Resources: Labor statistics and trends for the study region are as follows:

Employment:

SIC 24 (Standard Industrial Classification for the forest products industries) employment has been relatively flat in recent years and appears to have stabilized at current levels. The **jobs forecast to increase are for heavy truck drivers and “Blue Collar” workers.** *What the data does not show is the historical trend from 1990 to 2000, where logging employment fell 47% from its highs in 1989 and 1990, and sawmill employment fell 17%.*

<i>Average Annual Covered Employment, SIC 24, by County</i>						
<i>Year</i>	<i>Crook</i>		<i>Deschutes</i>		<i>Jefferson</i>	
	<i>Persons</i>	<i>% of total employed</i>	<i>Persons</i>	<i>% of total employed</i>	<i>Persons</i>	<i>% of total employed</i>
1998	1,393	23%	2,060	4.6%	1,434	22%
1999	2,060	25%	2,333	4.8%	1,358	21%
2000	1,430	24%	2,348	4.5%	1,423	21%

Source: D. Warren, Pacific Northwest Research Station - USFS

Deschutes County has the highest number employed but the lowest percent employed in the forest products industry, despite the fact that the majority of the region’s available timber is in Deschutes County. Both **Crook and Jefferson Counties are significantly more dependent on forest industry jobs.**

<i>Job Projections by Broad Occupation Crook, Deschutes, and Jefferson Counties</i>				
<i>Occupational Category</i>	<i>Employment</i>		<i>Growth</i>	
	<i>2000</i>	<i>2010</i>	<i>Percent</i>	<i>Net</i>
Agricultural, Forestry, and Fishing Workers	2,181	2,279	4.5%	98
Blue Collar Workers	18,680	19,815	6.1%	1,135
Lumber and Wood Manufacturing	5,030	4,810	- 4.4%	- 220

Source: Oregon Employment Department, 2001

Note: Job growth will substantially occur among agricultural workers, and especially in Jefferson County

<i>Employment Projections by Occupation, 2000 - 2010: Crook, Deschutes, and Jefferson Counties</i>			
<i>Occupation, 10 year trend</i>	<i>2000 Employment</i>	<i>2001 Total Job Openings</i>	<i>2010 Projected Employment</i>
Timber cutters and loggers, ⇄	244	2	227
Woodworking machine workers, ⇄	1,372	34	1,327
Truck drivers-Heavy tractor trailer, ↗	974	27	1,087

Source: Oregon Employment Department, 2001

Timber industry jobs are **not** expected to increase based on current trends tracked by the Oregon Employment Department—there is an overall shift from manufacturing to service sectors because of a decline in the forest products industry.

Due to this decline in timber industry jobs and the unstable wood products industry, **SIC 24 sector jobs are not seen as steady employment sources even though the average SIC 24 category wages are higher than the average wages offered in all other SIC categories.** Crook County in particular has been significantly impacted by changes in the wood products industry.

<i>Average Weekly Wages, \$</i>						
<i>Year</i>	<i>Crook</i>		<i>Deschutes</i>		<i>Jefferson</i>	
	<i>SIC 24</i>	<i>All other jobs</i>	<i>SIC 24</i>	<i>All other jobs</i>	<i>SIC 24</i>	<i>All other jobs</i>
1998	\$ 585.25	\$ 485.81	\$ 581.04	\$ 472.37	\$ 594.49	\$ 461.93
1999	580.37	503.55	623.40	491.21	627.50	474.47
2000	557.77	509.79	627.40	506.31	616.49	486.01

Source: D. Warren, Pacific Northwest Research Station, 2002

Unemployment:

<i>Number Employed in the Forest Product Industries, SIC 24, Compared to Total Unemployment and Population by County</i>									
<i>Year</i>	<i>Crook</i>			<i>Deschutes</i>			<i>Jefferson</i>		
	<i>SIC 24 Empl.</i>	<i>Total Unemp</i>	<i>Total Pop.</i>	<i>SIC 24 Empl.</i>	<i>Total Unemp</i>	<i>Total Pop.</i>	<i>SIC 24 Empl.</i>	<i>Total Unemp</i>	<i>Total Pop.</i>
1998	1,393	9.5%	17,236	2,060	7%	105,640	1,430	6.6%	16,627
1999	1,532	9.1%	17,686	2,333	6.4%	110,810	1,358	6.5%	16,861
2000	1,503	8.4%	19,182	2,348	5.3%	115,367	1,423	5.7%	19,009

Source: D. Warren, Pacific Northwest Research Station, 2002

Percent unemployment fell in all three counties in year 2000, but **the number of unemployed remained virtually the same in Jefferson and Crook Counties between 1999 and 2000**, despite large population increases. The job market absorbed all the additional labor in these two Counties in sectors other than forest products. The following are some observations provided by the Oregon Employment Department on overall employment trends, including forest products, in the 3 counties:

Crook County:

Crook County has a history of extreme fluctuations in unemployment as a result of its economic dependence on agriculture and the wood products industry. Yet there may be a silver lining even with the recent closure of the Ochoco and Crown Pacific mills: “This situation offers opportunities to businesses that offer wage and benefit packages comparable to the local wood products industry. **Businesses that can offer such a package without the cyclical fluctuations typical of the wood products industry can find a readily available pool of labor with a proven work ethic.**” *Oregon Employment Department, 2002*

Deschutes County:

Deschutes County has had consistently high unemployment rates, but these are partially the result of high population growth and an equivalent increase in civilian labor force. “Unlike the case of Crook County, Deschutes County remains a problem due to the overwhelming influx of job seekers into the local economy.” *Oregon Employment Department, 2002*

Jefferson County:

Jefferson County has a diverse economic base and has kept unemployment relatively low and stable compared to other two counties—includes a “vibrant” lumber and wood products industry and stable tribal and agricultural sectors. “The importance of Jefferson County’s tribal lumber and wood products sectors cannot be overstated.” SIC 24 jobs accounted for about 35% of non-farm employment. *Oregon Employment Department, 2002*

<p><i>Task 3: Identify New Smaller-Scale Processing Technologies Likely to Impact Biomass Processing and Attract Investment to the Region</i></p>
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For the sustainable commercial use of timber, it is important to work ‘backwards’ and size the technology to fit the forest, building only enough processing capacity, specifically selected for the resource, as can be provided for by the resource.

Several innovative technologies have been identified for processing and manufacturing products from small diameter Central Oregon timber species: Lodgepole pine, Ponderosa pine, White fir, Douglas fir, and Larch. All of these identified technologies are flexible and can manufacture diverse product types. This, in turn, opens options for finding the best products for the best markets.

Criteria for selection of these technologies were cost, efficiency, applicability to Central Oregon softwoods and small logs, product flexibility, environmental considerations, and available customer support services.

Four of the new technology firms that have been recommended for consideration by COIC have already expressed interest in a joint venture or loan financing arrangement with a similar restoration and fuel reduction project in Northern Arizona and would likely be favorably inclined to do so in Central Oregon.

Summary of New Technologies and Companies for COIC Consideration:

New processing technologies can reduce the cost of processing small timber and increase the value of product manufactured from solid wood and residual derived from small log processing. For this project effort, Mater Engineering has identified five (5) technologies for consideration:

- a. **High-speed, single-pass, small log processing:** differs from traditional log processing in two substantive ways. First, the technology is specifically designed to efficiently process only small logs (from 4”- 11” sed). Second, the breakdown of the log to lumber is accomplished in one, single-pass process step, differing from traditional milling operations that require multiple steps to produce lumber. It is this design, focused specifically on small logs, that produces the higher-speed, more cost effective processing. Pacific NW mills that have incorporated this new technology in their production line report significant increases in product yield and production speed at competitive prices.
- b. **Wood glulam beams made with fiber-reinforced polymer (FRP):** increases the strength of wood beams made from standard lumber of the grade produced from small diameter logs. With a fiber-reinforced polymer layer, the size of the wood beam can be reduced using up to 40% less wood resource to produce marketable beams. Recent tests conducted on lumber from small diameter Ponderosa pine from the SW region of the US produced results in FRP glulam beams equal to the performance of non-reinforced glulam beams made from Douglas fir.
- c. **New high-compression molding system using wood residual (Sorbilite):** combines wood residual/fiber, agricultural fiber, shredded tires, etc. with recycled plastics, to produce multiple molded products (cabinet doors, furniture forms, moulding, etc.) The high compression process allows for up to 85% reduction in energy use. This system may prove advantageous not only for residual from small log processing but also for juniper biomass abundant throughout the study region. Recent tests conducted using a mix of sawdust, chips, and bark produced from small diameter Ponderosa pine produced quality moulding and cabinet door parts.
- d. **New lumber hardening process (Indurite):** employs a non-toxic (soy and corn starch), wood-infusion process to turn “softwood” into “hardwood”. Recent tests conducted on lumber produced from small diameter Ponderosa pine resulted in a 27% hardness increase in heartwood and an 89% increase in hardness in sapwood. Further, the wood hardening process increased the fire resistance of the wood to the highest possible standard index for any wood species.
- e. **New lumber stress grading technology (E-Grader):** affordable in-line processing technology that improves the grading of lumber over traditional visual grading practices. Recent tests conducted on lumber produced from small diameter Ponderosa pine resulted in approximately 30% of visually graded lumber being upgraded to higher value products.

Recently, small diameter Ponderosa pine logs from the Grand Canyon region of the US were processed through a small log mill using the technology detailed above. Lumber produced from the primary log breakdown was then forwarded on to E-grader, FiRP – Greenweld; and Indurite technology producers for

materials testing. A mix of sawdust, chips, shavings, and bark produced from primary manufacturing was sent to Sorbilito for product development. These mill trial and technology test results provide a good indicator for the potential uses of the COIC region's small timber resources. The findings of these tests are included as **Attachment A**.

A More Detailed Review of "New" Technologies:

High-speed, single-pass, small log processing

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604-852-7293, ext. 3
info@hewsaw.com

Tom Elliott
CAE/Neunes (McGeeHee) International
PO Box 970
Sherwood, OR 97140
503-625-4703

High-speed, single-pass, small log processing differs from traditional log processing in two substantive ways. First, the technology is specifically designed to efficiently process only small logs (from 4"- 11" sed). Second, the breakdown of the log to lumber is accomplished in one, single-pass process step, differing from traditional milling operations that require multiple steps to produce lumber. It is this design, focused specifically on small logs, that produces the higher-speed, more cost effective processing. Pacific NW mills that have incorporated this new technology in their production line report significant increases in product yield and production speed at competitive prices.

Many of these systems employ curve sawing technology that can produce merchantable lumber from curved and misshapen logs. The name "curve sawing" indicates that the machinery can cut logs curved like a C ("sweep") and like an S ("snake") by sawing along the grain; **producing longer, higher-valued lumber from small logs**. Curve sawing reduces the downfall and waste resulting from trying to cut a straight piece of lumber from a curved log.

Benefits:

- Efficient, fast processing of previously uneconomical logs;
- Can produce long lumber (has a higher value);
- Technology is proven;
- Mills report increased recovery from between 5% to 30%;
- One mill reports that their small log system has the same costs of production per mbf as a conventional mill system sawing standard size sawlogs.

Operating Characteristics (varies with brand):

- Processes small logs in lengths of 4' to 20';
- Processes small logs from 4" diameter to 11" depending on equipment brand;
- Proven production rates of 300 to 500 feet per minute (fpm);
- Available optimizing systems can greatly increase efficiency with the use of a computer scanning system that sets the chipping heads and saws to cut for the highest value per piece;
- Can produce lumber sizes from 1x2 to 2x8 and cants from 2x2 to 8x8 depending on system and log size.

Drawbacks:

- Some systems cannot saw logs with a large end diameter of 10" or greater.
- Requires a steady supply of small logs to be cost effective. This may require an upgrade to the log infeed and debarking system if installed in an existing mill

Costs:

A complete machine costs between \$ 750,000 to \$1 million, not including infrastructure costs and installation, depending on system and options. A regular linear system needs 120 feet of floor length; a transverse loading system needs 40 to 50 feet. A small amount of water and vegetable oil are used to cool the saw guides (about 2 gallons of water per day). The oil and water end up in the sawdust and can be disposed of without any environmental hazards.

The E-Grader:

Jeffrey Garver, Vice President
Advanced Resin Technologies & Engineered Wood Solutions
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Corvallis, OR 97330
541-740-7870
jgarver@proaxis.com

Engineered Wood Solutions (the parent company of ART) **markets the E-grader:** a compact, inexpensive machine for in-line engineered component stress tests. The "E" represents *Modulus of Elasticity*, MOE, a strength measure of structural soundness.

The E-Grader individually stress tests a lumber product and certifies it for use as a structural member. This grading step improves the grading of lumber over traditional visual grading practices to meet structural specifications by mechanically testing the strength for truss or laminate stock. The machine is compact and significantly less costly than competitor machine stress grading equipment. Recent tests

conducted on lumber produced from small diameter Ponderosa pine resulted in approximately 30% of visually graded lumber being upgraded to higher value product. (See Attachment A)

The E-grader tests the MOE of each individual piece of lumber, beam, or glulam product in the production line. It has a high production rate and can handle a large range of lumber and beam sizes. This machine is a final step in production “that obtains a higher value from machine-graded lumber,” and applies a certified stamp that guarantees to the builder that the component meets engineering standards for a specified use.

Benefits of E-Grader:

- Lower cost, higher test rate, and greater range of timber sizes accepted;
- It proof tests products made from low-grade wood (like suppressed Ponderosa pine) to determine structural integrity, then stamps the products.
- It proof tests low grade wood and glued finger-joint for use as face laminated beam stock.

Costs:

E-grader is much less expensive than similar machine stress grading equipment: about \$100,000 as compared with \$350,000 to \$500,000.

Interest in financing a project or engaging in a joint venture:

Yes. Mr. Garver said that Accelerated Resin Technology (ART), may be **interested in a joint venture or loan financing for a project in Central Oregon.** Mr. Garver said they could offer a pay-as-you-go package on equipment, for example.

Fiber Reinforced Polymer GluLam Beams (FiRP)

Dan Tingley, President

FiRP, Inc.

USA: 6300 SW Reservoir Avenue

Corvallis, OR 97333

541-929-3781

541-929-7429 fax

email: dant@firptech.com

Wood glulam beams made with fiber-reinforced polymer (FRP): increases the strength of wood beams made from standard lumber of the grade produced from small diameter logs. With a fiber-reinforced polymer layer, the size of the wood beam can be reduced using up to 40% less wood resource to produce

marketable beams. The result is a less costly but higher value-added product with lighter weight and smaller cross sectional profile.

FiRP, Inc. licenses the technology and materials for reinforcing wooden structural components, or engineered wood used in construction. The FiRP technology interleaves very high strength fiber composites within engineered structural components to reinforce both compression and tension zones in the structural element. It allows the use of less expensive, lower grade material for manufacture into high value end products. The Greenweld resin is also used in manufacturing, further speeding up the process and reducing manufacturing time.

Recent tests conducted on lumber from small diameter Ponderosa pine from the SW region of the US resulted in FRP glulam beams equal to the performance of non-reinforced glulam beams made from Douglas fir. FRP glulam beams made from Ponderosa pine showed double the load bearing capacity compared to nonreinforced pine glulam beams. (See Attachment A)

Interest in financing a project or engaging in a joint venture:

Dr. Tingley has indicated a keen interest in working with regions such as Central Oregon to establish a FiRP production facility. His company has indicated an interest in serving as project partners or investors in regions that demonstrate potential. His firm sees value in using the lumber from small diameter logs because of its low cost (compared to graded glulam stock) and its 'greenness' with respect to the forest resource. This is because other FiRP licensees supply "sustainably produced" materials to Home Depot and he wants to grow in this market.

In manufacturing the FRP glulam beams, a relatively new gluing process was used called Greenweld. **Greenweld is a new cold-set resin and gluing process that finger-joints and laminates wood that is wet, dry, or frozen, and it can successfully glue wet wood to dry wood.** It is not temperature sensitive, and it works on all major commercial softwood and hardwood species. The Greenweld glue system can be used with conventional finger-jointing equipment or glulam equipment, and **it does not need costly heating or RF curing equipment.** The glue is environmentally friendly (no formaldehyde), and the Greenweld process has been certified for structural materials. **Advanced Resin Technologies (ART)** is a U.S. subsidiary of Engineered Wood Solutions Ltd. (EWS), based in Auckland, NZ, that markets **the Greenweld Process.**

Sorbilite

Les Litchfield, Sales Associate

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Sorbilite's Plastron technology is a high pressure molding system that can make three-dimensional value-added components from wood fiber and a recycled thermoplastic binding agent such as plastic milk jugs. The Sorbilite system can utilize wood residual/fiber, agricultural fiber, shredded tires, etc.. The high compression process allows for up to 85% reduction in energy use. This system may prove advantageous not only for residual from small log processing but also for juniper biomass abundant throughout the study region.

Recent tests conducted using a mix of sawdust, chips, and bark produced from small diameter Ponderosa pine produced quality moulding and cabinet door parts. (See Attachment A) The product potential is very diverse: cabinet doors, fireproof shingles, architectural moulding, and furniture parts, etc. Sorbilite uses environmentally friendly resins, minimal amounts of water, and produces no residual waste and parts can be finished with paints, laminates, and veneers. The greatest benefit is that **high quality value-added parts can be made from the lowest value fiber.**

Benefits:

- **High quality value-added parts can be made from the lowest value fiber** and finished in one step. Finish types include paints, laminates, and veneers.
- The finished Sorbilite molded **product itself is very hard and can be made fireproof.** The system can be set to make parts of different densities.
- The finished Sorbilite material **can also be sanded, cut, and shaped in the production process.**
- Compared to other composite molding technologies, **Sorbilite is faster, and needs less space, energy, and staff to operate.**
- **Sorbilite-made products are considered to be “sustainably-produced”** by a major U.S. retailer, Home Depot. Home Depot carries a line of Sorbilite-made doors and cabinets for do-it-yourself projects.
- **Products are numerous:** furniture, furniture parts, decorative mouldings, full size doors, cabinets, fireproof shingles and other fireproof products, pallets, mats, architectural reproductions, mural art panels, audio speaker components, anything that can be molded. It will **easily produce anything with intricate shapes.**

- **A turnkey operation costs between \$2 to \$2.5 million, plus infrastructure costs as needed;** this is based on production volume, the fiber resource, the plastic resource, and the product(s).
- **The system will need a 130 ft. x 165 ft. building, and a 2,000 amp power service;** it will use approximately 600 KW/hour.

Interest in financing a project or engaging in a joint venture:

The nearest Sorbilite plant is in North Dakota and **the company is interested in expanding elsewhere in the United States.**

Before such a venture can be negotiated, **the company will want to ensure that there is both a business plan and identified products and markets.** Sorbilite has experience in marketing their products and can offer assistance.

Indurite:

**Tony Petley, Director
Engineered Wood Solutions Ltd.**

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The Indurite system employs a non-toxic (soy and corn starch), wood-infusion process to turn “softwood” into “hardwood”, e.g. Radiata pine can be hardened to the equivalent of Red oak, and used for high traffic flooring. Indurite treated veneer can be used, similarly, to harden a panel surface and provide strength to inner core veneers. Indurite treated wood performs well during machining and has the characteristics of a much harder wood. Indurite treated wood can be glued and finished, and surprisingly, takes water-based finishes better than oil based finishes.

The ability to modify a lower value species makes Indurite an attractive value-added step for utilizing lumber from small logs. Indurite has strong potential for use in many products, because in addition to hardening, the solution can fire-proof, stain, infuse with a pesticide or fungicide, improve machining characteristics, improve strength characteristics, improve weathering, and create other material improvements in most species. The formula can be targeted to a given species or end-product specification. Standard pressure treating equipment can be used, and the costs are similar to conventional wood preserving treatment.

Recent tests conducted on lumber produced from small diameter Ponderosa pine resulted in a 27% hardness increase in heartwood and an 89% increase in hardness in sapwood. Further, the wood hardening process increased the fire resistance of the wood to the highest possible standard index for any wood species. (See Attachment A)

The Indurite process encompasses three key steps:

- *Rough sawn* lumber is dried to 30% moisture constant. There are two significant benefits here: a) wood need not be surfaced before treating; b) wood can be air-dried.
- Treatment is accomplished in a conventional vacuum pressure vessel.
- The product is then kiln dried to 8% moisture content at low temperature, 60° to 70° F, using a hardwood schedule to catalyze the starch/cellulose chemical reaction.

Secondary Benefits:

Fire Retardance: Boric acid, a fire retardant, is an integral component of the treating fluid and provides a secondary benefit to Indurite—“flame spread limits are vastly improved because Indurite can penetrate through the entire cross section.” Fire retardant data is available from EWS standard tests on Radiata pine.

Other Treatments: Anything that can be dissolved in the Indurite solution can be carried into the cellular structure and effectively modify the wood: colorants and dyes, mold inhibitors, and pesticides. Effective decay or weather resistance has been demonstrated in lab tests, but has not been field tested yet. Indurite is being refined for durability and weather resistance so that treated wood can be used for decking, garden accessories, and outside furniture.

Products:

Mr. Petley recommends a phased marketing approach that takes advantage of a well-established market for interior products such as: flooring, moulding, paneling, and furniture. He believes that durability and proven weather resistance is imminent, and that markets for exterior products will need to be explored.

Costs:

Assuming a lumber/timber production of 20 mmbf per year, delivered to the processing plant and with a moisture content close to the fiber saturation point for the species, and an Indurite process that includes impregnation, curing, drying, and machining:

- Costs are US\$600 to US\$700 per mbf to produce a flooring product with a potential market value in excess of US\$1,500 per mbf.

- Plant costs are estimated to be US\$800,000 to US\$ 1 million, plus infrastructure costs, as required.

Interest in financing a project or engaging in a joint venture:

Mr. Petley said that EWS will not enter into a joint venture, **but that they would seriously consider funding process equipment and amortizing the cost based on a per kilogram used** (with a minimum monthly production rate). He said a dollar figure could be calculated once information about species, formulation, and intended volume production is available.

Task 4: Determine Potential General Markets for Products Developed from Biomass in the COIC Region

Proven markets are critical to new business development based on small diameter timber from Central Oregon. **Markets for wood and wood products must find the highest possible end value so that operations are profitable and can:**

- Afford the higher costs of harvesting small logs and hauling them to a manufacturer or processing site;
- Afford the costs of shipping finished product to market;

Which Marketing Trends to Track:

- Population growth in the Northwest and West;
- Housing construction rates;
- Demographics and consumer preferences;
- Growth markets that respond to consumer environmental performance mandates in wood products

How to Identify Products:

- Products should be able to compete with wood products from other U.S. regions and foreign imports, e.g. low cost lumber from the U.S. South, New Zealand, and Canada;
- Products that can be manufactured with a variety of options: lighter weight, more styles and finishing options, potential for green certification, etc.;

- Product(s) that can demonstrate high profit margins to attract solid business interest;
- Products that can be produced in an existing and/or upgraded manufacturing facility in Central Oregon, or in an operation with lower start-up costs and shorter start up time;
- Products that are “green”: the manufacturing steps are clean and efficient; manufacturing uses little water and power; there are minimal to no environmental costs; the product is made from recycled or recyclable materials; manufacturing produces a waste product that can be re-used or recycled.

How to Access the Markets:

- Target buyers in growth regions;
- Identify product lines experiencing growth; identify industry sectors experiencing growth;
- Ensure a sustainable and predictable supply of resource for product manufacturing.

Markets Summary

Central Oregon’s small diameter timber resource can provide the opportunity for successful wood products industry revitalization. This revitalization can in turn support wildfire prevention and public forest restoration by providing an income from the material that is removed from the forest. The small diameter material can be matched with appropriate new technology, and products can be made for existing strong markets... this is the pathway to viable economic development in Central Oregon.

1. Given the available information, **the potential availability of timber resource appears sufficient to support regional scale development.** *Critical to this, there must be a reliable, steady annual small log supply available to sustain development.*
2. The identified secondary manufacturing technologies create specific product options for small diameter logs that meet current market demands:
 - a. Through the use of new technologies, Lodgepole pine, Ponderosa pine and White fir can be used for higher value structural applications;
 - b. Mixed wood waste or residue from processing logs can be made into complex high value panel and furniture components;
 - c. Value can be added up-front with minimal capital investment

Best Market Bet:

Remodeling and home improvement are major markets for wood products, and residential remodeling activity is in the midst of sustained enduring growth. Between 36% to 57% **of the \$102+ billion that is spent per annum on remodeling in the US are spent on products that can be made from small diameter softwood timber.** The largest demand for wood products comes from the preference for kitchen and bath remodels, followed by room additions, window and door replacement, and a host of other projects. Remodeling also has a tendency to lead to the purchase of residential furniture.

Demographics play a significant role, as does the aging of the existing home inventory. **The “Baby Boom” generation is the main driver behind the nationwide remodeling boom,** and several other trends are also converging at the beginning of the new millennium that are expected to fuel further growth in the remodeling industry.

Remodeling activity is strong with “do-it-yourselfers” (DIY), and as owners age, remodeling becomes a “build-it-yourself” (BIY) project where contractors are hired to do the work. In a 2002, survey of homeowners planning improvements, two-thirds or 27 million households planned to do the work themselves making **do-it-yourself overwhelmingly the home improvement method of choice.**

Best Product Bets:

- **Remodeling:**

Best bets for COIC producers are likely centered on producing those products used in the home repair and remodel industry:

- Kitchen and bath cabinets
- Components (door panels, window part, other parts)
- Moulding and millwork
- Windows and doors
- Flooring, paneling
- Structural materials: framing lumber, glulam beams, trusses
- Exterior project materials for decks and fencing
- Furniture

- **Green Building products:**

Even better than wood alone, is a wood product that can boast of being “green”. These are products that are considered natural and safe for human health, safe for the environment, and reduce dependence on energy. The Green Building movement has taken hold among a growing number of architects, builders, and government procurement operations.

Much of Central Oregon’s small diameter timber resource can be considered “green” because its harvest can restore natural forests, prevent wildfires and reduce threats to both people and wildlife. Wood is also renewable, unlike petroleum based products, aggregate and mineral products, and other building materials that are often substitute for wood.

- **Engineered Lumber Products:**

Structural, engineered, wood products are **a rapidly expanding market that is forecast to “grow by over 500% between 2000 and 2010.”** Remodeling and homebuilding is one reason, another is that installed civic infrastructure is deteriorating with age, corrosion, accidents, weather, under-design, and damaging events like earthquakes, all of which leads to “increased opportunities for new materials and structures as part of a major thrust towards infrastructure renewal. Engineered wood products are as strong or stronger than similar solid wood products, only cheaper and made of a less valuable timber, such as small diameter logs.

Innovative Product Prospects for Central Oregon:

- Manufacturing components using the Sorbilite system that molds wood waste and recycled plastic together. Potential products include panels, parts for windows, doors, and furniture, and decorative millwork and moulding are ideal products for this type of operation.
- Reinforced glulam beams: Adding a layer of high tensile strength fiber in beams that are made with low grade softwoods has been tested and shown to produced results equal to the performance of non-reinforced glulam beams made from Douglas fir. Utilizing lumber from small diameter logs adds value to what might otherwise be a low value commodity.
- Flooring and doors and door parts made with Indurite: This treatment uses safe natural substances to greatly increase hardness, strength, and fire resistance of wood. Tests of wood treated with Indurite have shown extraordinary improvement in the characteristics of lumber from small diameter softwoods.

Detailed Markets Overview

Remodeling & Home Improvement Trends

Several current trends are driving remodeling and home improvement activities across the nation and in Oregon. For the wood products industry, this is good news. Wood products are preferred for interior and exterior projects, and the variety of products used, from lumber to kitchen cabinets, can support multiple wood products manufacturing operations of many sizes. **Multiple information sources are forecasting that upward home improvement and remodeling trends are widespread and enduring.** (Selected examples of sources too numerous to list here: the American Association of Retired Persons (AARP); BuilderOnline; the National Association of Realtors; and Kitchen & Bath Design News.)

From a March 2002, telephone survey of 668 homeowners nationwide:

“Americans are pouring money into home improvements as a way to increase the value of their homes in a difficult investment environment, according to a recent survey from Champion Mortgage.

“Almost half of those surveyed (45%) said they would do the work themselves.

“Almost one in five respondents (18%) expect to spend \$10,000 or more on home improvements in 2002.”

Source: Business Wire, April 23, 2002 - survey by Champion Mortgage

From a March 2002, online poll of 1,000 households nationwide:

“...seven out of ten households say they are planning a home-improvement project in the next six months, with each expecting to spend an average of \$1,000.

“Do-it-yourself is overwhelmingly the home improvement method of choice among consumers... Almost of two-thirds of expected home improvers, representing 27 million households, plan to do the work themselves.”

Source: Home Channel News, April 5, 2002 – survey by eBrain

“The North American (softwood) lumber market outlook is forecast to be favorable for the period 2002 to 2004. ...**rebounding U.S. housing starts, and repair and remodeling activity, will drive lumber consumption higher through 2004.**”

Source: Engineered Lumber Trends, May 14, 2002, volume 6, #5

What is driving the increase in remodeling activity?

From “2001, Housing Facts Figures and Trends”:

“The nations’ homeownership rate reached a record high of 67.4% (average) in 2000, and is expected to continue rising as increasing numbers of households achieve the American Dream.”

National Association of Homebuilders, 2001

The largest class of owners are members of the Baby Boom generation who are “expected to drive remodeling activity in the future.” **There are two types: Do-it-yourselfers and Build-it-yourselfers**—the latter hire builders and contractors to do the work for them and are usually older or higher income owners.

From The Home Improvement Research Institute, February 2002, report:

“The age group between 55 and 65 will have the highest rate of growth in home improvement spending in the next 10 years.” Homeowners aged 45 to 65 will represent nearly all of the growth in home improvement spending.

Older and/or wealthier households “will be more likely to seek pros to complete projects.”

Source: Home Channel News, February 22, 2002

Several other trends faced by the aging U.S. population are converging now at the beginning of the new millennium that will fuel further growth in the remodeling industry:

- A need to configure their home **to fit a retirement lifestyle or a disability;**
- A high percentage of existing **homes are at the end of the aging cycle** of 30 years and are known to need repairs and maintenance;
- Home improvement is perceived as **a more solid and reliable form of investment** in light of the current economic/investment environment;

- There is a strong new interest in upgrading or **modernizing for energy savings**, for improving **interior home ‘health’** (mold, VOCs, dust, ease of cleaning), and in **natural or environmentally friendly “green” building designs and materials**;
- Low interest rate for refinancing and home equity loans are also spurring remodeling efforts.

The Nationwide Picture of Homeowners by Age:

Homeownership is flat, yet high, among age groups in 40 up to 70+ years, but is expected to increase with the gradually aging population. Note that **younger homeowners in age groups from Under 25 to age 39 have shown a steady increase in homeownership rates**. They will also contribute to remodeling activity because new owners typically do major remodeling and renovations within one year after purchasing a home (*NAHB*).

<i>Five Year History of U.S. Homeownership Rates by Age of Owner, 1996 – 2000, %</i>												
<i>Year</i>	<i><25</i>	<i>25-29</i>	<i>30-34</i>	<i>35-39</i>	<i>40-44</i>	<i>45-49</i>	<i>50-54</i>	<i>55-59</i>	<i>60-64</i>	<i>65-69</i>	<i>70-74</i>	<i>> 75</i>
1996	18%	35%	53%	62%	70%	74%	77%	79%	81%	82%	81%	75%
1997	17.7	35.0	52.6	62.6	69.7	74.2	77.7	79.7	80.5	81.9	82.0	75.8
1998	18.2	36.2	53.6	63.7	70.0	73.6	77.8	79.8	82.1	81.9	82.2	76.2
1999	19.9	36.5	53.8	64.4	69.9	74.5	77.8	80.7	81.3	82.9	82.8	77.1
2000	21.7	38.1	54.6	65.0	70.6	74.7	78.5	80.4	80.3	83.0	82.6	77.7

U.S. Census Bureau, 2000

Specific Product Trends

Kitchen cabinets, bathroom vanities:

“Continuing to benefit from good weather, low interest rates, and strong consumer demand, **sales of kitchen cabinets and bathroom vanities continued their upward demand** in January (2002), the Kitchen Cabinet Manufacturers Association said last month. ...manufacturers participating in the association’s monthly ‘Trend of Business’ survey reported that **cabinet sales in January rose a healthy 15.5% over those of January 2001**. ...despite overall economic softness and the September 11 terrorist attacks.”

Kitchen and Bath Design News, March 2002

Components (door panels and parts):

“Remodeling, especially, and residential construction overall are among the major drivers now fueling continued growth in components and dimension. Sector growth was 7% in 2001, surprising because this was an off-year across the industry.”

Source: Wood Components Manufacturing Association (WCMA), 2001

Wood flooring:

“Wood Flooring Contractors reported recently in a survey by Hardwood Floors Magazine, that **71% of wood floor related work was remodeling projects** while the remaining 29% was in new construction. They also reported Contractors are selling 76% unfinished, versus 23% going to Prefinished Engineered and Prefinished solid (wood floors).”

Source: Wood Floors Online – Wood Floors International Inc., March 2002

Moulding and millwork:

Moulding and millwork sales are growing with sales of all remodeling products: kitchen cabinets, “built-ins, shelves, and entertainment centers, typically focused around the fireplace are hot, as are crown mouldings.” The most popular interior designs drive moulding and millwork designs and product types, and in the present market for moulding and millwork, **“The straight grain and fine texture of maple hardwoods are all the rage...”**

How does this relate to small diameter softwoods from Central Oregon? **Lower priced softwood lumber can be finger-jointed and machined, and then veneered with high quality maple or other high value hardwoods.** The machinability and length of suppressed softwood make it an ideal substitute for solid clear maple lumber, which has a limited length, limited supply, and high price. Additionally, the wood waste from processing operations in Central Oregon can be formed into a composite with recycled plastic, compressed into complex moulding and millwork designs, and veneered with maple (see information on Sorbilite in the Technologies section).

Source: Millwork News and Views, 2001

Furniture:

“The AFMA (American Furniture Manufacturers Association) is optimistic about the future of residential furniture.” The AFMA notes, as in other wood products industry sectors, **“Baby Boomers are good news...** They’re central to our industry in their sheer numbers and in their tastes and in their readiness to spend on their homes.” The strongest **furniture categories with the best long-term prospects are home office and juvenile furniture**, and because of buyer demographics, “... styles range from the most traditional to in-your-face avant garde.”

Source: AFMA, 2001

Structural Products:

Structural, engineered, wood products, such as glulam beams with a fiber reinforcement layer, are a **rapidly expanding market that is forecast to “grow by over 500% between 2000 and 2010.”**

Globally, installed civic infrastructure is deteriorating with age, corrosion, accidents, weather, under-design, and damaging events like earthquakes, all of which leads to “increased opportunities for new materials and structures as part of a major thrust towards Infrastructure Renewal. ...**FRP composites offer innovative and cost effective solutions” for civic construction projects that typically are under pressure due to extreme budget constraints and intolerable service disruptions to users.**

Source: Excerpted from the “Infrastructure Composites Report – 2001” in Engineered Lumber Trends, May 2002.

All other Engineered Lumber Products (ELP):

Engineered Lumber Products are equivalent substitutes for solid wood structural products, and can even exceed the utility of solid wood with increased span and load potential, and increased insulation characteristics. The use of ELP has increased from ~ 2 billion board-feet (solid wood equivalent) in 1995 to 3.3 billion board-feet (solid wood equivalent) in 2001. Usage is forecast to increase, starting at 3.6 in 2002 to 4.3 billion board-feet in 2005. ELP consists of Parallel Strand Lumber (PSL), Laminated Veneer Lumber (LVL), I-joists, trusses, conventional glulam beams, and other engineered products.

Note: Many ELPs are manufactured from low-value raw resource: chips, flakes, shreds or strands, narrow veneer, and low strength species. The drawbacks for primary processors however is that a relatively low price is paid for the raw materials.

Source: Engineered Lumber Trends, May 2002.

“Green” building products:

Green building products, as the name implies, are considered to be natural or safe for humans and the environment. A product’s ‘greenness’ is defined in many ways, some expected and some not. Examples of ‘green’ products: products made from recycled or reused materials, or sustainably-produced materials that did not result in environmental damage; materials that have a direct benefit for both human and the environmental health; products made through a production process that uses low energy and water inputs; or products made from raw materials are non-toxic and environmentally safe substances.

Wood Products:

- Sustainably-grown forest products
- Wood-plastic composites
- Non-toxic wood preservatives
- Wood flooring
- Products from wood waste
- Engineered wood products

Other Products:

- Natural linoleum flooring (cork, linseed oil)
- Recycled plastics, tire rubber, paper, etc.
- Natural fibers for floor and wall coverings
- Cotton insulation
- Non-toxic or natural finishes and sealants
- Soy-based glues, milk-based paints

“Green Building” is a relatively new movement among architects and builders to design and build homes and commercial buildings that are environmentally friendly. The movement’s goal is to reduce dependence on non-renewable resources such as petroleum, steel, and aggregate, and thereby reduce impacts to nature. Green Building tenets cover everything from site planning to protect natural areas, to energy conservation, to the use of sustainably produced materials.

Green Building markets are rapidly growing in the U.S. among do-it-yourself retailers, builders’ supply firms, and professional builders, but according to a September 2000 survey conducted by Cahners Residential Group, **homeowners are driving this growth:**

<i>Homebuyer and Builder Green Building Material Preferences</i>	
Homebuyers:	Builders:
Home owners’ four most important environmental aspects, by rank: <ol style="list-style-type: none"> 1. Energy efficiency 2. Building products with recycled content 3. Products that won’t affect indoor air quality 4. Products that don’t use old growth trees 	Some green features are becoming standard in the industry, and builders are now purchasing the following types of materials: <ul style="list-style-type: none"> ◦ 98.6% consider energy-efficiency; ◦ 45% consider materials with recycled content, renewable resources, reduced off gassing, and durability.

<i>Evidence of a Consumer Driven Market for Green Buildings</i>		
	Homeowners	Builders
<i>Willingness to pay:</i>	89% of buyers say they are willing to pay more for lower utility bills and better indoor air quality.	95% of builders say the greatest constraint is cost and local availability.
<i>Cost of green building features:</i>	56% say they will pay an additional \$2,500 to \$5,000 for a green upgrade to their home.	Builders claim green products are 5% to 15% more expensive and don't believe most customers are willing to pay the difference.

Official Green Building programs are being established around the nation:

- Green public buildings programs: San Francisco, CA; Hennepin, MN; **State of Oregon, State of California; State of Washington**; State of Utah; State of New Jersey; State of New York; State of New Mexico; State of Wisconsin; State of Missouri; State of Maryland; Commonwealth of Pennsylvania; State of Florida; State of Minnesota; State of North Carolina; State of Michigan
- Selected localities with green building ordinances: Austin, TX; **Portland, OR**; Denver, CO; Santa Monica, CA; Pattonsburg, MO; San Diego, CA, Boston, MA; New York City, NY; Scottsdale, AZ; Arlington, VA; **Seattle, WA**; Boulder, CO; Los Angeles, CA; Dakota County, MN; etc.
- Green schools program: the State of Texas

Governments are specifying procurement of 'green' certified products (20% of US GNP):

- Federal: \$200 billion US/yr
- State/local: \$1 trillion US/yr

Cities:

- New York City: (4th largest economy in US)
- San Francisco
- Philadelphia

Proposed legislation in US Congress: “Greening of the Government Act”:

By 2005 – at least 5% of wood products purchased by Federal agencies must come from wood resources, which have been certified by a program, which requires:

- Adherence to Forest Stewardship Council (FSC) principles *at a minimum*
- Chain-of-custody
- Annual audits

Why Central Oregon’s small log resource can be considered ‘green’:

- The removal of small diameter logs falls into the category of sustainable, ecologically sensitive forestry because:
 - ✓ They are a product of a forest restoration effort to improve forest ecology and reduce the wildfire threats to wildlife habitat and communities;
 - ✓ Small diameter timber is a low-grade wood that can substitute for higher value timber (and reduce pressure on natural forests).
- Central Oregon primary and secondary manufacturers have many existing and new options for making ‘green’ products from small diameter timber:
 - ✓ Using the waste product or residue or by-product for value-added products as well as “green energy” or biomass energy.
 - ✓ Investing in newer, high-tech equipment and manufacturing process(es) with low energy and water usage.

General Product Distribution Trends for Targeted Products

Remodeling Products:

Where do DIY remodelers go to shop for home improvement projects? : *(Based on 900 interviews of homeowners across the US)*

- 65% - Home Center Stores (Lowe’s, Home Depot)
- 19% - Hardware Stores
- 11% - Lumber Yards

The Home Center focus is crucial for two reasons:

- In contrast to other industry sectors, the DIY market actually expanded during the recession of 2001. Sales were up by over 10% among the industry's Top 500 retailers. Indeed, US consumers appeared to remodel their way right through the economic downturn, fueled in part by historically low interest rates. Over the past 13 months, approximately \$55 billion was generated by mortgage refinancing in the US, with over one-third of that amount being spent on home improvement and remodel projects.
- The top 5 home center chains in the US (Home Depot, Lowe's, 84 Lumber, Menards, etc.) have led the way in creating market demand for environmentally-friendly (certified) wood products. In the western states alone, Home Depot currently sells over \$3 million of certified wood product per month, and demand currently exceeds supply.

A New Remodeling Market: *Building contractors:*

- Because of the aging population, **remodeling contractors will increasingly displace do-it-yourself homeowners. Build-it-yourself sales (BIY = hiring a contractor) are expected to expand**
- Home Depot has already rolled out a nationwide "Pro-Initiative" that provides special services and discounts to professional builders and is focused on penetrating the "pro" wallet;
- The initiative will be in place in 80% of Home Depot stores by the end of 2003.

Wood products for the remodeling market should be targeted to those places where contractors shop for these materials: (based on 600 interviews with professional remodelers)

Sources experiencing **net gains** in "Pro" buyers customers:

- Specialty supply houses
- Home center stores
- Wholesale distributors
- Manufacturers (direct)

Sources experiencing **net losses** in "Pro" buyer customers:

- Warehouse home centers
- Lumber and building dealers
- Hardware stores

Furniture:

"Traditional distribution channels still dominate. ...**the vast majority of the business is coming from the furniture and specialty stores, and from the department stores.**" Beginning about 5 years ago, sales of furniture through the internet and retail catalogues increased and threatened to undermine the furniture industry's mainstay retail centers, but consumers returned to retail stores because "There's a tactile element here, people want to touch the furniture before they buy it." Note:

Retail settings are also the primary outlets for home office furnishings, including modular and Ready-to-Assemble (RTA) products.

Source: AFMA, 2001

Components:

“Building product manufacturers are the leading consumers of dimension and component products, followed by furniture and cabinetry.” These ‘end-product’ manufacturers often prefer to outsource their components and parts (i.e. buy from specialty components manufacturers) because of significant cost savings. “Companies purchasing most of their components earn 20.1% return on equity, compared to 12.6 percent for those which make most of their own.” Over half (52%) of companies plan to increase their purchase of components from specialty manufacturers, 40% expect their purchases to remain current levels

The Central Oregon region’s existing wood products infrastructure may be prime for participating in this growth market and joining the trend— **“Sawmills and dimension operations are adding significant component production capacity as they diversify into a variety of value-added wood products.”**

Source: Wood Components Manufacturing Association (WCMA), 2001

Based on an analysis of information from the Wood Components Manufacturing Association, the Sorbilite process may have very strong potential for making a highly competitive components manufacturing operation in Central Oregon because it can bypass concerns in the industry at large.

1. The Central Oregon region does not have a shortage of skilled labor, which is a serious concern for the majority of manufacturers located in the Eastern U.S.
2. Lumber quality is clearly not an issue as Sorbilite uses waste wood and residue.
3. The Sorbilite process avails the production of low-cost, high-quality components with short lead times.
4. Changing style trends are more easily accommodated by Sorbilite because retooling consists of creating new mold rather than changing entire production lines.

Task 5: Development of an Economic Framework with Identified Pilot Project Potential

This Task was to provide COIC with an economic discussion and proposed framework for potential follow-on pilot project development in the region. The economic framework discussion included in this section incorporates a technical gap analysis (what we have; what we need; etc.) to attract investment to the region.

Based on the results of Tasks 1-4; Mater Engineering recommends the COIC partner organizations consider a new economic framework for the region based on the following:

Supply: Move from *highly variable* to *highly levelized* (coordinated) regional timber supply offering. The focus is not necessarily on putting out more volume, but on providing a *more level volume each year within the region's forest landscape* that can foster new investment to the area. New pilot project opportunity exists for the region for this effort.

Markets: Move from “*niche-only*” to *niche and commodity* solid wood markets to capture highest value for small diameter logs. The Central Oregon region has focused a good deal of time, energy, and funding toward development of market opportunities for small diameter logs within a more niche market setting (log home construction; structural use of roundwood; etc.). Understanding these niche markets and fostering production activity to capture these niche markets is very important for the region. It is equally important to understand the direct relationship traditional production/markets have to creating successful businesses focused on niche markets. In many cases, access to log supply for smaller producers focused on niche markets actually becomes easier, more consistent, even possibly less expensive, with the help of efficient larger-scale production in the region focused on more tradition solid wood markets.

Investments: Move from *isolated* efforts to *strategically linked* efforts in capturing new investments to the region (this will likely be based on introduction of new production technologies). *Isolated* investment efforts happen when a technology idea is introduced to the region in absence of a broader industry infrastructure evaluation. *Strategically linked* investment efforts happen when multiple technologies can be introduced to a region where one technology reduces the investment risk through production linkage with another introduced technology. Strategically linked investment efforts can also be accomplished by linking market due diligence efforts to securing new technology manufacturer investment in the region.

Partnership: Move from *non-monitoring* to *modeling* community benefits based on public resource sales and contracts.

More detailed discussions of each of these economic framework elements are provided below.

Supply

What we have ...

... that's good:

- There is a fairly even offering mix between sawlogs and small logs (this trend has been more evident in recent years than in the past)
- There appears a good distribution of sizes of contracts offered to accommodate different sizes of resource purchasers (compared to other USFS regions in the US)
- Within many Ranger Districts in the region's National Forests, there appears to be an established track record on the ability to sell what is offered (smaller percentage of "no bids" than what is evidenced in many other USFS regions across the US)
- Other small diameter wood flow is projected to come on line on a consistent annual basis from the Warm Springs Indian Nation that can help establish a "guaranteed" volume for establishing a small log processing mill in the region. Current estimates provided by Mr. Doug Manion, Warm Springs Tribal Forester, are between 10-12 mmbf/yr. of 5"-9" diameter material.

... that's challenging:

- There appears to be a notable inconsistency in the number of timber sales offerings from year to year between Ranger Districts within each National Forest (with the exceptions of resource offerings from the Bend and Fork Rock RD in the Deschutes NF and the Paisley RD in the Fremont NF);
- There appears to be dramatic fluctuations in volume of timber sales offerings from year to year between Ranger Districts within each National Forest (with the exception of small log sales offerings from the Bend and Fork Rock RD in the Deschutes NF).
- There appears no resource offering coordination (contracts and timber sales) between Ranger Districts within each National Forest.
- There appears no intra-regional resource offering coordination (contracts and timber sales) between the National Forests in the region.
- For all National Forests, small log timber sales over the last several years appear to have focused on Lodgepole pine, even though dense stands of Ponderosa pine and white fir exist. Introduction of additional small log markets in the region may expand the understanding of other species' small log market value the opportunity to further meet fuel load reduction goals.
- For all regional National Forests, there appears to be a clear division between departments responsible for timber sales and stewardship contracting, and departments responsible for meeting National Fire Plan (NFP) mandates. There appears no mechanism in place to document what

resource is coming off of treated acres relative to size and volume of small diameter trees. As a result, little information is available to determine the market value of resource being harvested from treated acres. Although not a standard practice, some regions – especially in the south western part of the US, have completed valuable pilot projects on determining volume, size, and potential value of small diameter resource being treated through National Fire plan mandates. The information, combined with traditional timber sales data, is then used to determine overall financial viability for small log processing potential.

What we need:

The supply challenges identified are not insignificant: a) forest stewardship and restoration efforts typically require the removal of smaller diameter material to reach forest health goals; b) successful timber sales are those that balance the mix of sawlogs and small logs offered. Without efficient small log processing, balanced timber sales will often go un-bid. Lack of interest in timber sales (un-bid sales) can be a product of multiple issues: no way to cost effectively process the small logs within a working region; lack of overall log volume offered within a region on an annual basis; lack of consistency of volume offered over time within a region. For Central Oregon, the overall volume of resource being offered may be less of an initial constraint compared with the sporadic, uncoordinated nature of the resource offering overtime, and the lack of longer-term planning. Short-term, uncoordinated resource offering protocol may also have other unintended impacts for a region:

- It can severely diminish the sustainability of surrounding communities who have relied on a consistent timber base for economic stability,
- Short-term, uncoordinated resource offerings can lead to an increase in the number of timber sales and contract services being issued to businesses outside the region due to decreased capacity within the region.

Critical path elements (i.e. what steps need to be undertaken first to affect positive change) include the following for Central Oregon (see the “*Supply*” *Critical Path Chart* at the end of this section):

1. Coordination of timber sales between Ranger Districts and National Forests to reach a *levelized* resource supply within the region (intra-regional resource offering protocol). As this effort would be a benchmark activity within the entire USFS system, it should be a designated pilot project, with lessons learned shared with other USFS regions;
2. Implementation of longer term (3-5 year) resource management planning within all Ranger Districts. This was a practice in the past and can be reinitiated within current administrative parameters. This will require additional funding and stakeholder involvement at the front end of planning so there are less appeals and law suits;
3. Determination of volume/characteristics of biomass coming off treated acres under the National Fire Plan (NFP);
4. Coordination between timber sales and NFP treatments within Ranger Districts and between National Forests;

5. Coordination of projected small log volume from public lands matched with a more “guaranteed” supply expected to be harvested from tribal lands in the region;
6. Consideration of upgrading existing mills and/or the development of a new small log processing mill in the region. Based on overall timber sales offering experienced in the region and assuming that same overall volume remains fairly constant for the future, it appears that there may be a sufficient overall volume of small diameter logs to consider development of one small log processing operation in the region.

Investments

Central Oregon has a unique opportunity to entice new investment to the region by thinking strategically about how to leverage multiple new technologies that can substantially increase the value of products from small diameter logs. As noted in the “***Technologies***” section of this report, new technology manufacturers have expressed interest in helping to finance new manufacturing operations but require community involvement in several areas.

What we have ...

... that’s good:

For ***primary*** production:

- The region still has primary processing mills in place to process larger logs;
- There’s production infrastructure in place to be able to expand primary processing to cost effectively process small logs.

For ***value-added*** production:

- There region already has in place high-quality, value-added wood product manufacturers where new products and new technologies might be successfully introduced.
- Technology manufacturers, some based in Oregon, appear quite interested in investing in the region to establish their new production technology.

... that’s challenging:

For ***primary*** production:

- The existing production capability in the region is not designed to efficiently and cost-effectively process logs that are less than 8” sed.
- The lack of consistent and adequate supply of log volume from USFS lands has forced a shut-down of most of the region’s mills. Options for reopening are being considered but are contingent upon securing a consistent supply of offshore resource (mostly radiata pine from Chile, New Zealand, Brazil).

For value-added production:

- Interest from new technology manufacturers to invest in the region is often based on the region being able to document an adequate wood supply. Investors also look to the community to assist in developing a business plan and in conducting the appropriate marketing due diligence for products to be manufactured employing the new technology.
- For some technologies, materials testing will need to be conducted to determine production viability on untested species. Recent testing of small diameter Ponderosa pine logs and lumber has already been conducted which can be directly applied to the region, but testing for other Central Oregon species, such as Lodgepole pine has yet to be accomplished.

What we need:

The best bet for securing new investment into the region is to strategically link with interested manufacturers who offer new technologies focused on capturing the highest value from small diameter logs. Manufacturers of the Sorbilite, FiRP, Greenweld, E-Grader, and Indurite technologies have all indicated an interest in investing in forest-based communities. Many of the technologies have strategic linkages: FiRP and Greenweld are already combining their technologies to produce a marketable product specifically focused on lumber from small-diameter timber; the E-Grader can now be employed in both large log and small log processing operations to increase the percentage of higher-grade yield from each log; the Sorbilite process can use wood residue matched with other residue from agricultural production to produce high quality product.

Critical path elements to entice new investment to Central Oregon include the following (see the ***“Investment” Critical Path Chart*** at the end of this section):

- It is unlikely any new technology investment will happen without levelizing the long-term wood flow in the region.
- The establishment of a cost effective small log processing center in the region is central to the economic viability of the new technologies that will rely on both the lumber and residue output to produce new products. Anticipated future small log volume available in the region suggests that enough volume might exist to warrant development of a new small log mill, but probably not more than one in the region. Existing industrial infrastructure exists in the region (Ochoco Lumber, Crown Pacific, and Warm Springs Forest Products) to add a small log processing line. Warm Springs Forest Products will have it’s own “guaranteed” supply of small logs coming off their own Tribal lands that can potentially be processed through a new small log mill in the region. Developing a “bankable” business plan for construction of a new small log processing facility in the region should be a priority.
- New technology manufacturers are often willing to help finance materials testing in targeted regions. Connecting the linkages to complete materials testing for Central Oregon species should be a priority for the region.
- Undertaking marketing due diligence for products manufactured with new technologies should also be a regional priority, especially for the Sorbilite, Indurite, and FiRP/Greenweld technologies.

While evaluation of niche markets for small diameter logs should continue, the region may find unique opportunities in expanding the market focus to commodity products as well – given some of the new technology interest referenced above. Further, special events focused on environmentally friendly or “green” wood are currently unfolding in Oregon and the Pacific Coast region that may open up special market opportunities.

What we have ...

... that's good:

- Markets (especially for value-added products) are still good, with many growing. For commodity products (lumber, etc.), markets have fluctuated, but the final decision of the Canadian Softwood Lumber Tariffs is projected to open up major product/market/pricing opportunities for softwood producers in the PNW. In May of this year, the US International trade Commission gave final approval to stiff tariffs on imports of Canadian lumber. The ITC ruling clears the way for average tariffs of 27% to be levied on Canadian softwood lumber imports – which currently makes up about one-third of the US supply of all wood used in housing construction. In 2001, the US imported \$5.7 billion worth of softwood lumber from Canada.
- Retailer demand for wood products made from independently certified well-managed forests is growing substantially in the US and throughout many other regions throughout the world. In 1999, the US market demand for “certified” wood products was less than 1% of total solid wood volume sold in the market; today the demand exceeds 25% and is growing. Notable private forestland owners in or near the Central Oregon region are achieving forest certification to access these markets: the Warm Springs Indian Nation has just completed a full Forest Stewardship Council (FSC) on all their tribal forestlands, and Potlatch Cooperation achieved FSC-certification of their 22,000 acre hybrid poplar farm in Boardman in 2001. The State of Oregon, along with Washington State, California, and British Columbia, will be participating in a unique certification pilot project to determine desirability of forest certification on public lands. Oregon brings two State Forests to the project– including the Sun Pass State Forest immediately to the south of the region. These unique events in and around the Central Oregon area afford special opportunity for wood resource harvested from restoration and forest stewardship efforts.
- New technologies, such as the Sorbilite technology, have already been acknowledged by some major retailers (such as Home Depot) as producing environmentally-friendly products and are given preference for purchasing because of that designation.

... that's challenging:

- Because of the lack of a coordinated, levelized regional wood supply, Central Oregon is currently not well-positioned to take advantage of market opportunities resulting from the implementation of the tariff on Canadian softwood lumber.

- Currently, USFS lands are precluded from achieving certification status from some of the certifying organizations (like the FSC), even though recent decisions have opened up certification options for other federal lands (DOD and DOE).
- Central Oregon will not be able to attract new technology to the region, which has been retailer-acknowledged as producing environmentally-friendly products, without stabilizing material supply and processing within the region.

What we need:

To take advantage of some of the emerging “green” market opportunities, COIC might consider the following as priority efforts (see the “*Markets*” *Critical Path Chart* at the end of this section):

- As identified before, none of these market opportunities exist without a regional levelized wood supply.
- A benchmark pilot project might be initiated with Oregon’s Bonneville Environmental Fund (BEF) to achieve “green” biomass designation from wood flow derived from restoration and stewardship contracts off of USFS lands. The pilot project could include full forest certification assessment by forest certification auditors, without becoming certified (assessments are not prohibited). The recommendations from the fill assessment (assuming compliance to certification standards is determined) can be used as baseline documentation for achieving BEF “green” biomass designation. Such a designation could then be used for retailer acknowledgement for wood product preference, and could immediately be used for access into the “green” energy markets sponsored by the BEF.
- Markets research should be initiated to determine the impacts to increased market opportunity for wood product manufacturers based in Central Oregon as a result of implementation of the tariff on Canadian softwood lumber.. This information can be used as valuable support documentation in developing a “bankable” business plan for establishing a small log processing mill in the region.

Partnership

More and more forest-based communities are beginning to acknowledge the need for being better partners with the USFS in tracking and modeling the correlation of timber sales and service contracts to community-based benefits: where the harvested resource goes, is it processed within the region, do regionally-based contractors secure the work; what factors exacerbate resource and work flow to outside businesses; what factors reverse that trend. New pilot project opportunity exists for the region for this effort. Currently, no such monitoring effort exists within the Central Oregon region. This community benefits modeling becomes important not only to the Forest Service, but the forest-based communities as it encourages stronger collaboration based on monitored annual deliverables for achieving sustainable resources and sustainable communities.

What we have ...

... *that's good*:

- Existing interagency cooperation and partnerships, such as COFMS (Central Oregon Fire Management Services – BLM and the Deschutes/Ochoco NF's) and the cooperative agreement between the Fire Chief's Association, the federal agencies, and ODF regarding wildland fire fighting.
- Broader stakeholder groups like COPWRR, which are helping to generate a Central Oregon vision for forest restoration and fuel reduction.

...that's challenging:

- These initiatives are still young – there remains significant mistrust between and among agencies, communities, and stakeholder groups;
- There is a need to involve a larger portion of the public as stakeholders in the project.

What we need: (see the “*Partnership*” *Critical Path Chart* at the end of this section):

A Central Oregon Vision of forest restoration and sustainable restoration-based industries. A benchmark pilot project might be initiated to evaluate (from a recent historical basis) the following for both timber sales and service contracts issued within the region's National Forests:

For *timber sales*:

- Who secures the sales? Are they located within the region?
- How much resource leaves the region for processing?
- With a regionally-coordinated, levelized supply, what might change?

For *service contracts*:

- Who gets the work?
- Are the contractors from the region?
- With a regionally-coordinated, levelized supply, what might change?

The projects' findings could be powerful documentation to encourage accelerated support for initiating an intra-regionally coordinated (levelized) resource offering protocol within and between the four National Forests in the region. The project's findings would also provide an opportunity for COIC to create the nation's first *community benefits model* template that could be used by many other forest-based communities across the US. Finally, the project's findings could be used as a starting point for creating guidelines for Charter Forest designation in the US.

