

CROP and Small-Log Processing Feasibility
for
the Central Oregon Region

June 2004

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Project Background

In the later part of 2001, the Central Oregon Intergovernmental Council (COIC) was awarded a series of national grants through the National Fire Plan to address the removal of dangerous build-up of woody material in Central Oregon forests. The grants were issued to cover three specific project goals:

- * Determine the long-term feasibility of using small-diameter logs and woody material to produce energy in mothballed local facilities;
- * Determine the best way to mechanically-remove the biomass from the targeted forests; and
- * Develop a market-driven approach to hazardous fuel reduction that could maintain/grow local jobs and bring divergent stakeholders together in a common sustainable resource direction.

Focusing on the last goal, in 2003 Mater Engineering was retained by COIC to undertake a fuels and by-product utilization study for the region focused on small diameter logs (from 4"-12" dbh). In particular, the study was to help identify the protocol and datum for an interagency coordinated resource flow over the next five years; then evaluate the potential for setting up a small log processing facility in the central Oregon region to profitably convert that small diameter resource into marketable products. The project would also shape a business plan framework for attracting investment into the region based on the processing of small diameter logs.

The scope of work for the project covered six (6) key tasks:

1. **Conduct a Coordinated Resource Offering (CROP) Assessment and Timber Supply Analysis for the Region:** Mater Engineering proposed to work off a 80-mile radius of the Bend-Redmond area for this task. The focus of projected harvest datum would be on public land resource offerings and *readily-available* private forestland data. For public land resource offerings, Mater Engineering would obtain 5-year projections from targeted forest landowners. Baseline recommendations for the project would be based on 5-year "*levelized*" supply projections. Biomass data from public lands sources come from at least three distinct sources: *projected timber sales; projected service contracts (procurement,*

restoration, stewardship contracts); and projected fuel load reduction volumes based on National Fire Plan mandates. Where feasible (ie where information is available), biomass information would be catalogued according to defined splits in diameter size for small logs (4"-12" dbh with three diameter splits: 4"-7", 7"-9", and 9"-12"), large logs (12" dbh +), and biomass (<4" dbh). The breakout in log size is most important in ascertaining maximum value-add product manufacturing based on appropriate small log processing technology. Based on the resource datum provided, Mater Engineering would develop a coordinated resource offering protocol (**CROP**) model and individualized resource offering maps (ROMS) for the region. The ROMs would graphically illustrate projected resource flow *within each district* from year to year for the projected 5-year period.

2. **Conduct a Markets Analyses for Products that Could be Manufactured from Small Diameter Logs:** Under this task, Mater Engineering would provide updated markets research on products likely to be produced from lumber manufactured from small diameter logs. Market updates would encompass both commodity and value-added products.
3. **Conduct a Small Log Processing Equipment Review:** As the COIC Project Advisory Council determined that the existing sawmill on the Warm Springs Indian Nation lands would be the targeted site for construction of a small log processing line, for this task Mater Engineering would focus primarily on the log breakdown center in a small log processing line. Updated technical information on the leading equipment suppliers and technology will be provided and correlated to the requirements of a small log processing facility that could be located in the COIC region.
4. **Conduct a Facility Siting Review Based on Projected Resource Flow:** Again, although the COIC Project Advisory Council determined that the existing sawmill on the Warm Springs Indian Nation lands would be the targeted site for construction of a small log processing line, Mater Engineering would provide general siting information within the investor landscape based on targeted species selections and CROP evaluation.
5. **Develop Mill Options Datum for Facility Set-Up:** Under this task, Mater Engineering would identify the critical business plan elements and unit costs necessary to construct a "bankable" business plan for construction of a small log processing facility. This would include critical information such as staff and employee requirements; competitive hourly rates, and general position requirements.
6. **Determine Preliminary Baseline Feasibility for Establishing a Small Log Processing Facility in the COIC Region:** Under this task, Mater Engineering would develop a baseline (preliminary) business model template for evaluating the economic feasibility of establishing a small log processing operation in the COIC region.

Before CROP analysis and mapping is undertaken, it is important to understand exactly what CROP is and why it is important to opening up major investment opportunities for the COIC region.

What is CROP? How Does it Work?

The premise of CROP is two-fold:

- Coordinate projected resource offerings within agencies (ie ranger districts within a single National Forest; National Forests to National Forest) and between agencies (USFS, state, military, Indian nations, etc.) within an investor landscape; and
- Focus on levelizing supply, with levelized analysis applied to volume, diameter, and species within an investor landscape.

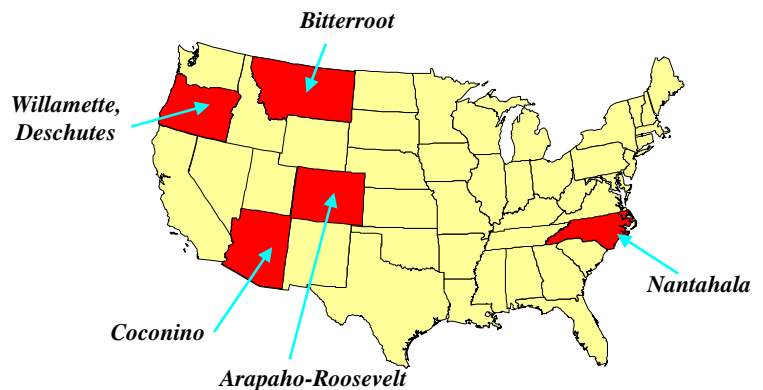
Anticipated deliverables for implementing CROP in the region would be:

- **Re-inviting investment back into the region;** potentially focused on new appropriate technology. Identifying appropriate technology demands a shift in the way decisions are often made relative to processing wood biomass. Traditional process decisions are often based first on understanding the technology, then adapting the resource requirements to fit the technology. With appropriate technology thinking, the technical equation is reversed. First understand the resource offering based on solid forest restoration goals, then identify the technology to fit those needs. The difference on the ground can be significant. Biomass-to-energy projects, for example, may require consistently larger volumes of biomass over longer periods of time to offset capitalization costs and negotiated contract requirements if selling power back to the grid is part of the project scope. Similar requirements might be expected for larger wood processing operations (such as oriented strand board facilities) where costs to capitalize are high (typically \$30-\$40 million), and resource volume requirements are also high. With appropriate technology as a framework, multiple smaller-scale technology - such as dedicated single-pass small log processing mills- might prove a better solution for both the forests and forest-based communities needing financially-viable production options.
- **Increasing the value of the resource being offered** and reducing the volume of resource that would still be defined as “valueless” under the Healthy Forests Restoration Act (HFRA) definition (see *Basis for COIC CROP Work* section of this report);

- **Reducing the disparity between resource offered and resource sold** performances from year to year on Federal forests;
- **Increasing environmental support** for longer-term resource removal based on transparent forest restoration planning at the landscape level; and
- **Increasing the credibility of USFS forest management activities** within the forest products industry sector.

There are four (4) key elements to successful *CROP* implementation:

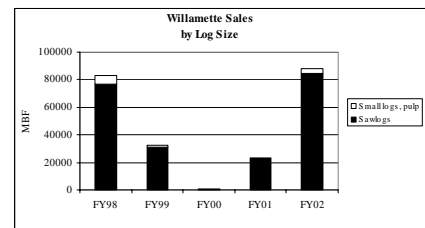
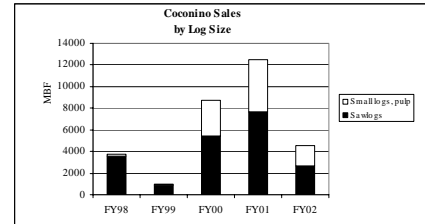
1. *Assessment*: Obtaining investor landscape level projected five-year resource flow between primary resource offering entities and assessing the data for proposed variations in volume, diameter sizes, and species mixes over time.
2. *Mapping*: The projected resource offering will be mapped to allow interested parties (regional representatives; members of the public; potential investors; stakeholders, etc.) the ability to quickly see projected resource flow within the defined investor landscape. These resource offering maps (ROMs) should be able to quickly convey the following information:
 - ***How much*** is proposed for removal within the investor landscape over a stated period of time (in this case a five-year projection)?
 - ***Where*** will the volume come from within the investor landscape?
 - ***Who*** will provide the projected volume?
 - ***How levelized*** will be the projected removal over time? Why can some ranger districts within a National Forest sell what they offer while others can't? What conditions prompt a 'no-bid' response within potential buyers? There are many reasons why this condition exists, but recent research conducted by the Pinchot Institute for Conservation out of Washington DC provides some insight into the cause and effect of resource offering activity on National Forest lands and buyer response. The research, conducted in 2003 and designed to determine community benefits from forest management activities on Federal forests – was conducted on six National Forests across the US, including the Deschutes.



Timber sales purchasers between 1998-2002 from each National Forest were interviewed. At least a 50% response rate for each National Forest was achieved. Among other questions, timber sales purchasers were asked what changes they had noted

over the last five years regarding timber sale volumes offered by the USFS. Purchaser responses were then matched to analysis of actual performance of the National Forests regarding volumes offered during that period of time. The results were notably surprising: while almost 80% of timber purchasers stated they had observed a decrease in total volume of timber sales offered between 1998-2002, actual performance was quite different on four of the six National Forests evaluated in the study.

With the exceptions of the Bitterroot and the Nantahala National Forests that did exhibit continuous declines in sales offerings between 1998 through 2002, the Willamette, Deschutes, Coconino, and Arapaho-Roosevelt National Forests offered sales volumes in 2000 through 2002 that were close to or exceeded sales volumes offered in 1998 and 1999. Why the difference in perception of performance and actual performance? Purchaser responses suggest that the lack of leveled, steady supply (as evidenced in the supply performance tables for the Coconino and the Willamette National Forests) may foster incorrect perceptions of diminishing sales volume offerings over time, and may significantly reduce contractor ability to respond to timber sales – especially in the absence of longer-term harvest planning protocol.



- What is the ***comparative credibility*** of the projected removals? Comparative credibility analyses quickly identify probable credibility “gaps” in the information being presented in the ROMs. The analyses look at historical (5 year) resource removal practices for each primary resource player in the investor landscape, and then matches projected volumes with historical performance. When dramatic variations in resource offering between historical and projected performance are apparent (volume, diameter sizes, levelization of supply, etc.), resource suppliers will need to anticipate and mitigate credibility gaps up front. If a ranger district has historically provided sporadic and declining timber sales but is projecting a level, increased volume over the next five years, investors will want to understand the new conditions within timber sales and/or service contracts for that ranger district that will mitigate the gap in credibility.
- What are the ***associated risks***? These will vary depending on the type of product to be manufactured from the resource flow. For the ***CROP*** model for the COIC region, investors will likely target four (4) associated risk factors for evaluation:
 - i. ***What percentage of projected wood flow will be in the >12” dbh log category?*** This associated risk speaks to the “social license to harvest” factor. While no diameter “caps” are implemented in the COIC region, experience in collaborative forest restoration projects shows that more environmental stakeholders are willing to be full participants in these type of projects where logs <12” dbh are the primary focus. As a target percentage, social license to harvest is notably improved when 70% or more of the projected removal volume is <12” dbh.

- ii. For targeting small log processing potential (4"-12" dbh), how much volume per year will be available in that diameter bracket? The new small log processing technology now available in the US that provides a single-pass, dedicated system for the processing of these small diameter logs typically might require ~ **25 million board feet** (mmbf) of wood furnish annually for a single shift. Investors will calculate a +20% factor to ensure enough resource availability. For a mill needing 25 mmbf of wood furnish annually, investors will want to see that the landscape can supply ~ 30 mmbf annually. They will also want to see that residual furnish is available above and beyond that 20% factor.
- iii. How much volume is projected to come on line as a result of fuel load reduction mandates? The heightened political focus on the implementation of the HFRA may create additional opportunities and constraints for investors relative to project risk. On the opportunity side, volumes to be removed for fuel load reduction to meet fire plan mandates may be viewed as reduced risk given new administrative measures (ie categorical exclusions; longer-term service contracting) that can be employed on Federal forest lands. Conversely, the increased political focus on the large number of acres of Federal forests to be treated in a short time frame may cause investors to assign a higher risk factor to those contracts designated for fuel load reduction efforts. In either case, investors will want to have a clear sense of how much total planned removal will be comprised of volume designated for fuel load reduction efforts.

3. *Marketing:* The **CROP** model is intended to produce a long-term viable and reliable marketing tool for the region, targeting several audiences:

- ✓ Industry investors: primary and value-added producers
- ✓ Technology providers
- ✓ Financial institutions
- ✓ Environmental stakeholders
- ✓ The public at large

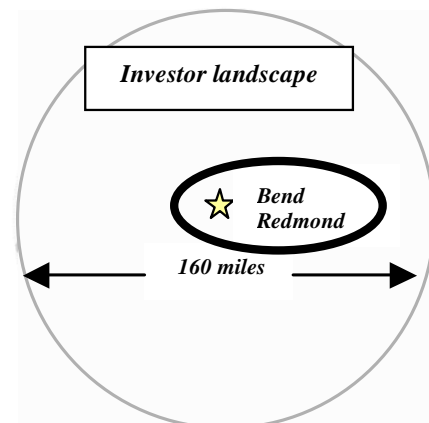
Each of these target audiences will benefit from the larger landscape, longer-term approach to resource management. The transparency of information at the larger-landscape level should also prove beneficial to these targeted audiences

4. *Monitoring:* Who monitors performance of **CROP**? Community-based organizations like the COIC with a good track record provide the logical independent collaborative structure and format to effectively monitor the performance of the **CROP** model from year to year and over time.

Methodology for COIC CROP Analysis

The methodology employed for this project required identifying an investor landscape, identifying key resource providers within that investor landscape, and obtaining projected resource removal data from the key resource providers:

- **Investor landscape:** The project used a 160-mile log haul factor (~80 mile radius from the Bend-Redmond area) as a baseline for defining the COIC CROP investor landscape. The concept of investor landscape is important, as investment decisions in wood processing operations are typically made with larger landscape evaluations compared to forest restoration project landscapes. Investor landscapes are often defined by how far away a processing operation can haul purchased wood furnish from public and private lands for its operation. The Pinchot Institute Community Benefits research project discussed earlier in this report discovered that NF timber sale purchasers in general have increased their log haul distances up to an approximate **200-mile investor landscape**.



- **Key resource providers:** As noted in the tables below, the investor landscape included twelve (12) ranger districts within the Deschutes, Ochoco, Mt. Hood, Willamette, and Fremont-Winema National Forests. Four (4) BLM Districts and ten (10) counties were also included in the data collection:

<i>National Forests and Ranger Districts Involved in the COIC CROP Landscape</i>				
<i>Deschutes NF</i>	<i>Willamette NF</i>	<i>Ochoco NF</i>	<i>Mt. Hood NF</i>	<i>Fremont-Winema NF</i>
Bend/Ft. Rock Sisters Crescent	Detroit Sweet Home McKenzie Middle Fork	Lookout Mt. Paulina	Clackamas	Chemult Silver Lake

<i>BLM Districts and Counties Involved in the COIC CROP Landscape</i>	
<i>BLM</i>	<i>Counties</i>
Eugene Salem Prineville Lakeview	Deschutes Jefferson Klamath Crook Lake Lane Linn Marion Wasco Wheeler

In addition, the investor landscape included forestlands owned and managed by the Oregon Department of Transportation (ODOT).

➤ Projected resource removal data: Each of the key resource providers was requested to provide a 5-year projection (2003-2007) for resource removal (see **Provider CROP Data** tab of this report for specific breakouts). Although forest products industry investors often prefer 10-year projections for investment purposes, a 5-year projection was selected to encourage more critical thinking on employing *appropriate technology* that may best fit forest restoration activities (smaller diameter volumes, etc.). Information on projected resource offering was provided to Mater Engineering as follows:

- All volume information was supplied in either hundred cubic foot units (ccf), mbf, mmbf, cubic feet, or green tons. Conversion factors used to achieve mmbf data were as follows:

✓ 1 cubic foot	= 5 board feet
✓ 100 cubic feet	= 500 board feet
✓ 5 green tons	= 1 mbf

- The projected volumes were provided in five diameter at breast height (dbh) breakouts:

< 4" dbh 4"-7" 7"-9" 9"-12" >12" dbh.

These diameter breakouts were selected as a means to best evaluate the potential to invite investment to the region focused on small log processing (4" - 12") and maximizing grade recovery.

- Diameter and volume information was provided on a per-species basis, and all projected volumes were identified by the type of venue the resource would be offered through: timber sale; service contract; pre-commercial thinning, etc.

Basis for COIC CROP Work

We begin with an historical examination of what has happened in the study region in the past relative to resource offering. Looking at just the ranger districts in National Forests encompassed within the project's investor landscape, we find that between 2000-2002 many ranger districts were unable to sell notable volumes of what they placed up for timber sales offering. Of the twelve (12) ranger districts encompassed within the five National Forests in the COIC investor landscape, only 3 ranger districts were able to sell all volume placed up for sale during that period of time (see **Exhibit A**). Further – only 2 of the twelve ranger districts (Bend/Ft. Rock and Chemult) were able to offer consistent sales offerings from year to year, and only 1 of the districts with multiple year sales offerings was able to provide a levelized supply of volume offered (Paulina).

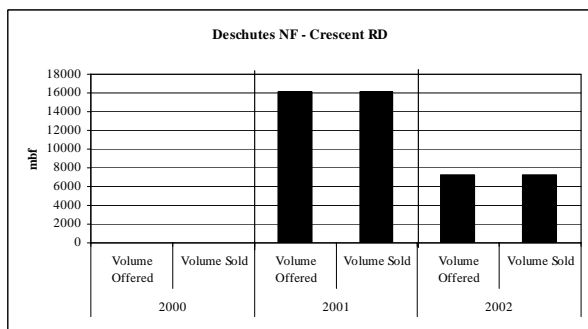
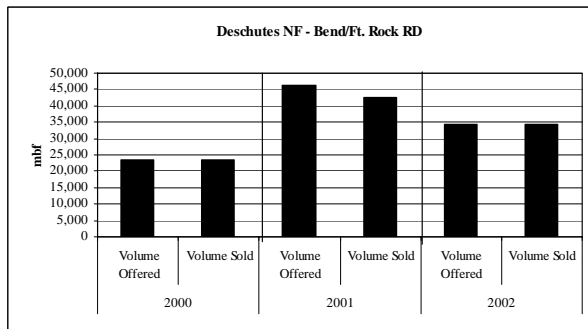
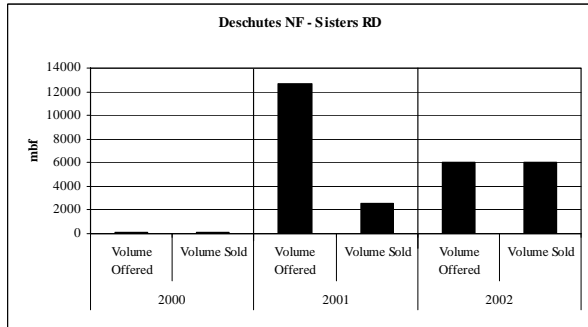
What became apparent:

- ✓ There appeared to be little or no coordination **between National Forests** in the study region relative to resource offering over time;
- ✓ There appeared to be little or no coordination **between Ranger Districts within a single National Forest** relative to resource offerings over time;
- ✓ There clearly was no coordination **between other agencies** in the study region (BLM, Oregon Department of Transportation, Counties, etc.) relative to resource offerings resulting from wood removal activities over time.

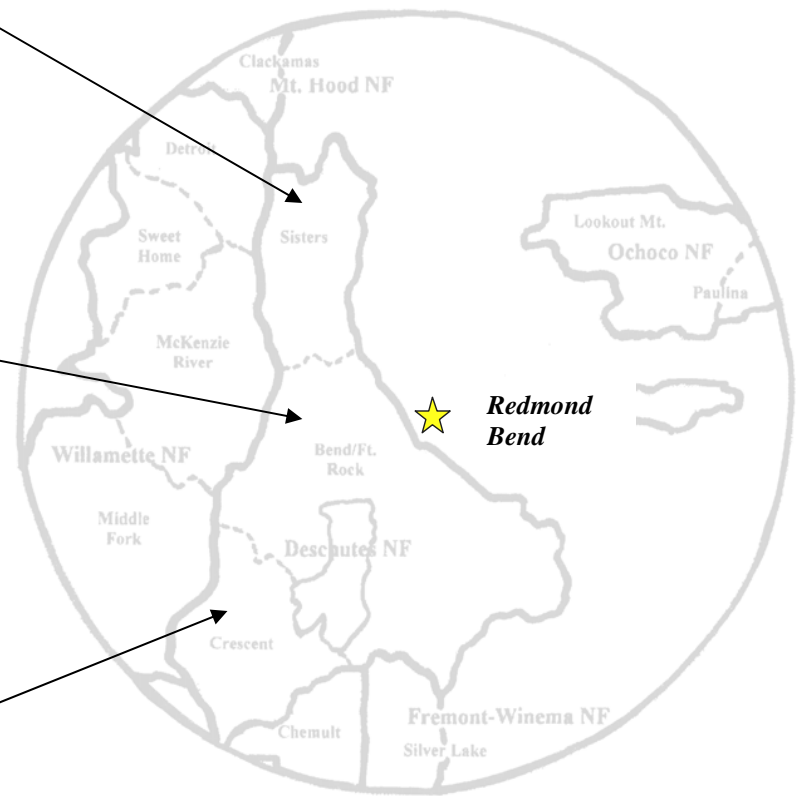
Complicating matters, biomass-to-energy evaluations being conducted in many regions throughout the US continue to suggest a lack of economic viability for “greenfield” projects, unless combined with solid wood processing operations where the residual from the processing operation is further converted.

For both solid wood processing and biomass-to-energy evaluations, potential investors looking at the COIC region may well have observed disturbing patterns in the region:

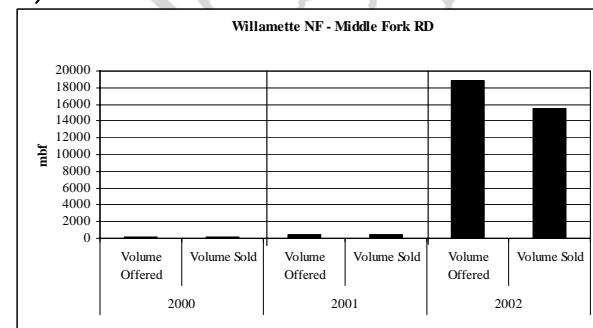
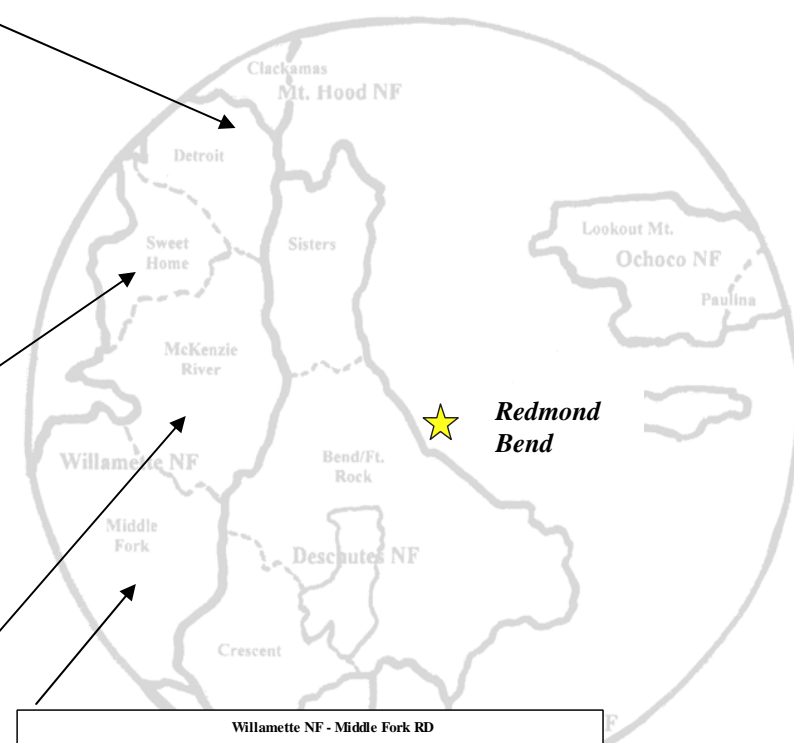
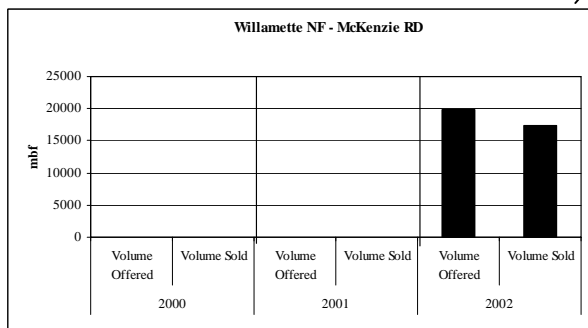
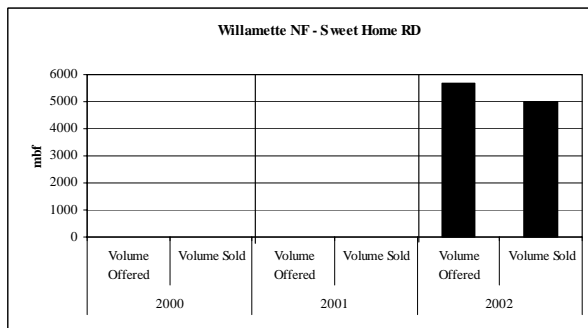
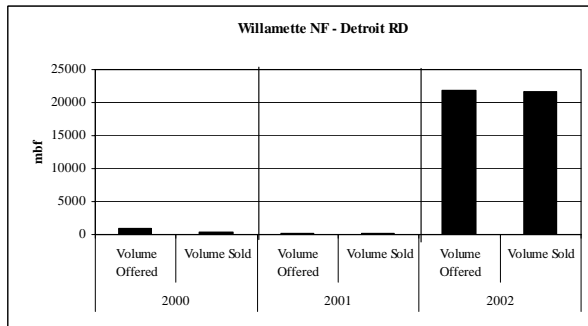
- ✓ **Erratic supply** over time; no level playing field for securing resource offering;
- ✓ **Uncertainty** as to where or when supply would become available within an investor landscape
- ✓ Little, if any, information on **resource characteristics** within the investor landscape; and
- ✓ **No investor risk mitigation** efforts within the investor landscape.



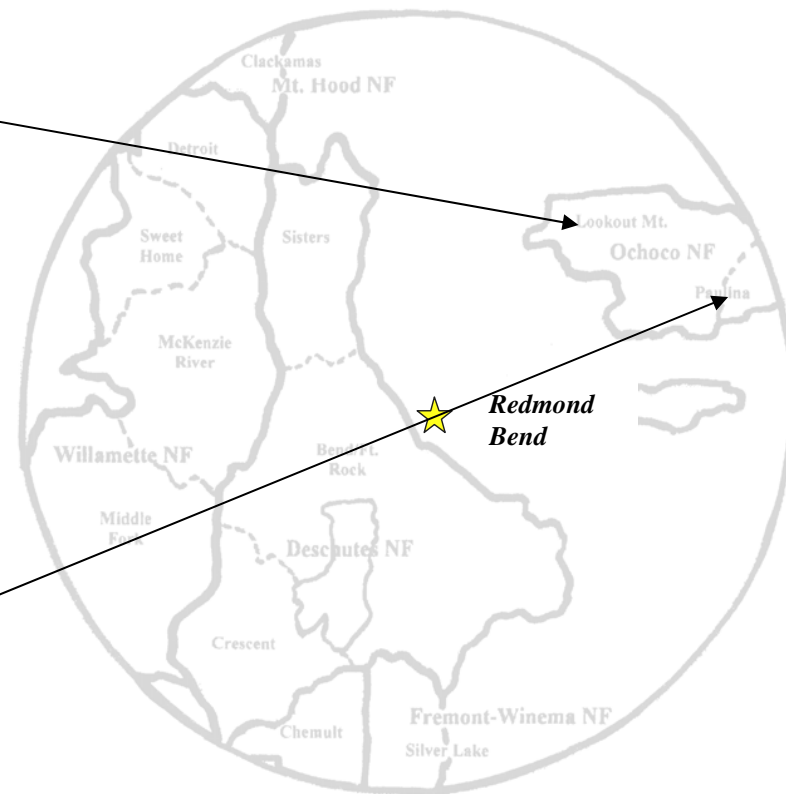
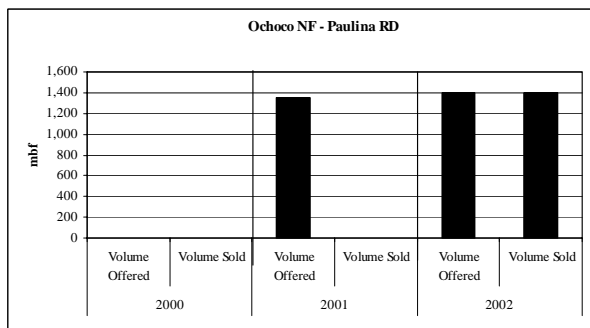
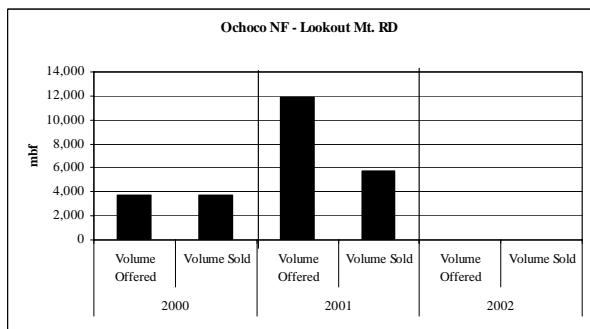
Deschutes NF



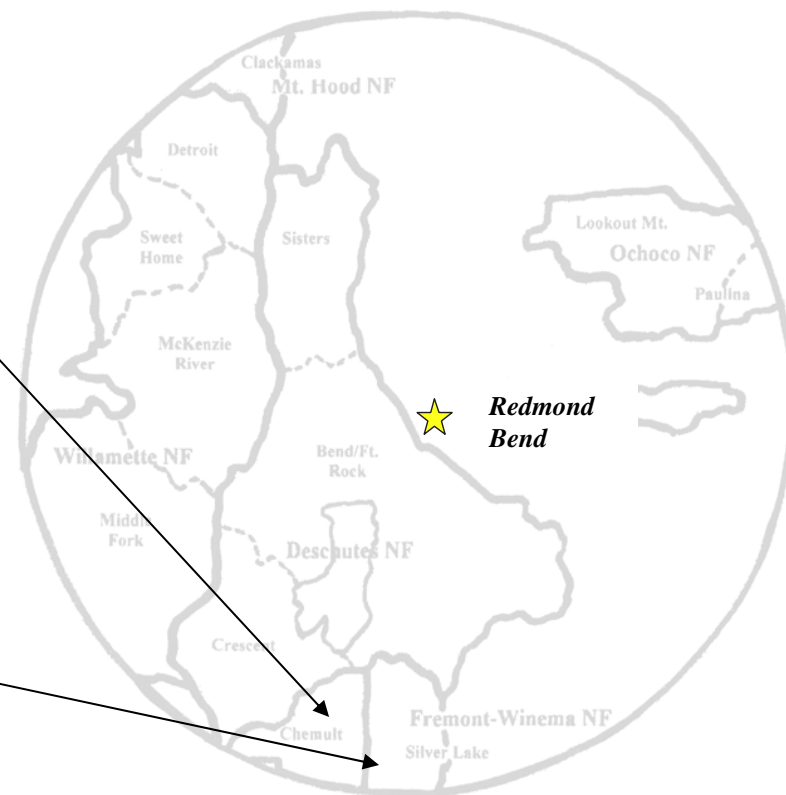
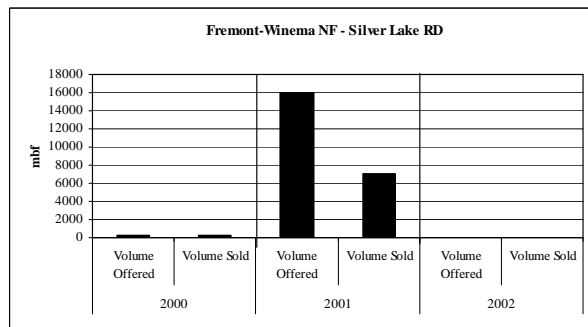
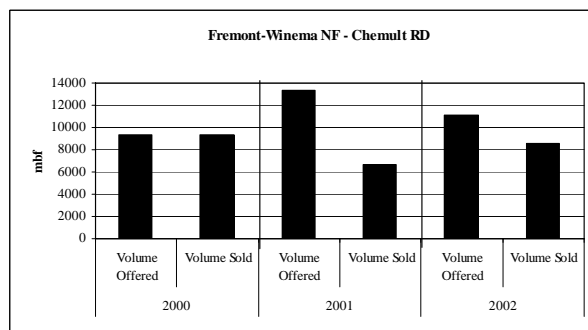
Willamette NF



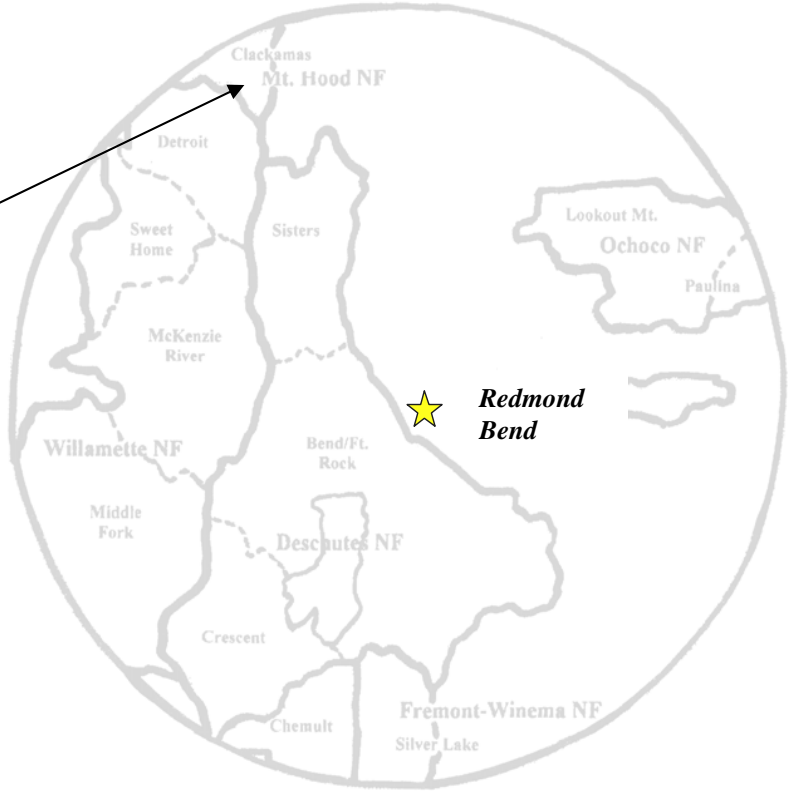
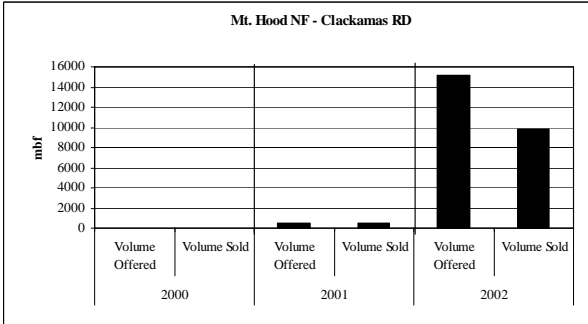
Ochoco NF



Fremont-Winema NF



Mt. Hood NF



Meanwhile, the President's **Healthy Forests Restoration Act** (HFRA), signed into effect in 2003, targeted reducing the risk of catastrophic fire by thinning dense undergrowth and small diameter material in priority locations. Key tenants of the HFRA are to:

1. *Reduce dense undergrowth that fuels catastrophic fires through thinning and prescribed burns;*
2. *Select projects on a collaborative basis involving local, tribal, state, Federal, and non-governmental entities;*
3. *Focus projects on Federal lands that meet strict criteria for risk of wildfire damage to communities, water supply systems and the environment; and*
4. *Encourage biomass energy production through grants and assistance to local communities creating market incentives for removal of otherwise "valueless" forest material.*

The USFS projects that 190 million acres of forest land in the US are to be treated for fuel load reduction (equaling ~ 950 billion board feet); 73 million acres will be on USFS land (with little or no coordination of resource offering occurring).

For the COIC region, the need to change the dynamics of the resource offering *within an investor landscape* in order to achieve forest restoration goals and investor buy-in became clear. The change would need to acknowledge that levelized supply was as important, if not more important, than increased supply. The change would also need to shift thinking within public agency structure from a project basis often at district level, to a larger landscape programmatic basis. **CROP** is then introduced as a recommended new framework for investor landscape level programmatic resource planning.

Summary of Project Results

Based on the 5-year CROP inventory analysis conducted for COIC, the following findings are summarized:

1. Approximately **787 mmbf** of wood resource is projected to be harvested off of **public lands** in the defined investor landscape (80-mile radius from Bend-Redmond area) between 2003-2007. The Willamette and Deschutes National Forests will provide the lion's share of the total 5-five-year volume (see **Exhibit B**). Of the 787 mmbf volume, over 50% is projected to come from logs greater than 12" dbh, with Douglas fir and ponderosa pine comprising the largest percentage of the total 5-year volume offered (30% and 24%, respectively; see **Exhibit B**). Projected volume offerings in the investor landscape for all diameter sizes will increase in 2004 then decline approximately 2% annually from 2005-2007.

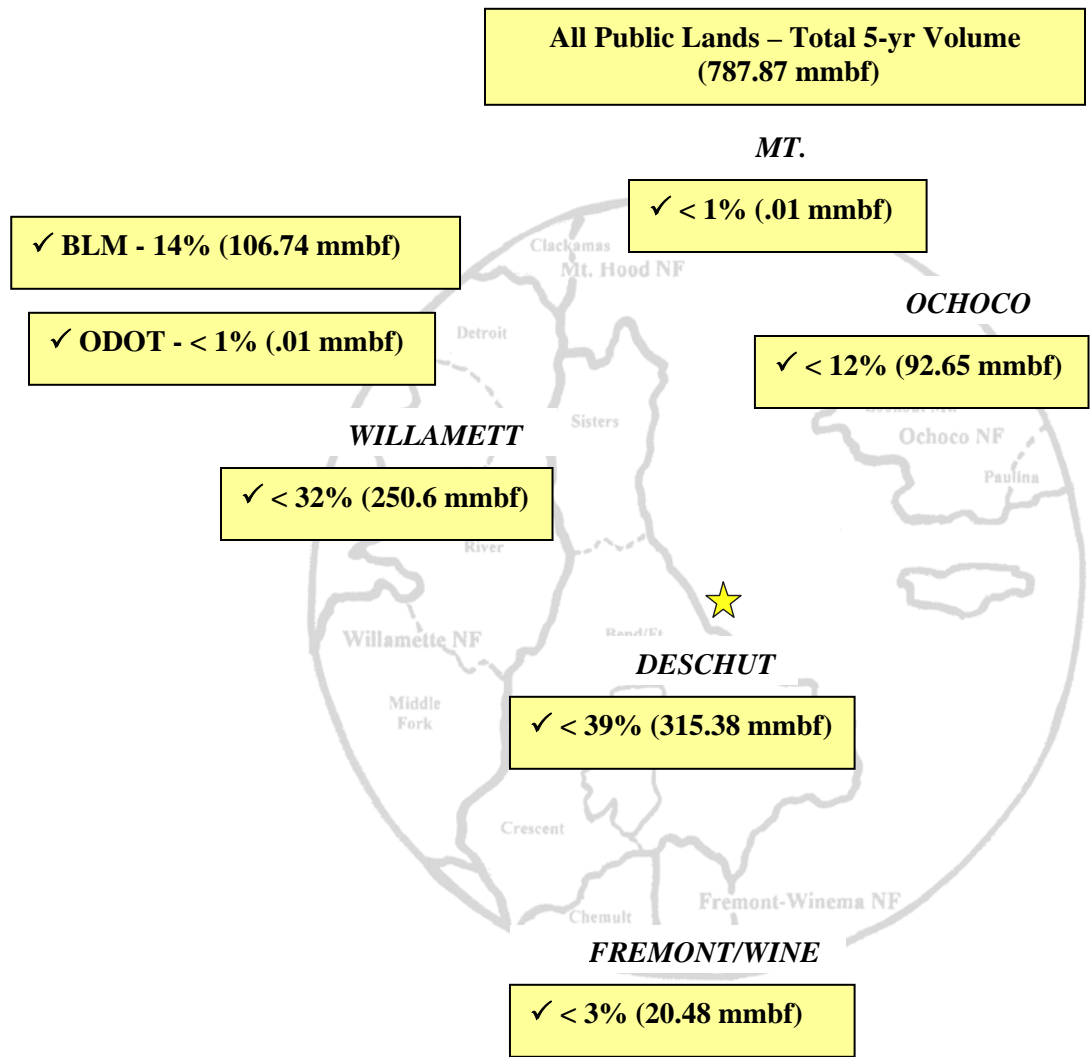
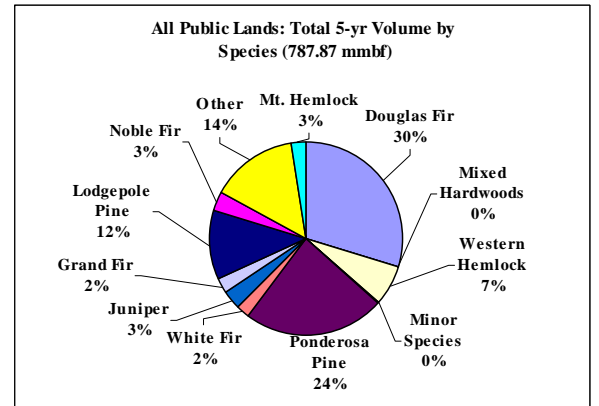
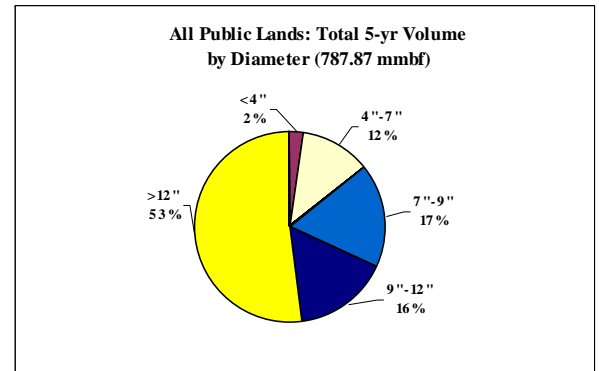
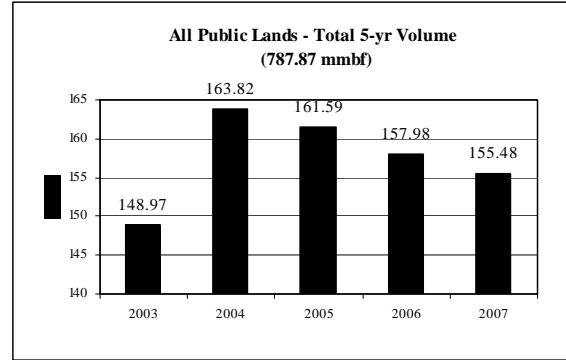


Exhibit B



**Planned 2003-2007 Biomass Removal for BLM and USFS forestlands, and ODOT,
within an 80-mile radius of Bend-Redmond area**

<i>Year</i>	<i>Total Volume (mmbf)</i>	<i>% of 5-year volume (~787 mmbf)</i>
2003	148.97	19 %
2004	163.82	21 %
2005	161.59	21 %
2006	157.98	20 %
2007	155.48	20 %



2. Included under the “**Large Log**” tab of this report are breakouts of >12” volume offering by land manager by year. This separation of analyses and datum results between large log (>12” dbh) and small log (12” dbh and less) is done intentionally in this report as this project is centrally focused on the feasibility of processing the small diameter resource. Nonetheless, it is important to view the full volume offering within an investor landscape.

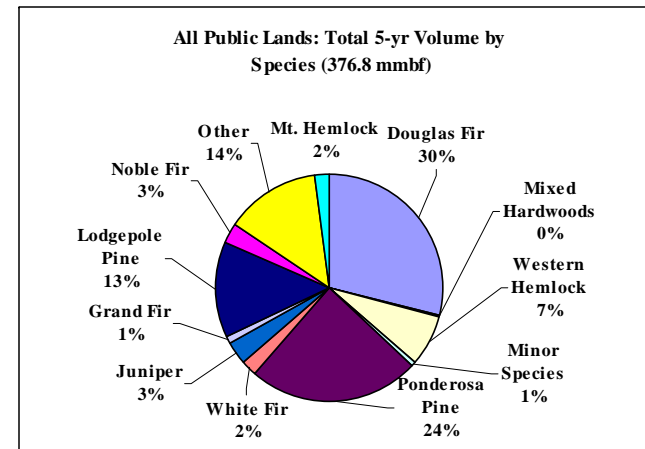
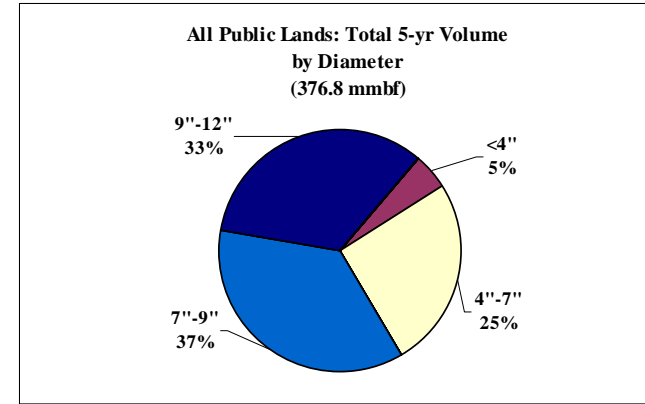
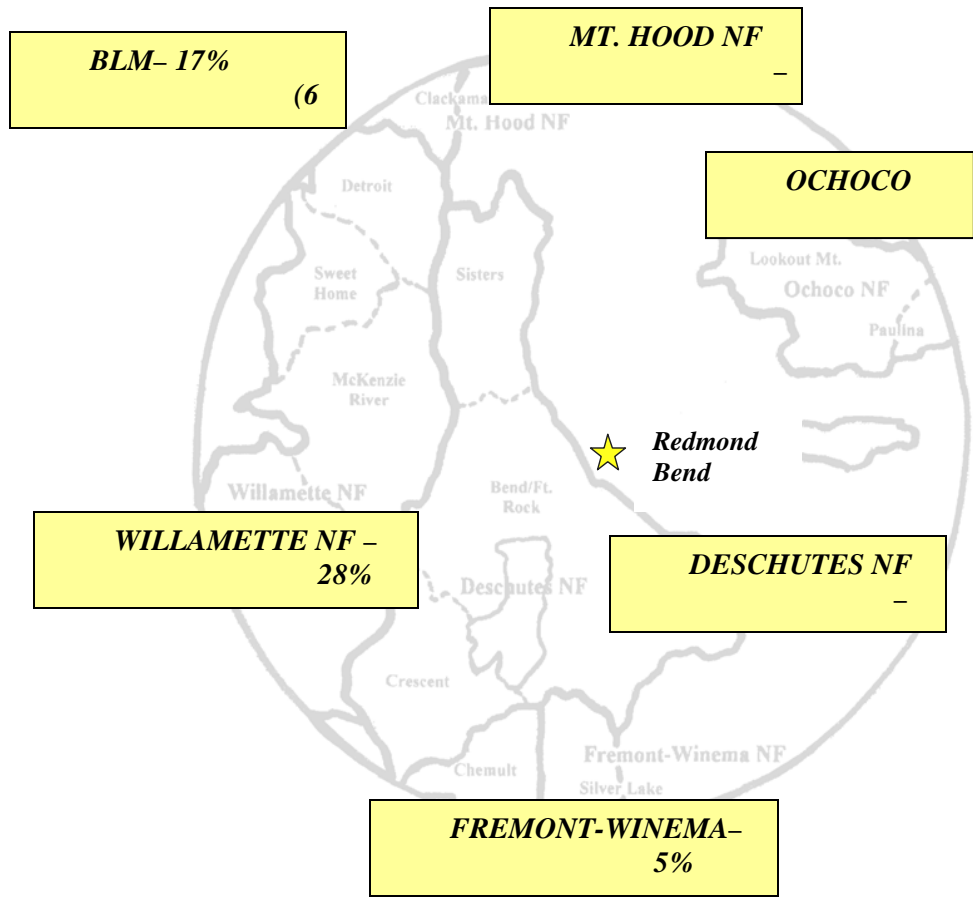
3. A summary of the results of the CROP analyses for the **Small Log volume** projected to be offered during the next five years within the investor landscape are as follows:
 - Approximately **377 mmbf** of small diameter wood resource is projected to be harvested off of **public lands** in the defined investor landscape (80-mile radius from Bend-Redmond area) between 2003-2007.
 - The Deschutes and Willamette National Forests will provide the lion’s share of the total 5-five-year volume: 43% and 28% respectively (see **Exhibit C**).
 - Of the 377 mmbf of small log volume, the largest percentage of logs will be in the 7”-9” dbh size range (37%), followed by 9”-12” (33%), and 4”-7” (25%). Resource <4” dbh will comprise ~ 5% of the total 5-year volume to be offered (see **Exhibit C**). Small log diameter breakouts by species offerings during the next 5 years are reflected in the following chart:

<i>Species</i>	<i>5-Year Volume (mmbf)</i>	<i>% of 5-year total</i>	<i>% 4"-7" (mmbf)</i>	<i>dbh % 7"-9" (mmbf)</i>	<i>% 9"-12" (mmbf)</i>
Douglas fir	109	30	16% (17.3)	31% (33.4)	44% (47.89)
Ponderosa pine	92.1	24	35 (31.9)	38 (34.9)	24 (22.4)
“Other “ Species	51	14	26 (13.49)	37 (19.14)	34 (17.69)
Lodgepole pine	50.8	13	36 (18.39)	40 (20.35)	22 (11.38)
Western Hemlock	27.8	7	25 (7.02)	30 (8.45)	41 (11.49)
Juniper	12	3	0 0	90 (10.75)	1 (.21)
Noble fir	10.7	3	3 (.263)	34 (3.66)	58 (6.21)
White fir	8.5	2	31 (2.67)	31 (2.67)	34 (2.88)
Mt. Hemlock	6.9	2	33 (2.3)	33 (2.3)	33 (2.3)
Grand fir	4.8	1	15 (.72)	20 (.957)	60 (2.87)
Minor Species	2	<1	88 (1.76)	6 (.115)	6 (.124)
Mixed Hardwoods	.35	<1	0	<1 .0004	1 .0034
Totals			(95.85)	(136.73)	(125.45)
			25%	37%	33%

- Douglas fir and ponderosa pine will comprise the largest percentage of the total 5-year volume offered (30% and 24%, respectively);
- And as noted in the datum for all diameter classes, the projected small log volume offerings in the investor landscape peak in 2004, then decline ~ 2%/yr through 2007:

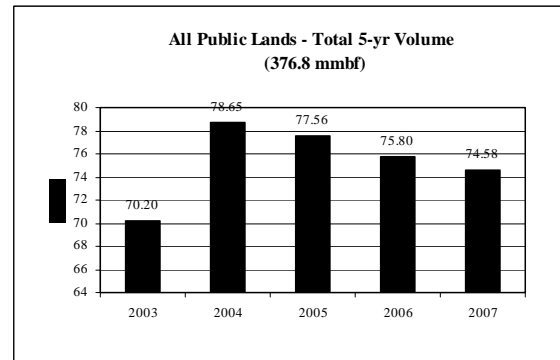
**All Public Lands – Total Small Log 5-yr
Volume (376.8 mmbf)**

Exhibit C



**Planned 2003-2007 *Small Log* Biomass Removal for BLM and USFS Forestlands
within 80-mile radius of Bend-Redmond Area**

<i>Year</i>	<i>Total Volume (mmbf)</i>	<i>% of 5-year volume (~377 mmbf)</i>
2003	70.20	19 %
2004	78.65	21 %
2005	77.56	21 %
2006	75.80	20 %
2007	74.58	20 %



- The table below provides an overview of the most significant small log volume providers in the COIC investor landscape on a per species basis:

**All Public Lands – Total 5-yr Volumes/Species (up to 12” dbh)
(376.8 mmbf)**

Species	5-yr Volume (mmbf)	Largest Resource Providers
Douglas fir	109.4	Willamette = 58% BLM = 33%
<i>Ponderosa pine</i>	92.1	Deschutes = 75% Ochoco = 13%
<i>Lodgepole pine</i>	50.8	Deschutes = 81%
<i>Western Hemlock</i>	27.8	Willamette = 58% BLM = 40%
<i>Noble fir</i>	10.7	Willamette = 100%
<i>Juniper</i>	12.0	BLM = 100%
<i>Mt. Hemlock</i>	6.9	Deschutes = 100%
<i>Grand fir</i>	4.8	Ochoco = 100%
<i>White fir</i>	8.5	Deschutes = 94%
<i>Mixed Hardwoods</i>	0.35	BLM = 100%
Minor Species	1.19	BLM = 100%
“Other”	51.66	Deschutes = 64% Willamette = 42%

4. An additional **361 mmbf/yr** of wood resource may be removed from private industrial and non-industrial forestlands in the investor landscape if future harvest trends match historical ('98-'02) harvest practices (see *Exhibit D*). Over 90% of the total volume will come from private industrial lands, with the remainder coming from private non-industrial lands. (Note: no diameter information from harvest off of private land was available for analysis). Percentage assumptions per county used for determining historical resource harvested in the investor landscape were as follows:

% in investor landscape:	Lake	= 25 %	Lane	= 12.5%
	Crook	= 100%	Linn	= 80 %
	Deschutes	= 100%	Marion	= 50 %
	Klamath	= 25 %	Wheeler	= 20 %
	Jefferson	= 100%	Wasco	= 20 %

5. For both industrial and non-industrial private forestlands (NIPF) in the investor landscape, Douglas fir will comprise the largest percentage of volume offering over the five-year period (59% and 64%, respectively). *Exhibits E and F* show how level the supply offering per species was in the investor landscape from 1998 through 2002. A snapshot of where 60% or more annual volume might come from within the investor landscape based on historical performance is provided in the following chart:

For Private Lands – Where 60% or more annual volume might come from (5-yr historical volume = 1,805 mmbf)

Species	NIPF Lands (~ 8%)	Forest Industry (~92%)
Ponderosa pine (17.5%) <i>5 yr = 313.86 mmbf</i>	•Wheeler •Deschutes •Klamath	•Klamath •Deschutes •Crook
Douglas fir (59.5%) <i>5 yr = 1,073.53 mmbf</i>	•Marion •Linn	•Linn •Lane
White fir (11%) <i>5 yr = 199.7 mmbf</i>	•Linn	•Linn
Lodgepole pine (7%) <i>5 yr = 131.79 mmbf</i>	•Klamath	•Klamath
Hardwoods (2%) <i>5 yr = 41.8 mmbf</i>	•Linn	•Linn
Hemlock/Cedar (2%) <i>5 yr = 44.8 mmbf</i>	•Marion	•Marion

All Private Lands (Industry & Other)
 ('98 - '02 volume = 1,805.6 mmbf or 361 mmbf/yr)

Exhibit D

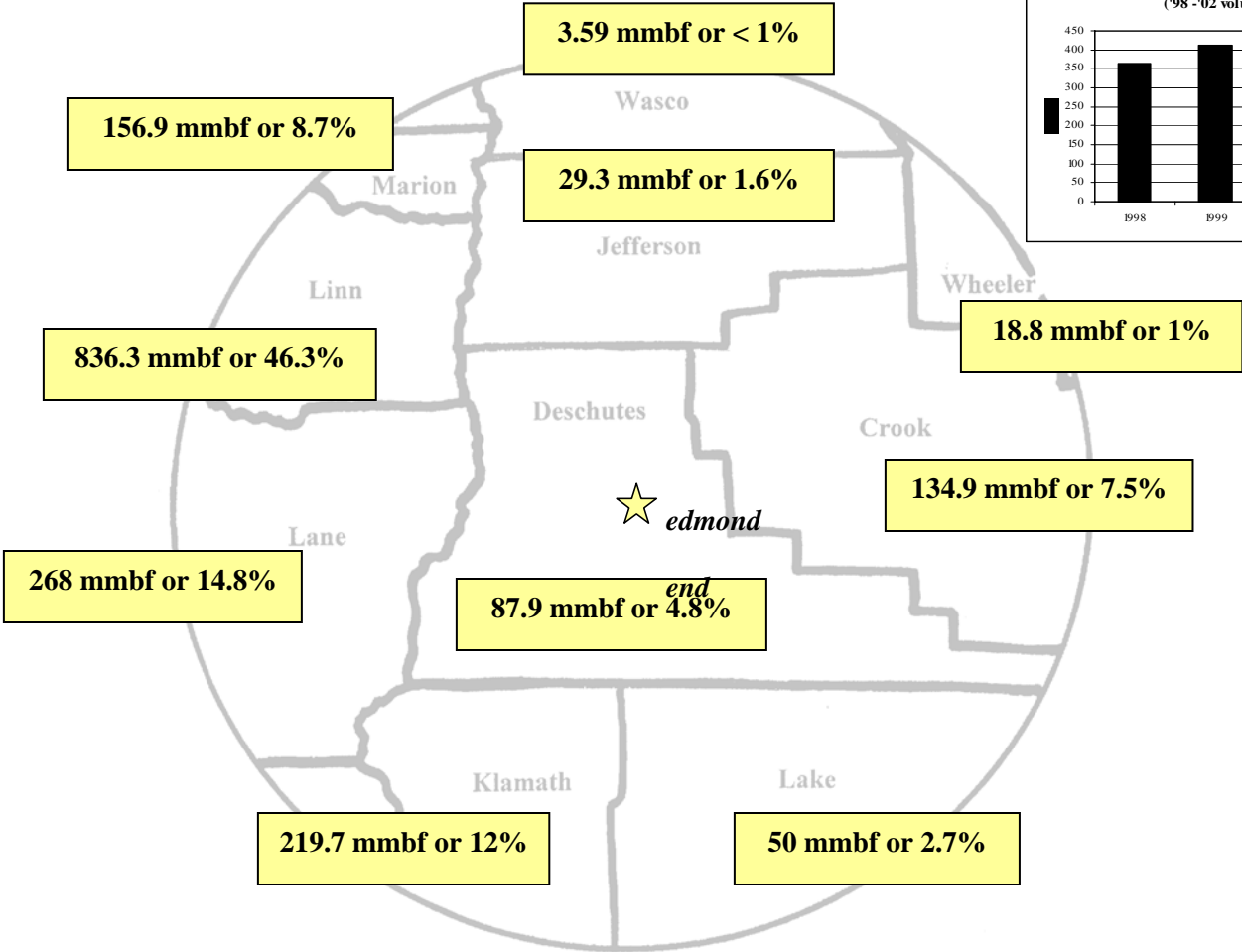
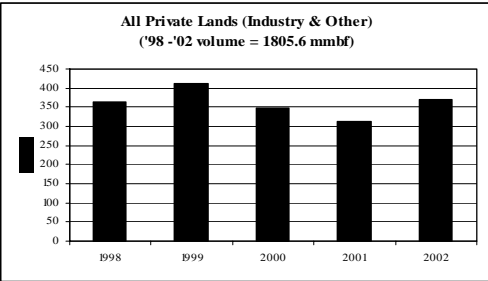


Exhibit E

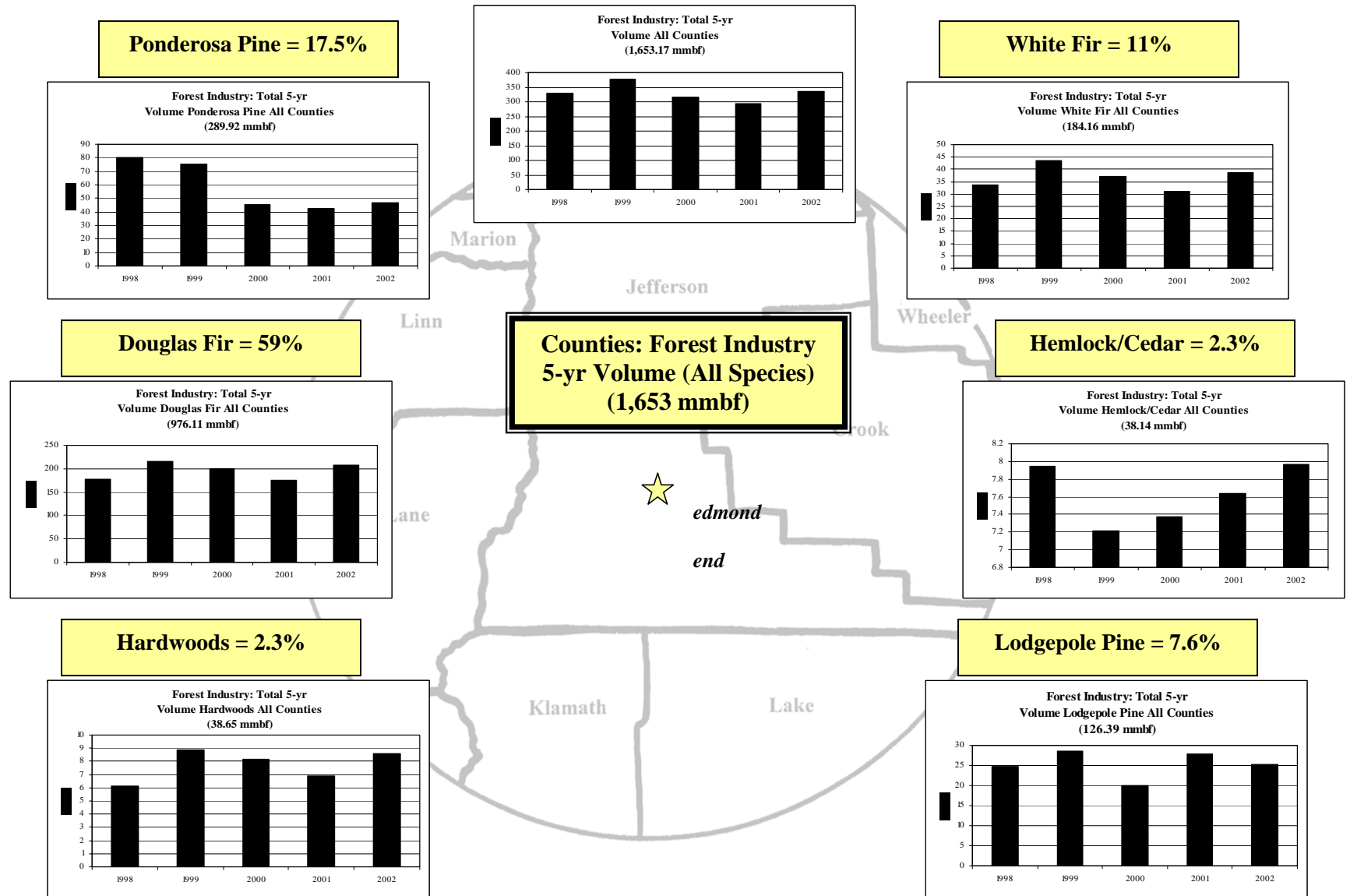
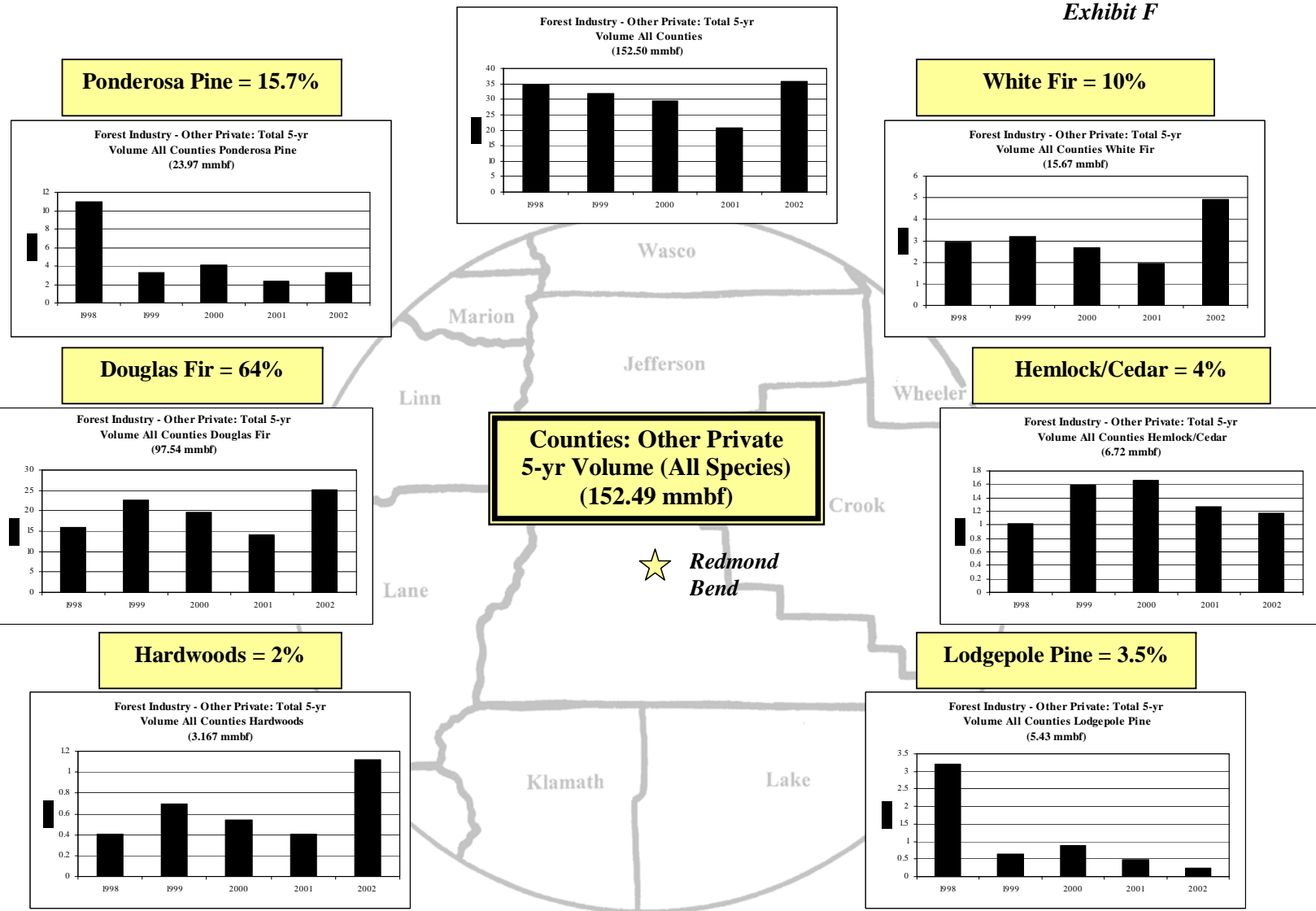
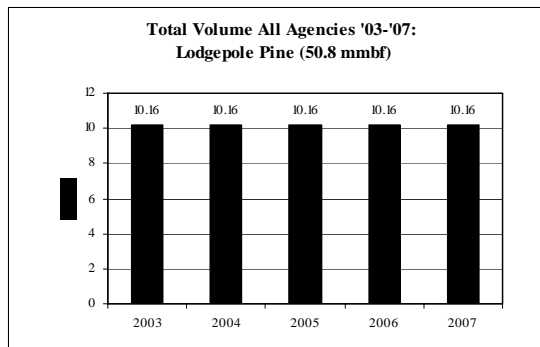
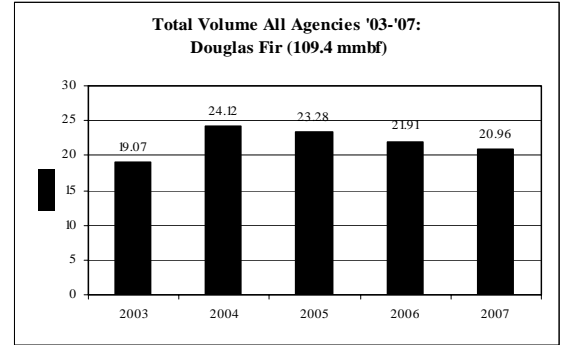
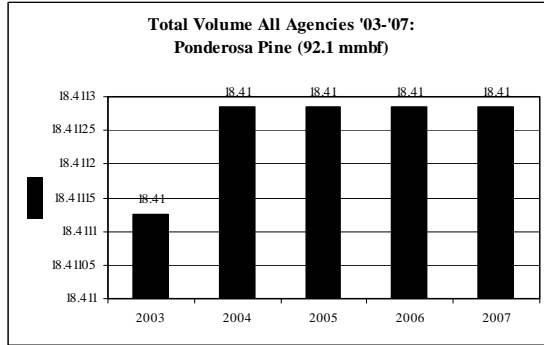


Exhibit F



6. Of the twelve (12) species and species combinations represented in the projected resource offering from public lands within the investor landscape, three (3) species will comprise resource offering in the 4”-12” dbh range that will equal over 60% of the total 5-year volume: **Douglas fir, ponderosa pine, and lodgepole pine**. Douglas fir will comprise 30% of the total volume offering; ponderosa pine 24%; and lodgepole pine 13%. All three key species will be offered at reasonably leveled supplies from year-to-year through 2007:



Detailed Small Log CROP Analysis Results for the COIC Investor

Note: This analysis is intended to be a starting point for continued resource offering coordination and monitoring through the CROP program. The value of CROP is not only the ability to quickly “see” within an ecological and investor landscape what is projected for removal, but to utilize a defined framework and protocol to continually update planned removal information over time between public-public and public-private land managers. As CROP becomes more of a standard resource offering protocol within the COIC region, it is anticipated that public agencies will know what to expect with respect to data submittal and reporting.

For this initial CROP effort, Mater Engineering analyzed the following for years 2003-2007:

- **How levelized** is the proposed resource offering over the planning period (5 years) within the COIC investor landscape?
- What is the **comparative credibility** of each key resource provider regarding projected removal volume?
- What are the **associated risks** and mitigating factors regarding the projected removal volume?

How Levelized?

Almost 70 **Resource Offering Maps (ROMs)** for each **small log** investor landscape species are provided under separate tab of this report.

Summarizing, the ROMs illustrate the following:

Douglas fir: (See Douglas fir ROM #1 attached)

- Will be offered by **13 public agencies** in the investor landscape in the next five years;
- Ranger districts within the **Willamette** National Forest and BLM districts will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **109 mmbf**;
- **75%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A relatively **levelized** supply will be offered from year to year (~ **22 mmbf/yr.**)

Ponderosa pine: (See ponderosa pine ROM #1 attached)

- Will be offered by **8 public agencies** in the investor landscape in the next five years;
- Ranger districts within the **Deschutes** National Forest will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **92 mmbf**;
- **62%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from year to year (~ **18 mmbf/yr.**)

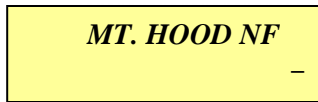
“Other”: (See other ROM #1 attached)

- Will be offered by **9 public agencies** in the investor landscape in the next five years;
- Ranger districts within the **Deschutes** National Forest will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **51 mmbf**;
- **71%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from year to year (~ **10 mmbf/yr.**)

**Douglas Fir CROP offering '03 - '07
(~109 mmbf)**



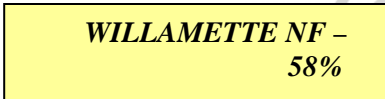
MT. HOOD NF



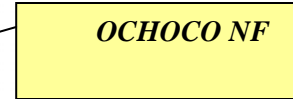
**BLM: Total all Districts - 33%
(36.5 mmbf)**



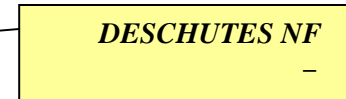
**WILLAMETTE NF -
58%**



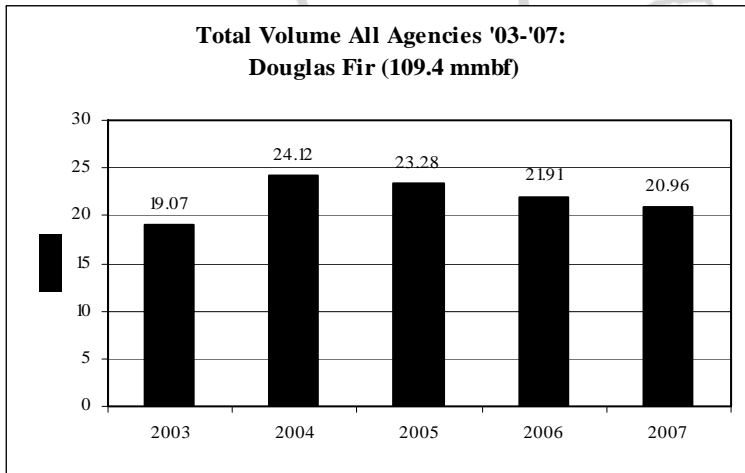
OCHOCO NF



DESCHUTES NF



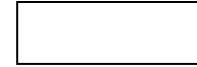
**Total Volume All Agencies '03-'07:
Douglas Fir (109.4 mmbf)**



By diameter:

- 10% = <4" 10.67 (mmbf)
- 15% = 4" - 7" 17.34 (mmbf)
- 31% = >7"-9" 33.44 (mmbf)
- 44% = >9"-12" 47.89 (mmbf)

***Ponderosa Pine CROP offering '03 - '07
(92.1 mmbf)***



DESCHUTES NF
-

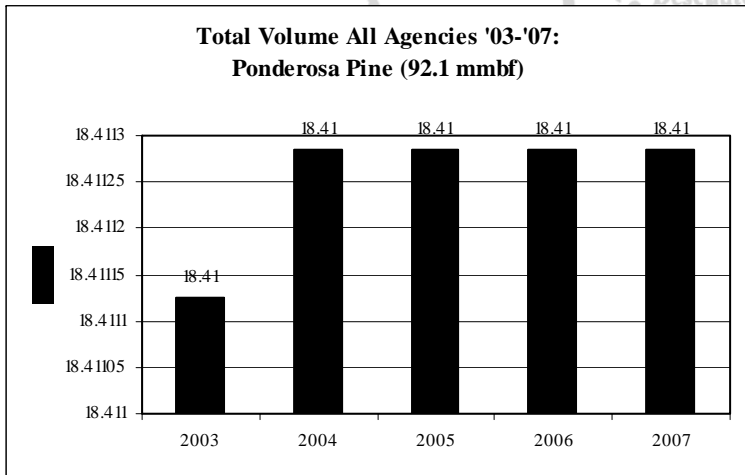
***BLM: PRINEVILLE
DIST.***

OCHOCO NF

By diameter:

- 3% = <4" 2.84 (mmbf)
- 35% = 4" - 7" 31.9 (mmbf)
- 38% = >7" - 9" 34.9 (mmbf)
- 24% = >9" - 12" 22.4 (mmbf)

FREMONT-WINEMA NF
- 12%



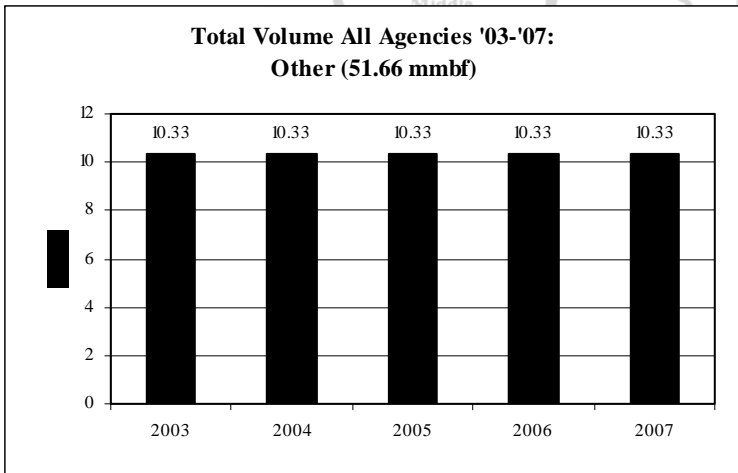
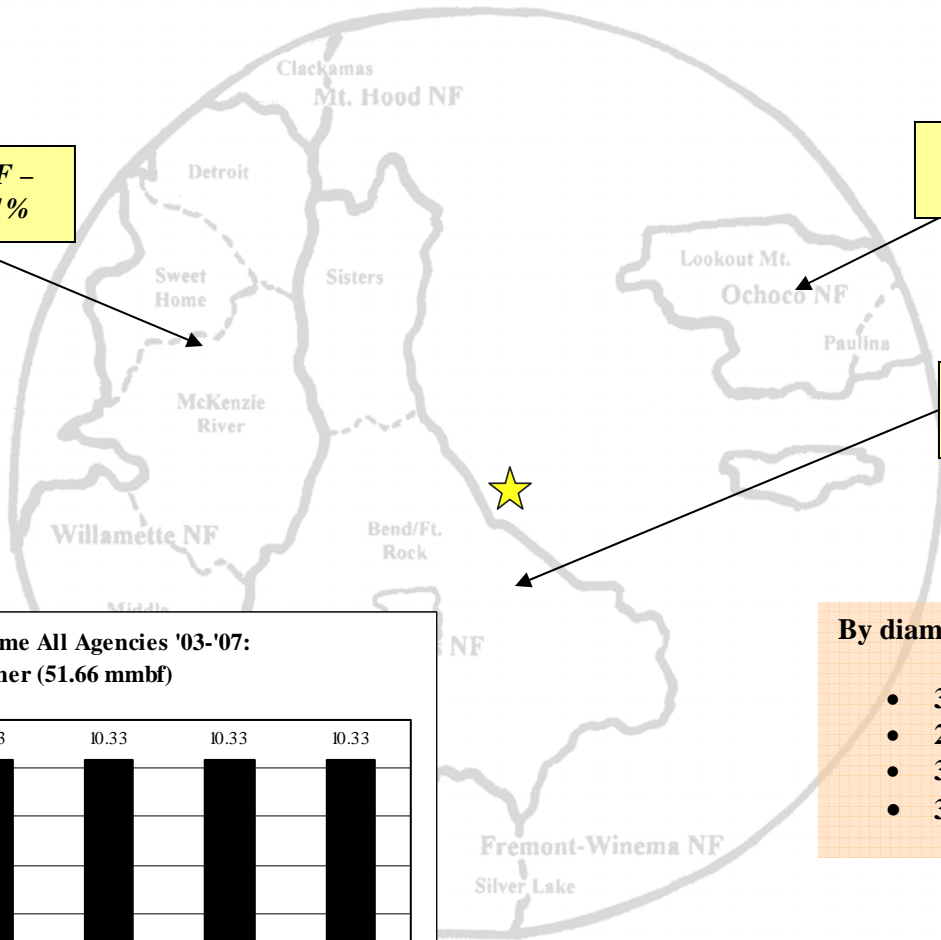
**Other CROP offering '03 - '07
(~51 mmbf)**



**WILLAMETTE NF -
31%**

OCHOCO NF

**DESCHUTES NF
-**



- By diameter:**
- 3% = <4" 1.31 (mmbf)
 - 26% = 4" - 7" 13.49 (mmbf)
 - 37% = >7" - 9" 19.14 (mmbf)
 - 34% = >9" - 12" 17.69 (mmbf)

Lodgepole pine: (See lodgepole pine ROM #1 attached)

- Will be offered by **5 public agencies** in the investor landscape in the next five years;
- Ranger districts in the *Deschutes* National Forest will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **51 mmbf**;
- **62%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A relatively **levelized** supply will be offered from year to year (~ **10 mmbf/yr.**)

Western Hemlock (See western hemlock ROM #1 attached)

- Will be offered by **6 public agencies** in the investor landscape in the next five years;
- The ranger districts of the *Willamette* National Forest and BLM districts will provide almost 100% of the projected 5-year volume;
- The projected 5-year volume will equal **28 mmbf**;
- **71%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **non-levelized** declining supply will be offered from year to year.

Juniper: (See juniper ROM #1 attached)

- Will be offered by **2 public agencies** in the investor landscape in the next five years;
- The Lakeview BLM District will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **12 mmbf**;
- **91%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from year to year (~ **2.9 mmbf/yr.**)

Noble fir: (See noble fir ROM #1 attached)

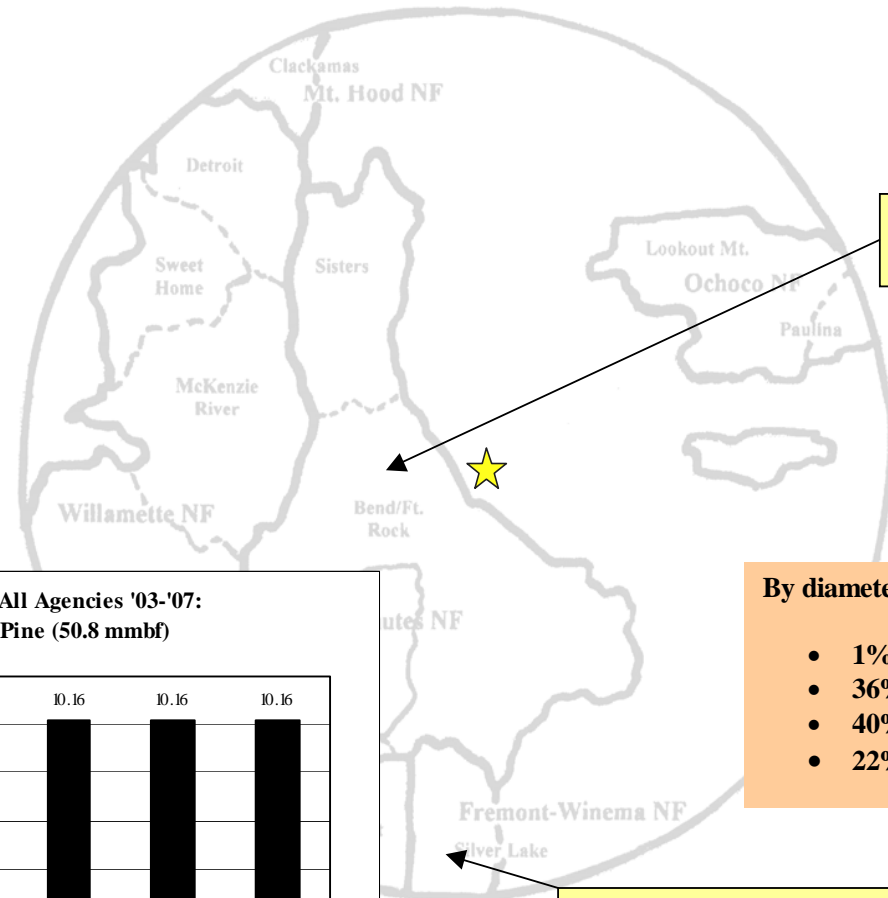
- Will be offered by **4 public agencies** in the investor landscape in the next five years;
- Ranger districts within the *Willamette* National Forest will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **10.7 mmbf**;
- **92%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from year to year (~ **2 mmbf/yr.**)

White fir: (See white fir ROM #1 attached)

- Will be offered by **4 public agencies** in the investor landscape in the next five years;
- Ranger districts in the *Deschutes* National Forest will provide over 60% of the projected 5-year volume;
- The projected 5-year volume will equal **8.5 mmbf**;
- **65%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- Save for 2003, a **levelized** supply will be offered from year to year (~ **1.6 mmbf/yr.**)

**Lodgepole Pine CROP offering '03 - '07
(50.8 mmbf)**

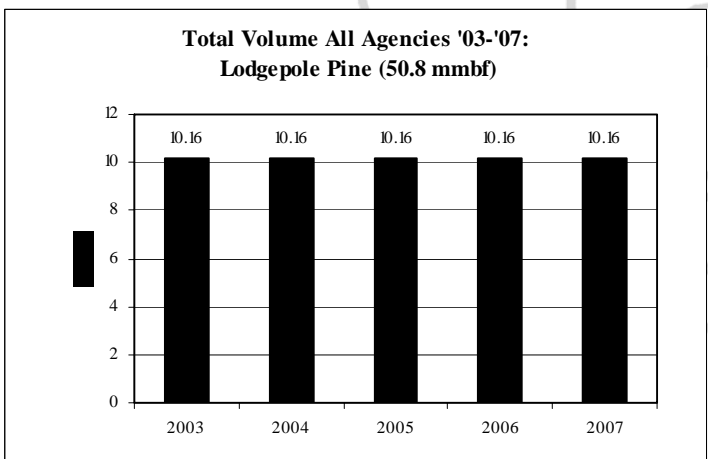
ROM # 1



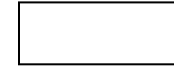
**Deschutes NF - 81%
(41.0 mmbf)**

- By diameter:**
- 1% = <4" .678 (mmbf)
 - 36% = 4" - 7" 18.39 (mmbf)
 - 40% = >7" - 9" 20.35 (mmbf)
 - 22% = >9" - 12" 11.38 (mmbf)

**Fremont-Winema NF - 19%
(9.8 mmbf)**



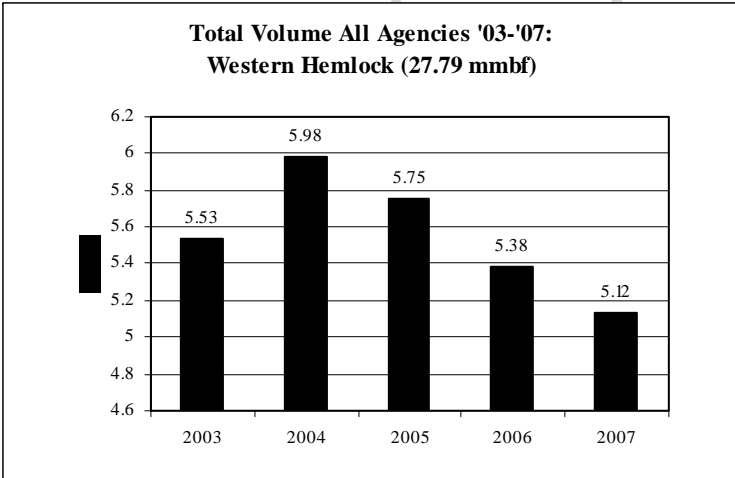
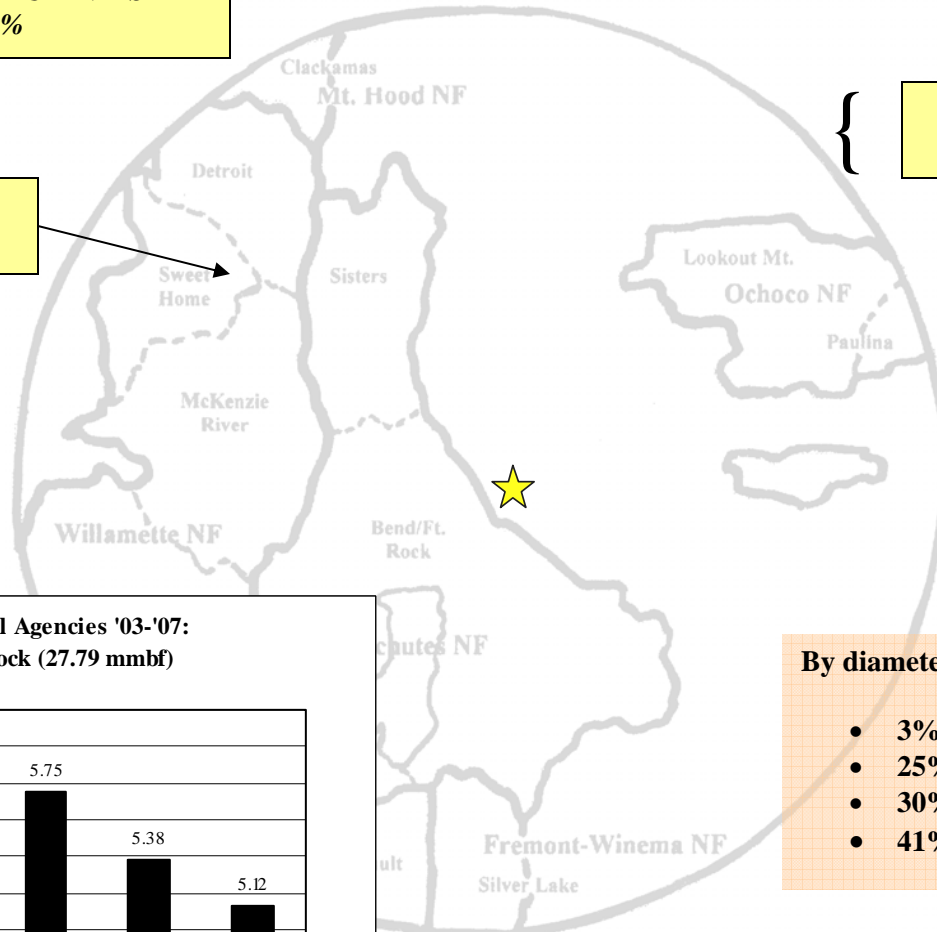
**Western Hemlock CROP offering '03 - '07
(27.8 mmbf)**



**MT. HOOD NF: CLACKAMAS RD
- 3%**

**WILLAMETTE NF -
58%**

**BLM: SALEM DIST.
- 40%**



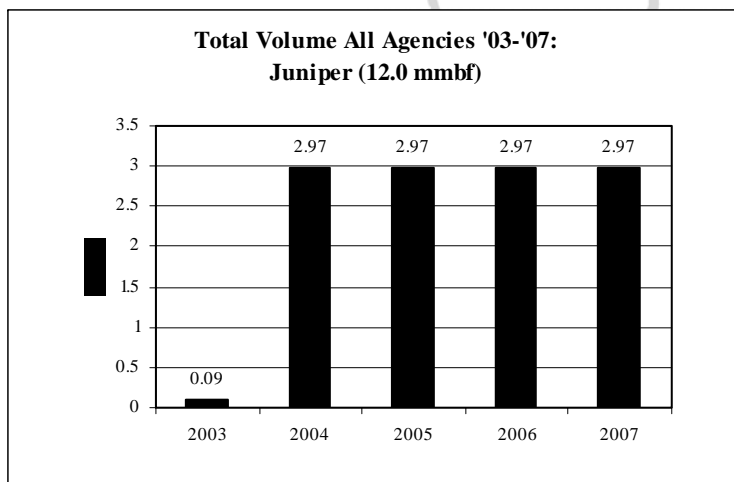
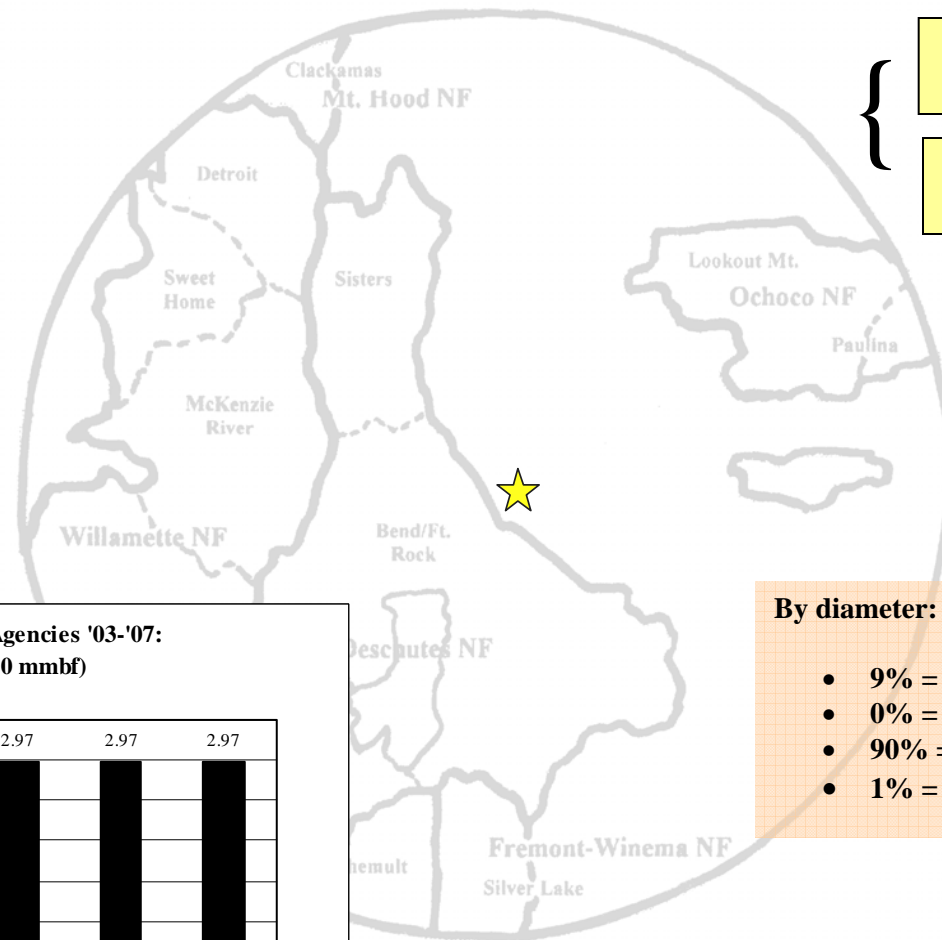
- By diameter:**
- 3% = <4" .837 (mmbf)
 - 25% = 4" - 7" 7.02 (mmbf)
 - 30% = >7" - 9" 8.45 (mmbf)
 - 41% = >9" - 12" 11.49 (mmbf)

***Juniper* CROP offering '03 - '07
(12.0 mmbf)**



**BLM: PRINEVILLE
DIST. -**

**BLM: LAKEVIEW
DIST. -**

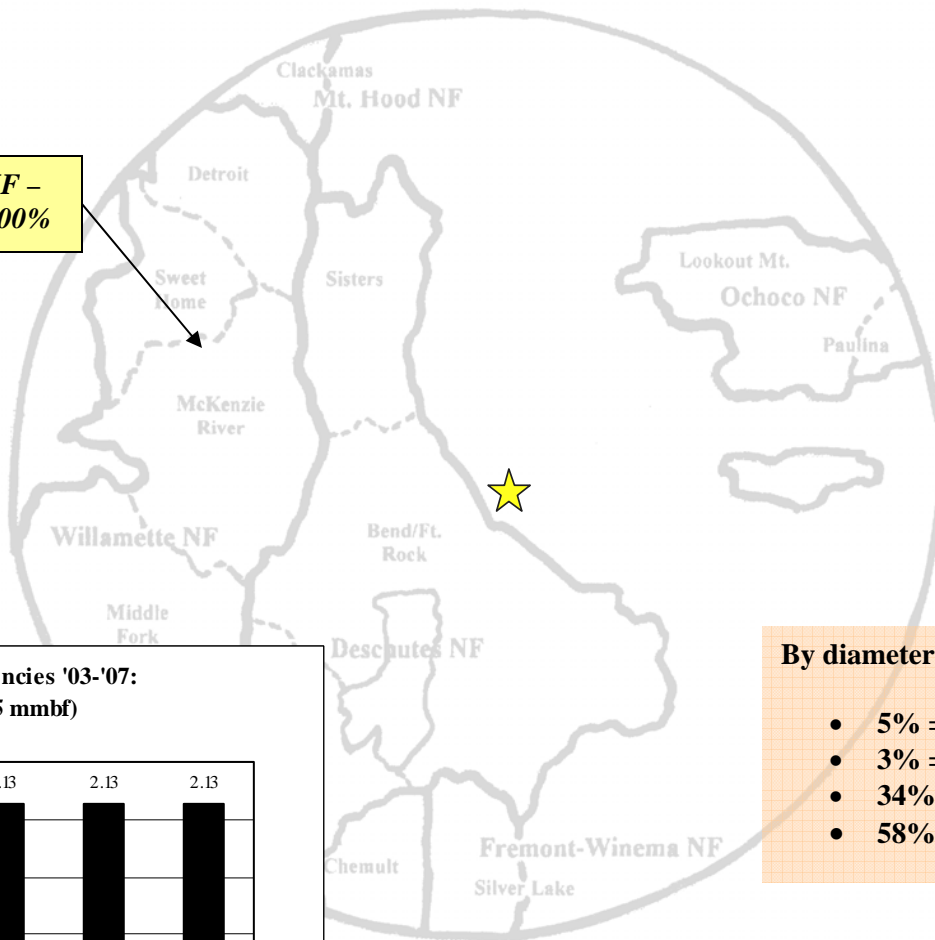


- By diameter:**
- 9% = <4" 1.04 (mmbf)
 - 0% = 4" - 7" 0 (mmbf)
 - 90% = 7" - 9" 10.75 (mmbf)
 - 1% = 9" - 12" .21 (mmbf)

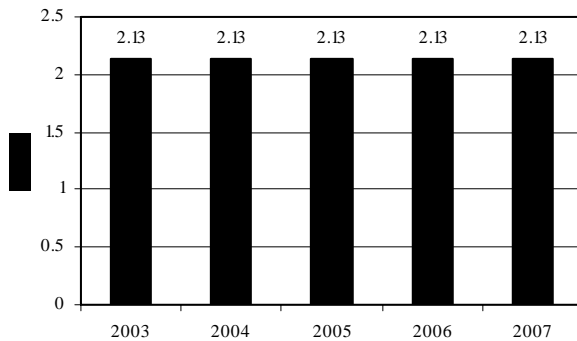
**Noble Fir CROP offering '03 - '07
(10.7 mmbf)**



**WILLAMETTE NF -
100%**



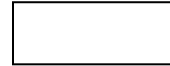
**Total Volume All Agencies '03-'07:
Noble Fir (10.65 mmbf)**



By diameter:

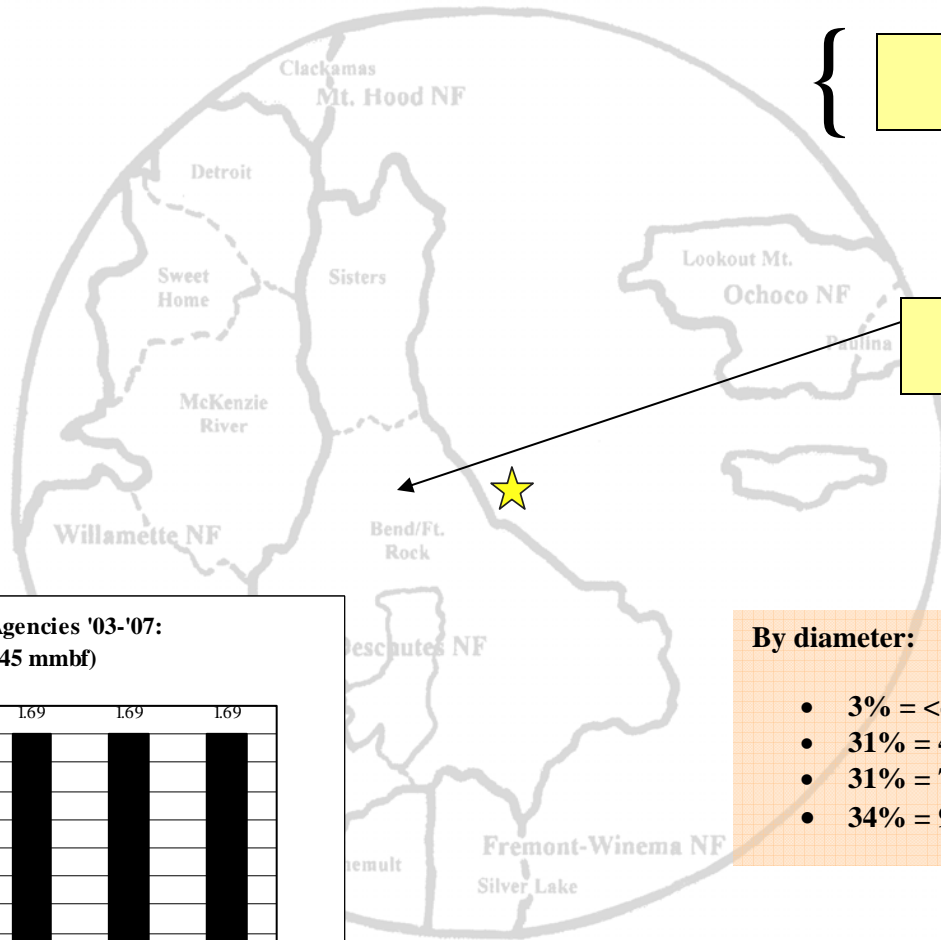
- 5% = <4" .525 (mmbf)
- 3% = 4" - 7" .263 (mmbf)
- 34% = 7" - 9" 3.66 (mmbf)
- 58% = 9" - 12" 6.21 (mmbf)

**White Fir CROP offering '03 - '07
(8.5 mmbf)**

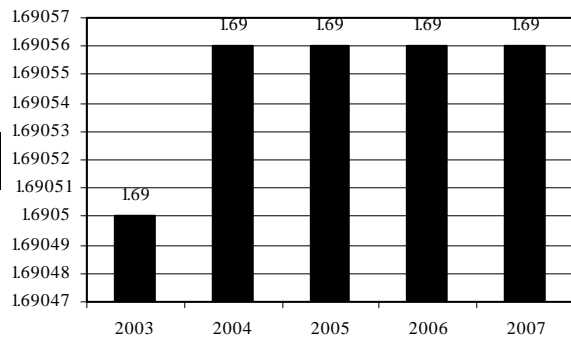


**BLM: PRINEVILLE
DIST. -**

**DESCHUTES NF
-**



**Total Volume All Agencies '03-'07:
White Fir (8.45 mmbf)**



By diameter:

- 3% = <4" .24 (mmbf)
- 31% = 4" - 7" 2.67 (mmbf)
- 31% = 7" - 9" 2.67 (mmbf)
- 34% = 9" - 12" 2.88 (mmbf)

Mt. Hemlock: (See Mt. hemlock ROM #1 attached)

- Will be offered by **3 public agencies** in the investor landscape in the next five years;
- Ranger districts in the *Deschutes* National Forest will provide 100% of the projected 5-year volume;
- The projected 5-year volume will equal **6.9 mmbf**;
- **66%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from year to year (~ **1.3 mmbf/yr.**)

Grand fir: (See grand fir ROM #1 attached)

- Will be offered by **2 public agencies** in the investor landscape in the next five years;
- Ranger districts in the *Ochoco* National Forest will provide 100% of the projected 5-year volume;
- The projected 5-year volume will equal **4.8 mmbf**;
- **80%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from year to year (~**.95 mmbf/yr.**)

Minor species: (See minor species ROM #1 attached)

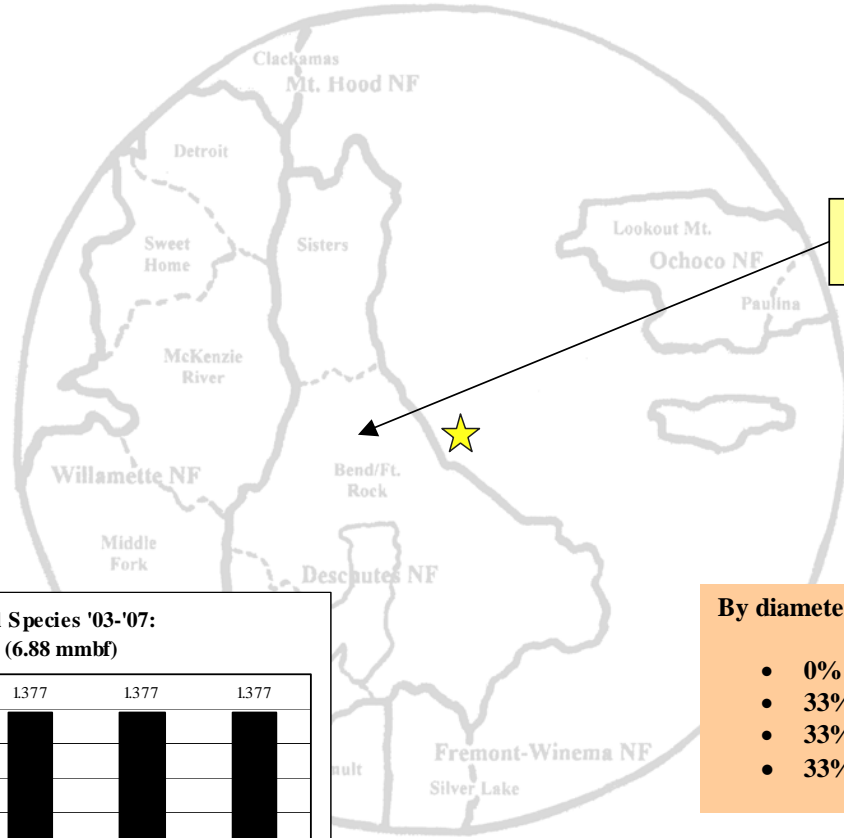
- Will be offered by **1 public agency** in the investor landscape in the next five years;
- The Salem District of the BLM will provide 100% of the projected 5-year volume;
- The projected 5-year volume will equal **2 mmbf**;
- **12%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **non-levelized** declining supply will be offered from '04 - '07.

Mixed hardwoods: (See mixed hardwoods ROM #1 attached)

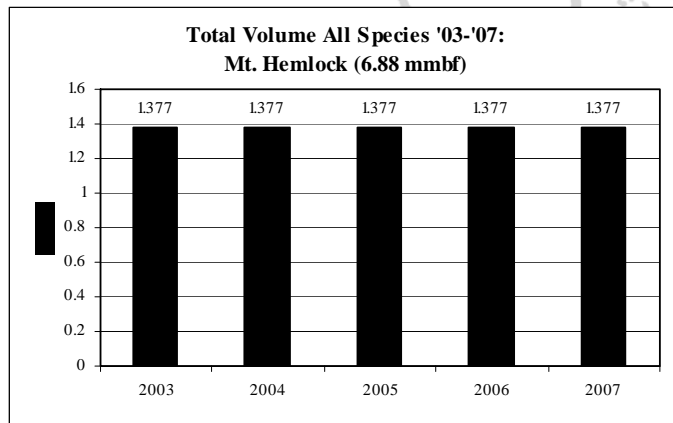
- Will be offered by **1 public agency** in the investor landscape in the next five years;
- The Eugene District of the BLM will provide 100% of the projected 5-year volume;
- The projected 5-year volume will equal **.35 mmbf**;
- **~1%** of the projected volume will be comprised of **7"-12" dbh** wood resource; and
- A **levelized** supply will be offered from '04-'07 (~ **.07 mmbf/yr.**)

**Mt. Hemlock CROP offering '03 – '07
(6.9 mmbf)**

ROM # 1



**Deschutes NF – 100%
(6.9 mmbf)**

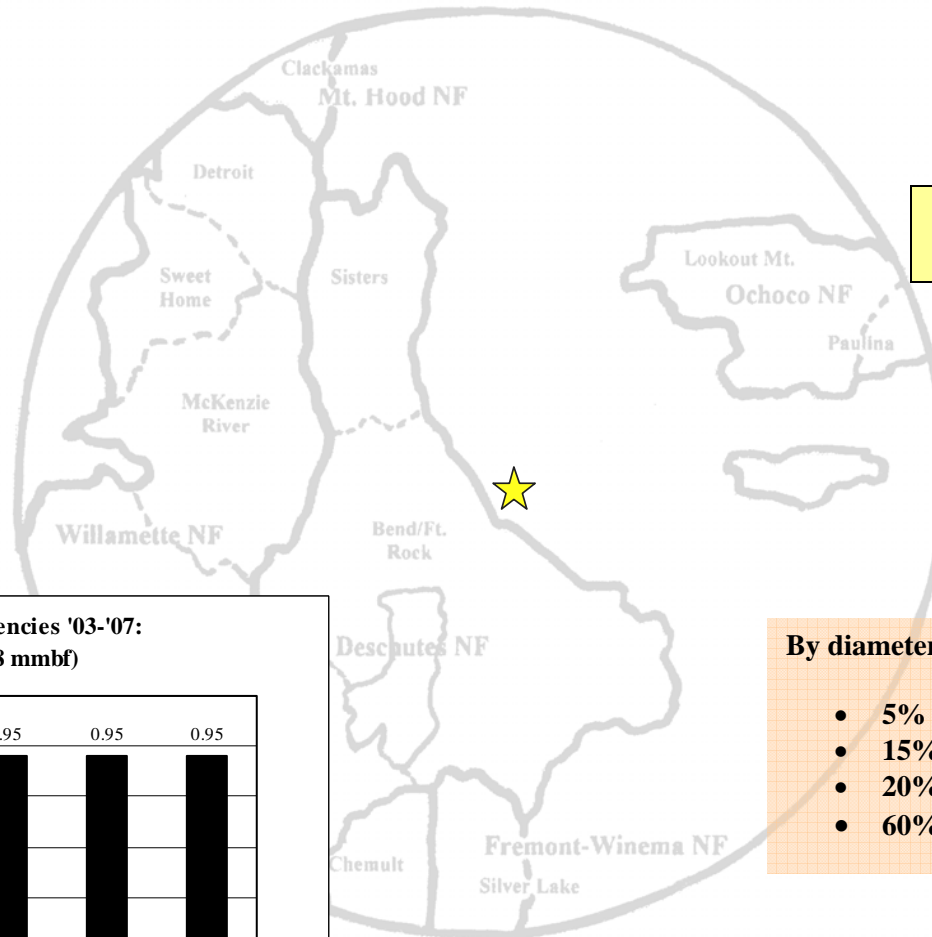


By diameter:

- 0% = <4" 0 (mmbf)
- 33% = 4" – 7" 2.30 (mmbf)
- 33% = >7" – 9" 2.30 (mmbf)
- 33% = >9" – 12" 2.30 (mmbf)

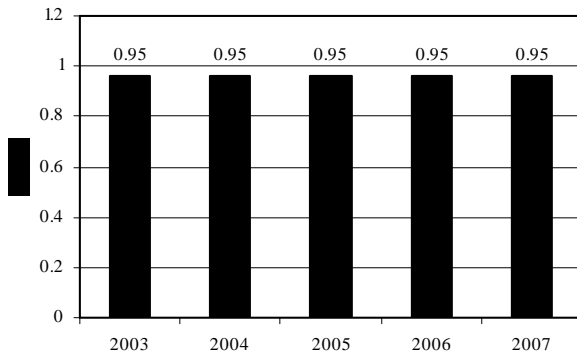
***Grand Fir* CROP offering '03 - '07
(4.8 mmbf)**

ROM # 1



***OCHOCO NF -
10***

**Total Volume All Agencies '03-'07:
Grand Fir (4.78 mmbf)**



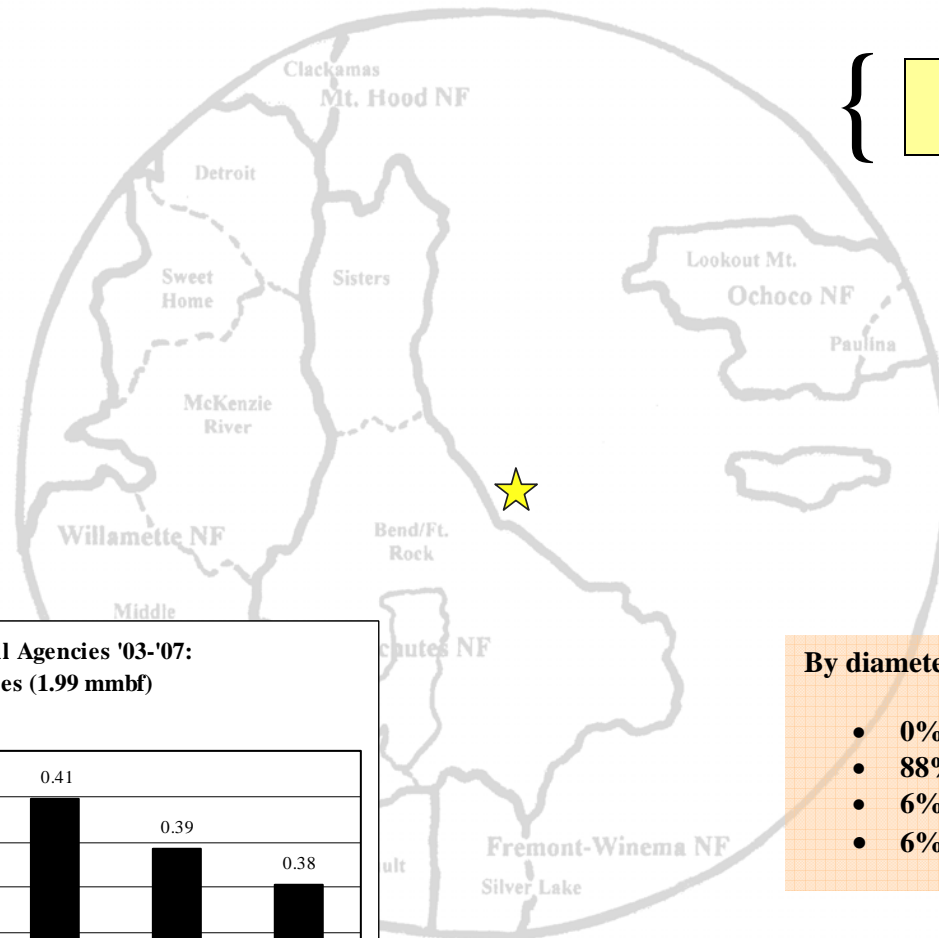
By diameter:

- 5% = <4" .24 (mmbf)
- 15% = 4" - 7" .72 (mmbf)
- 20% = >7" - 9" .957(mmbf)
- 60% = >9" - 12" 2.87 (mmbf)

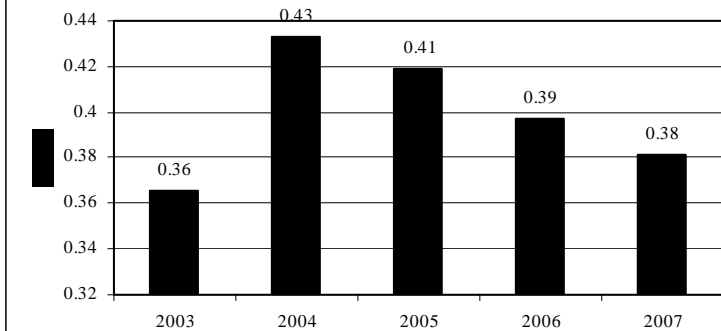
**Minor Species CROP offering '03 - '07
(2.0 mmbf)**

ROM # 1

BLM: SALEM DIST.



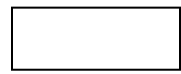
**Total Volume All Agencies '03-'07:
Minor Species (1.99 mmbf)**



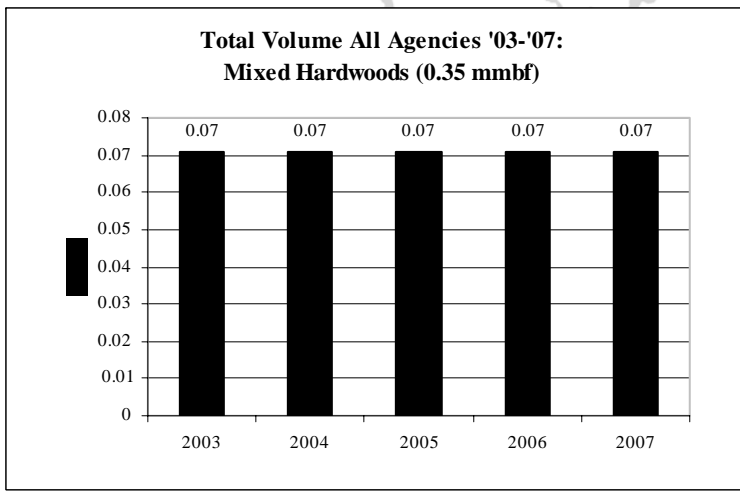
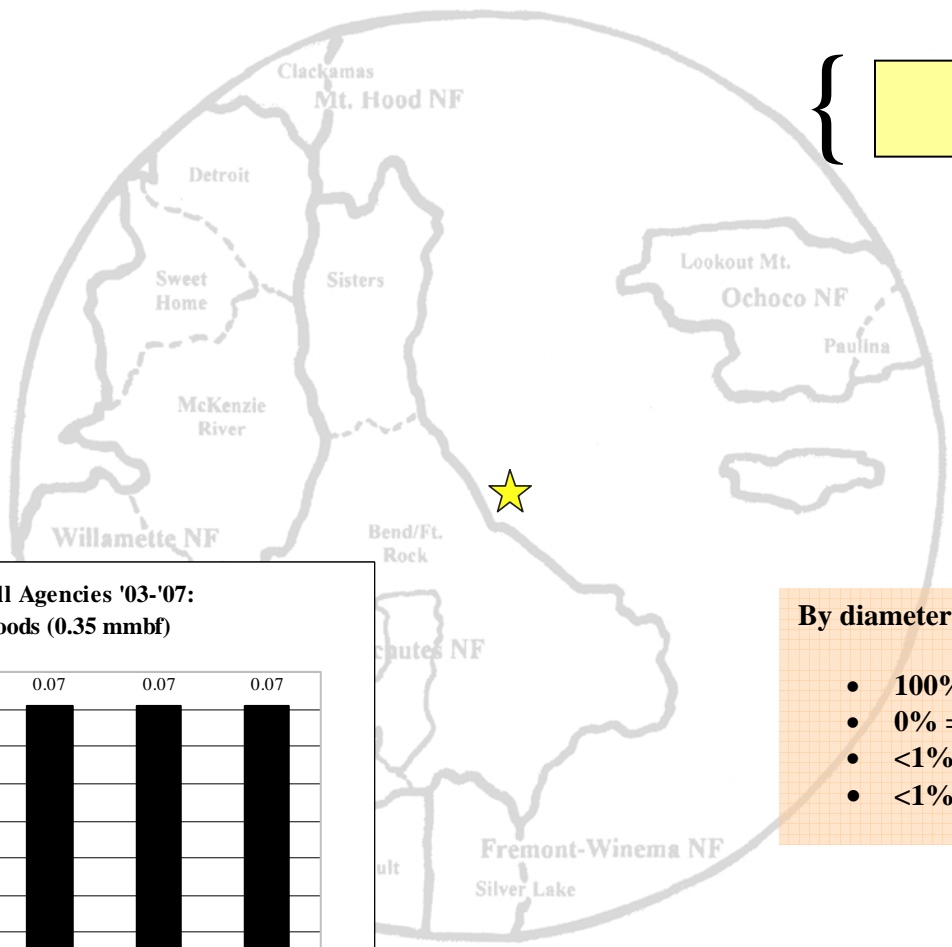
By diameter:

- 0% = <4" 0 (mmbf)
- 88% = 4" - 7" 1.76 (mmbf)
- 6% = >7" - 9" .115 (mmbf)
- 6% = >9" - 12" .124 (mmbf)

***Mixed Hardwoods* CROP offering '03 – '07
(0.35 mmbf)**



**BLM: EUGENE DIST. –
100%**



By diameter:

- 100% = <4" .35 (mmbf)
- 0% = 4" – 7" 0 (mmbf)
- <1% = >7" – 9" .0004 (mmbf)
- <1% = >9" – 12" .0034 (mmbf)

What is the comparative credibility of the projected volume removal based on historical performance?

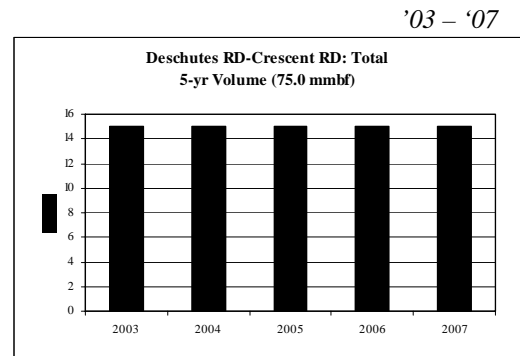
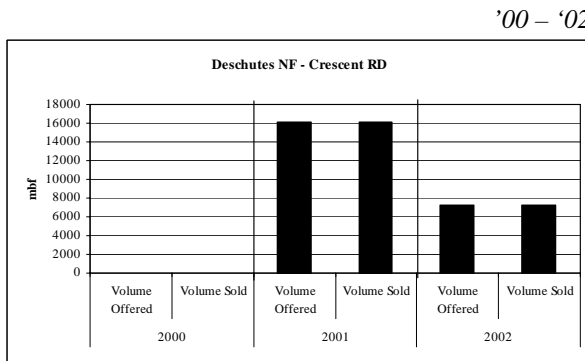
Whether we like it or not, investors will compare historical performance to projected performance and determine a credibility factor for each region. Mater Engineering was able to evaluate historical performances matched to projected removals of the USFS ranger districts encompassed within the COIC investor landscape. With the possible exceptions of the Chemult Ranger District (Fremont-Winema NF) and Bend/Fort Rock Ranger District (Deschutes NF), planned removals through 2007 for all other ranger districts will change pattern to a more consistent, stabilized resource offering compared with historical practices. Investors will want to be reasonably assured that a ranger district can follow through on planned removals in spite of past performance that may show sporadic, widely-varied resource offering over time.

Specific comparative credibility datum for annual removal of all species and all diameter sizes within each ranger district in the COIC investor landscape are as follows:

Deschutes NF: (*Bend/Fort Rock, Sisters, and Crescent RDs*):

- ✓ 2000-2002 sales volume: 287.7 mmbf
- ✓ 2003-2007 planned removal: 315.3 mmbf

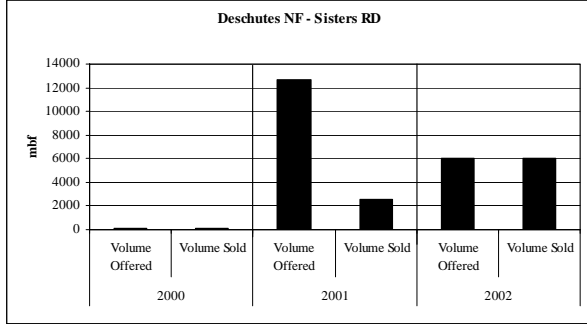
Crescent RD: * Consistent performance in sales vs offered: ↑
 * Consistent year-to-year offerings: ↓



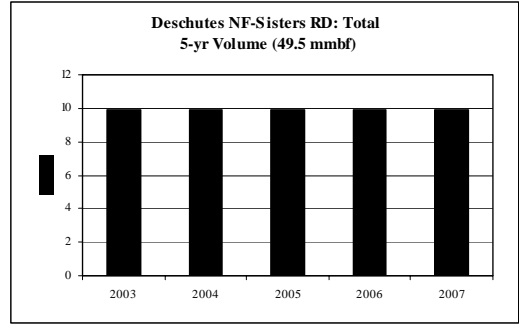
Sisters RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓

'00 – '02



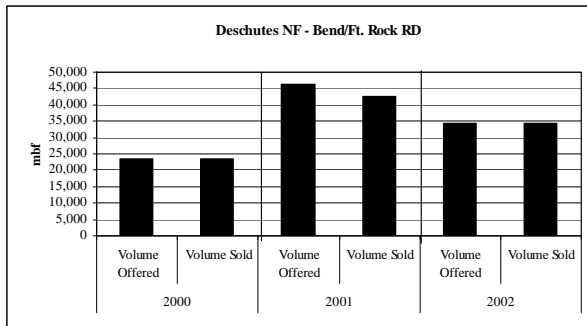
'03 – '07



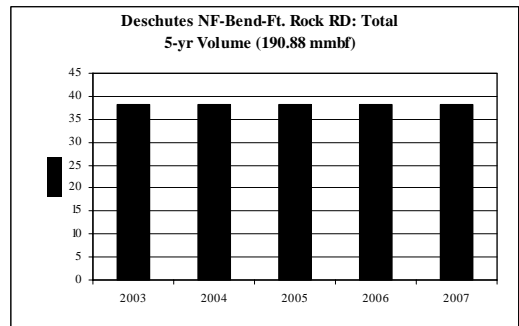
Bend/Fort Rock RD: * Consistent performance in sales vs offered: ↑

* Consistent year-to-year offerings: ↑

'00 – '02



'03 – '07



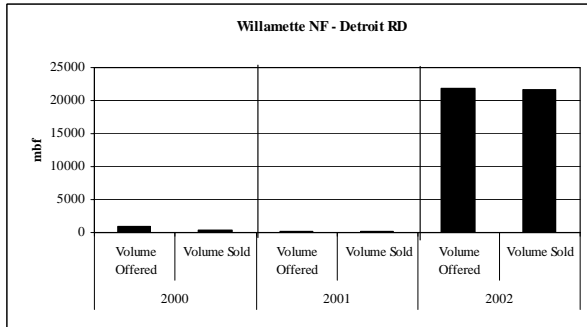
Willamette NF: (*Detroit, Sweet Home, McKenzie, Middle Fork RDs*):

- ✓ 2000-2002 sales volume: 128.5mmbf
- ✓ 2003-2007 planned removal: 253.1 mmbf

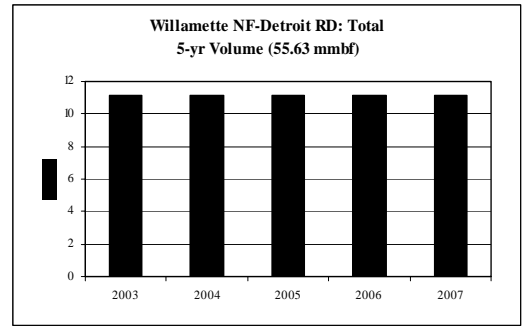
Detroit RD: * Consistent performance in sales vs offered: ↑

* Consistent year-to-year offerings: ↓

'00 – '02



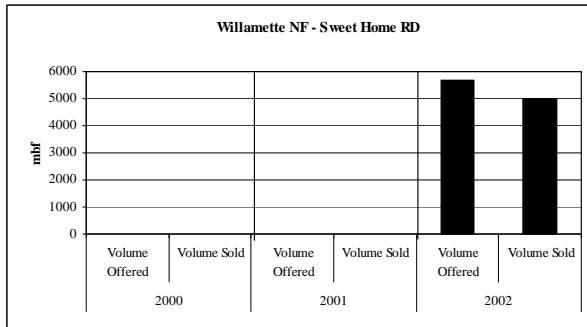
'03 – '07



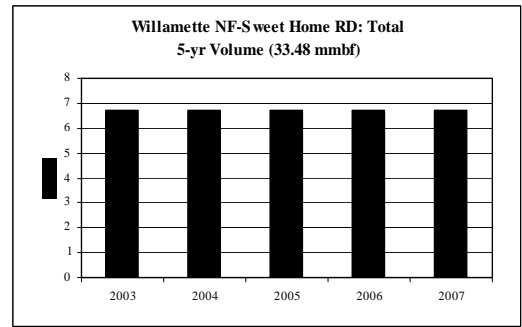
Sweet Home RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓

'00 – '02



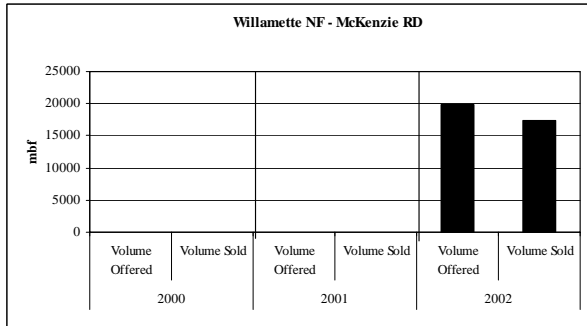
'03 – '07



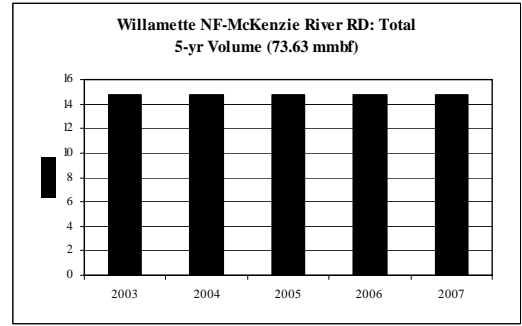
McKenzie RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓

'00 – '02

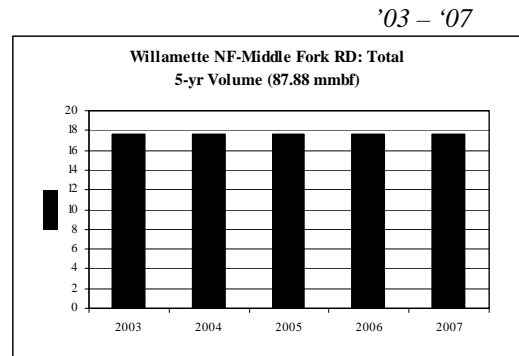
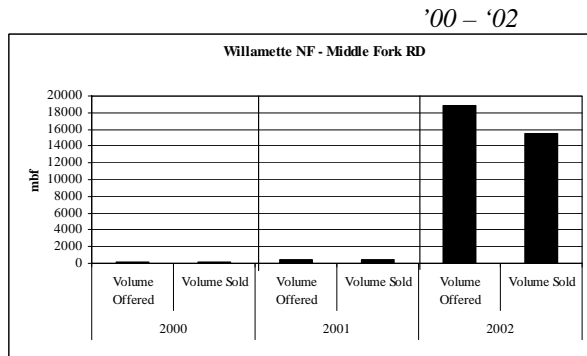


'03 – '07



Middle Fork RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓

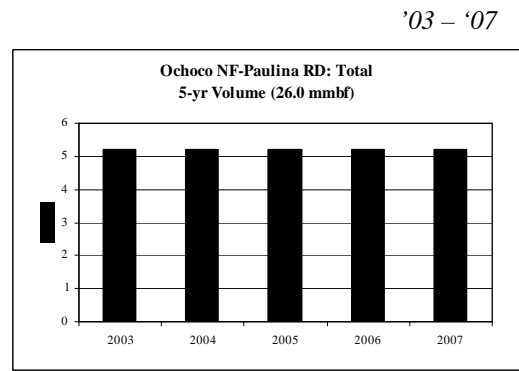
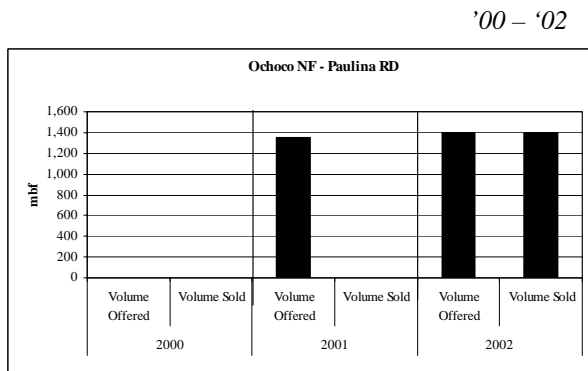


Ochoco NF: (*Lookout Mt, Paulina RDs*):

- ✓ 2000-2002 sales volume: 54.5 mmbf
- ✓ 2003-2007 planned removal: 92.6 mmbf

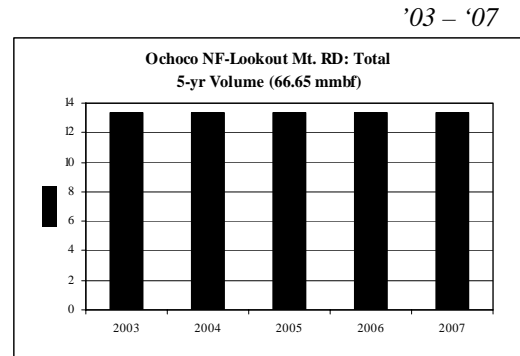
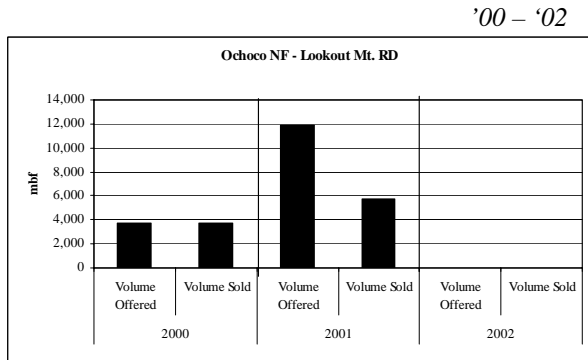
Paulina RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓



Lookout Mountain RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓

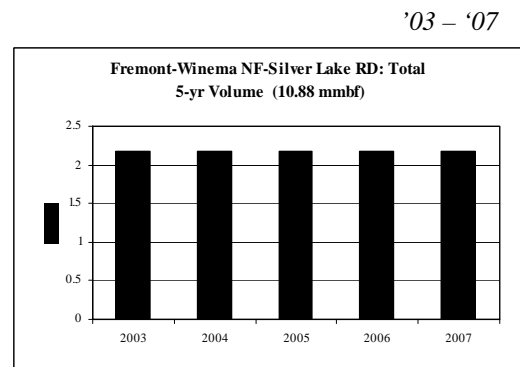
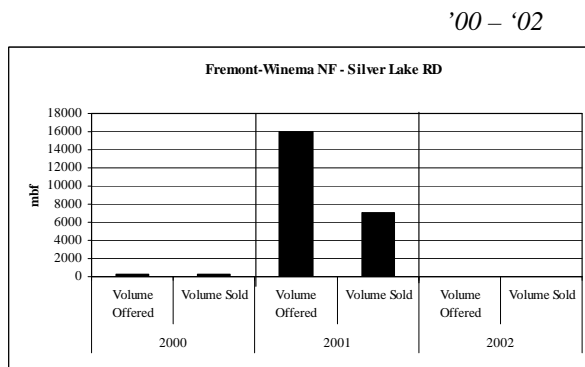


Fremont-Winema NF: (Silver Lake, Chemult RDs):

- ✓ 2000-2002 sales volume: 81.7 mmbf
- ✓ 2003-2007 planned removal: 20.4 mmbf

Silver Lake RD: * Consistent performance in sales vs offered: ↓

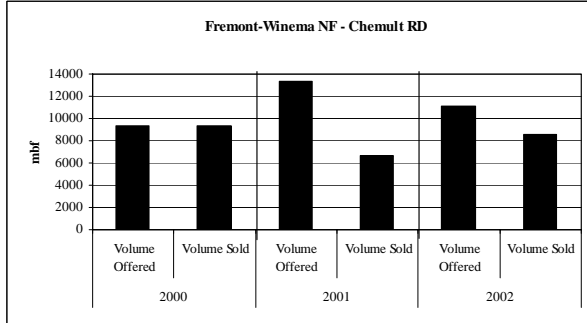
* Consistent year-to-year offerings: ↓



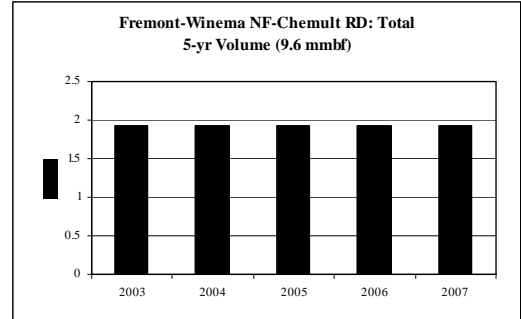
Chemult RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↑

'00 – '02



'03 – '07



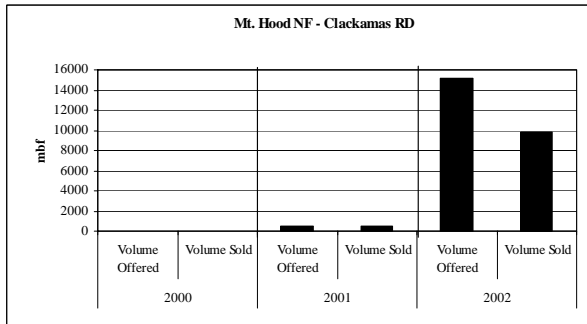
Mt. Hood NE: (*Clackamas RD*):

- ✓ 2000-2002 sales volume: 26 mmbf
- ✓ 2003-2007 planned removal: 2 mmbf

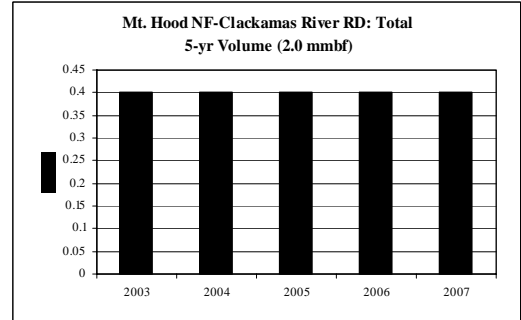
Clackamas RD: * Consistent performance in sales vs offered: ↓

* Consistent year-to-year offerings: ↓

'00 – '02



'03 – '07



What are the associated risks?

The first associated risk factor is to determine how much of the projected volume will be placed up for bid as typical timber sales versus stewardship and/or service contracts designated for compliance with **National Fire Plan** (NFP) mandates. Investors may attach a higher risk factor to NFP projected removals (also designated as fuel load reduction removals) as a result of recent environmental campaign focii on this particular public forestlands policy area. Some environmental campaign efforts highlight fuel load reduction contracts as a means “*to get the harvest – and get out quickly with flexibility to circumvent environmental safeguards.*” Regardless of validity (or lack thereof) of such a statement, investors will clearly understand and want to have addressed up front the public perception side to this new and relatively fast-tracked push to reduce fuel loading off of our public forests. As noted in the table below, within the COIC investor landscape, only about 25% of the total small log CROP removal through 2007 will be conducted under a fuel load reduction contract designation:

	<i>BLM (mmbf)</i>	<i>Deschutes (mmbf)</i>	<i>Ochoco (mmbf)</i>	<i>Mt. Hood (mmbf)</i>	<i>Fremont- Winema (mmbf)</i>	<i>Willamette (mmbf)</i>	<i>Total (mmbf)</i>	<i>%</i>
<i>Timber Sales</i> T	26.62	0	0	1.4	0.9	98.67	127.59	34%
<i>Pre-Commercial Thinning</i>	26.2	0	0	0	0	0	26.2	7%
<i>Pre-Commercial Thinning /Fuels</i>	0	61.93	9.26	0	0	0	71.19	19%
<i>Fuel Load Reduction</i>	0	0	0	0.1	19.5	0	19.6	5%
<i>Firewood/Post & Pole</i> F	10.75	0	0	0	0	0	10.75	3%
<i>Post & Pole</i> P	0	61.93	0	0	0	1.31	63.24	17%
<i>Service Contract</i> S	0	0	0	0	0	6.56	6.56	2%
<i>Post & Pole/Timber Sales</i>	0	37.75	13.89	0	0	0	51.64	13%
	63.57	161.61	23.15	1.5	20.4	106.54	376.77	100%

The second area of associated risk is to examine another “PC” (politically-correct) factor. Science discussions aside, this factor is typically driven by how much larger diameter (>12” dbh) trees will be removed. Within the COIC investor landscape, the datum for the projected CROP resource offering for all diameter classes during the next five years might suggest some difficulty here: over 50% of the total projected resource offering will be comprised of logs that are >12” dbh. The table below provides a snapshot of the proposed resource offering by species and diameter sizes for the four top volume species:

	% of 5-yr. total		
	>12"	4" - 12"	<4"
<i>Douglas fir (235 mmbf)</i>	58%	39.9%	2.1%
<i>Ponderosa pine (185 mmbf)</i>	50.3%	48.5%	1.2%
<i>Lodgepole pine (91.8 mmbf)</i>	45%	54%	1%
<i>W. Hemlock (52.4 mmbf)</i>	56%	41.5%	2.2%

The third area of associated risk is determining if enough 4" - 12" dbh volume is available in the investor landscape to support a small log processing operation while conforming to forest restoration parameters. For a mill needing 25 mmbf of wood furnish (single shift) annually, investors will want to see that the landscape can supply ~ 30 mmbf annually (a 20% plus factor). They will also want to see that residual furnish is available above and beyond that 20% factor. For the COIC investor landscape, the projected removal volumes in this diameter bracket look positive. Excluding secondary/specialty species such as juniper, minor species, and mixed hardwoods, the projected volumes still show real potential for investment of a small log mill in the area:

<i>Species</i>	<i>Projected Small Log Removals '03-'07 (mmbf)</i>	<i>Average annual volume (mmbf)</i>
<i>Douglas fir</i>	98.67	19.73
<i>Ponderosa pine</i>	89.2	17.84
<i>Lodgepole pine</i>	50.12	10.02
<i>W. Hemlock</i>	26.97	5.39
<i>Noble fir</i>	10.13	2.03
<i>White fir</i>	8.22	1.64
<i>Mt. Hemlock</i>	6.9	1.38
<i>Grand fir</i>	4.55	.91
<i>Combined Species</i>	50.32	10.06
		68.9 mmbf

Task 2: Conduct a Markets Analysis for Products that Could be Manufactured from Small Diameter Logs.

Under this task, Mater Engineering has examined the latest general and product-specific marketing trends likely to influence proforma business plan development for a small log mill construct in Central Oregon. Specific areas of research conducted by Mater Engineering personnel for this project included:

- Current demographic highlights in the US
- Updates on the US housing industry
- Updates on the Repair and Remodel industry
- Market trends in:
 - Kitchen Cabinets
 - Furniture
 - Windows and Doors
 - Paneling
 - Finger-jointed moulding
 - I-Joists
 - Glulam Beams
 - LVL
 - Commodity lumber

Results of the markets research follows:

Demograp

- Favorable demographics, immigration, and an aging housing stock will combine to create the need for approximately 1.8 million housing units per year (conventional plus mobile homes) throughout the remainder of this decade (National Assn. of Homebuilders 2002). Furthermore, single family homes will be larger than ever, averaging 2,300 sq. ft. in floor area in 2001, which is double the average house size of 1950. Additionally, house size is projected to increase another 10% by the end of the decade. Also, 75 to 80% of new conventional residential units will be single-family homes compared with 55% in the 1950's and 60's. Remodeling activity will be very strong, too, because 30% of the 120 million standing units are at least 30 years old.

Furthermore, there are approximately 80 million people between the ages 38 to 55 (born between 1947 and 1964), most of whom are now in their peak earning and spending years.

Source: Timber Processing, October 2003

- The substantial influx of immigrants to this country during the next 10 years will be a major support for housing demand in both the rental and for-sale markets, according to

National Association of Home Builders (NAHB) Economist Michael Carliner. Speaking at NAHB's recent Construction Forecast Conference in Washington, DC, Carliner said, 'Immigrants typically provide an initial stimulus to rental markets for their first few years in the U.S. After becoming established in the U.S. they become a major factor in the for-sale marketplace,' 'Since the 2000 Census, it appears that immigration has accelerated, with net of about 1.5 million new immigrants coming to this country annually since the beginning of the decade.' Analysts at the conference were also in agreement that an imminent bust in the nation's housing prices remains essentially out of the question. Not only have prices never declined on a national basis over the past 30 years, said Fannie Mae Director of Economic and Policy Research Michael Fratantoni, but inventories of unsold homes have been on a steady decline that's expected to continue in the near future. Part of the blame for this goes to restrictive land use policies, particularly in the East and West Coasts, he said. Fannie Mae is currently forecasting that, at the national level, prices on single-family homes will grow annually at a 5 percent pace between 2003 and 2013.

Source: *Structural Building Components Online – NAHB E-release, November 2003*

Homeownership Rates for the United States, by Age of Householder												
Year	<25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	>75
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
2001	22.5	38.9	54.8	65.5	70.8	75.4	78.2	81.0	81.8	82.4	82.5	78.1
2002/r	22.9	38.8	54.9	65.2	71.7	74.8	77.9	80.8	81.6	82.9	82.5	78.4
2003	22.8	39.8	56.5	65.1	71.3	75.4	77.9	80.9	81.9	82.5	82.0	78.7

U.S. Census Bureau, *Housing Vacancies and Homeownership Annual Statistics: Revised*

Source: US Census Bureau, 2003

- Based on interviews with builders and architects, NAHB is also projecting a number of design trends in new homes over the coming year. For example:
 - * The average size of newly built homes has stabilized at 2,300 square feet over the last three years and is expected to remain in the range in the coming years.
 - * More than half of all newly built homes will have 9-foot or higher ceilings, which are increasingly becoming a standard feature in the average home.
 - * Living rooms are shrinking or disappearing altogether. More than one-third of homes built last year did not have a living room, and this trend is expected to continue.

Source: *Structural Building Components Online – NAHB E-release, December 2003*

- Higher ceilings in new homes have been a growing trend for several years. The National Association of Home Builders reports that nationwide in 1997, about 35% of new single-family homes were built with 9-foot or higher walls on the first floor. This increased to about 60% during 2002. The share of two-story homes with 9-foot or higher walls on the second floor has increased from 13% in 1997 to about 22% in 2002.

NATIONAL ECONOMIC AND INDUSTRY INDICATORS

<i>Housing</i>	Jan 2004	Dec 2003	Jan 2003
U.S. Housing Starts (SAAR-000's)	1,903	2,067	1,828
U.S. Housing Starts, Single-Family (SAAR-000's)	1,537	1,670	1,509
U.S. Housing Starts, Multi-Family (SAAR-000's)	366	397	319

Source: Random Lengths Yardstick, February 2004, volume 14, issue 2

U.S. HOUSING STARTS AND PERMITS

Region	Jan 2004 Single-Family	Jan 2004 Multifamily	Jan 2004 Total	Jan 2003 Total	2004 Year- to-Date	2003 Year- to-Date
Starts – Actual (thousands)						
Northeast	5.5	2.6	8.1	7.8	8.1	7.8
Midwest	12.7	3.0	15.7	17.7	15.7	17.7
South	49.3	13.8	63.1	57.6	63.1	57.6
West	28.9	5.6	34.5	34.7	34.5	34.7
Total U.S.	96.4	25.0	121.4	117.8	121.4	117.8
Permits – Actual (thousands)						
Northeast	6.5	3.5	10.0	9.3	10.0	9.3
Midwest	14.1	3.6	17.7	18.6	17.7	18.6
South	49.6	13.2	62.8	60.8	62.8	60.8
West	26.8	7.4	34.2	32.9	34.2	32.9
Total U.S.	97.0	27.6	124.6	121.6	124.6	121.6

*Source: U.S. Census Bureau * Note: Census Bureau reports single-family starts and permits by region, regional multifamily starts and permits derived by subtracting single-family from totals.*

Source: Random Lengths Yardstick, February 2004, volume 14, issue 2

HOUSING

- U.S. home prices increased 8.4 percent last year, aided by historically low mortgage rates and confidence in an improving U.S. economy, mortgage finance company Freddie Mac said on Tuesday. Echoing data published on Monday by its regulator, the Office of Federal Housing Enterprise oversight, Freddie Mac said the U.S. home ownership rate hit a record high 68.6 percent in the fourth quarter, up from the previous record of 68.4 percent in last year's third quarter.

Source: LBM Daily Online – Reuters Limited, March 2, 2004

- ‘Today’s report indicates that the housing market has remained very strong as builders beefed up production to meet demand,’ says National Association of Home Builders chief economist David Seiders. ‘Starts and permits have been running at an elevated pace since the summer and fundamentals suggest that this strong new-home market should carry

through into 2004.’

Source: Frame Building News, January 2004

- Sales of new single-family homes should once again eclipse one million units next year, NAHB predicts. On the production side, starts of single-family units should recede by only 3.5 percent to 1.45 million units. In the multifamily sector, a strong condo component and solid production of federally subsidized low-income rental housing will continue to provide essential support to the market while better job growth will help combat high vacancies in market-rate rental housing. As a result, NAHB projects a mere 1.5 percent decline in multifamily production to 342,000 units this year, followed by some further softening in 2004 to 327,000 units. ‘Remodeling of existing housing – primarily improvements to owner-occupied homes – will also continue to be a major factor in terms of housing-related spending in this economy,’ Seiders said. ‘We’re projecting about \$182 billion of residential remodeling activity in 2003 and \$192 billion in 2004.’

Source: Structural Building Components Online – NAHB E-release, December 2003

- Persistently low U.S. mortgage interest rates and an improving economy may translate to a new record high in home sales in 2004, economists for the No.2 source of U.S. mortgage finance, Freddie Mac, said on Monday. Freddie Mac (NYSE:FRE – News) expects totals sales on new and pre-owned homes to reach 7.28 million, surpassing an anticipated record high of 7.19 million in 2003, Nothaft said.

Source: LBM Daily Online – Reuters Newswire, February 2004

- The single-family sector is expected to hold the housing market at a buoyant level in 2004, once again accounting for more than 80% of all new homes built during the year. However, analysts also point out that a surprise in 2003 was a strong growth in demand for condominiums; sales rose 13% through the first nine months of 2003. Overall, the 2004 multi-housing sector is expected to ease down from the 2003 level.

- So far, there’s little indication that housing construction will remain anything but robust in 2004, as borrowing costs remain low. And low interest rates could help offset rising costs for building materials such as plywood and OSB, builders said. U.S. housing starts did fall in February, for the second month in a row but are still on a pace to exceed last year’s levels, the highest since 1978.

Source: LBMDaily Online – Knight Ridder News Service, March 25, 2004

- Residential construction, which accounts for 51% of the construction market, will remain strong in 2004. Factors driving this activity will shift significantly in 2004 and 2005, though as the nation’s record low mortgage rates slowly disappear, leading to a slight dip in growth during 2004. FMI predicts that construction value will gain 6% annually through 2004 and 2005, based primarily on the strength of a higher quality mix of homes. Unlike the residential sector, the nonresidential sector did not perform well during 2003. However, FMI expects this sector to begin recovering in mid-2004.

Public building construction. The current slowdown in this area is partially due to state and local revenue decreases. The states with the most population growth and economic activity will need more new schools. There is also a substantial amount of school maintenance, repair, and renovation work yet to be done. Infrastructure construction spending was also

down in 2003. However, FMI expects this sector to resume growth in 2004 and for the next three years. Heading up this growth is the need for maintenance and improvements to the nation's public utilities, highways, streets, and water supply facilities.

Source: *Builder Online – 2004 Construction Market Outlook: Mixed Prospects, January 2004*

REPAIR AND

- The K&BDN-Wayman Group (Kitchen & Bath Design News) survey revealed that dealers and designers are generally bullish about current and future market conditions. More than half of the dealers and designers surveyed indicate that they expect current market conditions to improve over the next 12 months; in contrast, only 8% believe market conditions will deteriorate, while 39% say they expect conditions to remain about the same.
Source: *Kitchen & Bath News Online, no date stated.*
- Experts say that they're seeing the first signs that the 1970's may be returning. For example: Wood paneling is coming back, even in high-end homes.
Source: *Realtor Magazine Online – Hot Trends in Home Remodeling, December 1, 2003*
- Rooms such as wine cellars, media rooms, libraries, sewing rooms, meditation rooms, and even personal beauty salons and ballet studios are increasing in popularity, according to ASID (American Society of Interior Designers). These specialty rooms are being added to homes through remodeling or as options made by purchasers of new homes. But family members aren't the only ones being pampered with specialty rooms these days; pets are enjoying some pampering of their own. Indoor pools, usually decked out in cedar-lined rooms in basements or structures attached to the houses, sell for between \$100,000 and \$300,000. For mechanic members of the family, garages are becoming larger and more high-tech. Builders report that four-car garages are becoming a necessity at new-home developments throughout the United States.
Source: *Realtor Magazine Online – Hot Trends in Home Remodeling, December 1, 2003*
- Remodeling expenditures rose for the eighth consecutive quarter in the fourth quarter of 2003 to \$130.4 billion, a 7.3% increase from the same period a year ago.

What Homeowners Spend on Home Improvements 2003 (in billions)

1 st Quarter	\$121.7
2 nd Quarter	\$122.4
3 rd Quarter	\$125.2
4 th Quarter	\$130.4

Source: Joint Center for Housing Studies, Harvard University, January 2004

Source: *Lowe's For Pros Online - Stats and Facts, January 12, 2004*

- According to a quarterly National Association of Home Builders' (NAHB) survey of contract remodelers throughout the country, it's most likely to be a kitchen, bathroom or room addition.

Most Popular Remodeling Jobs

Kitchen	63%
Bathroom	61%
Room Additions	58%
Whole House Remodel	38%

Source: Housing Facts, Figures, and Trends 2004, NAHB

Source: *Lowe's For Pros Online - Stats and Facts, February 17, 2004*

- While homeowners once concerned themselves with home improvements that would add value to their homes or make them more marketable, there's less concern today with recouping one's investment than there is with making the home a comfortable and functional place to live. People are cocooning – spending more time at home – so they want larger entertainment areas, such as kitchens and family rooms. Those in search of serenity and safe haven from the outside world are opting for plush bathrooms as well. And an increasing number of Baby Boomers are planning to age in place, so they're seeking homes with bedrooms on the ground floor, wide hallways, and accessible countertops.

Source: *Realtor Magazine Online – Hot Trends in Home Remodeling, December 1, 2003*

- A second consecutive year of record sales of existing single-family homes is expected to keep residential repair and remodeling expenditures in the U.S. on a growth track. These analysts' estimates of R&R spending in 2003 average \$151 billion in inflation-adjusted 1996 dollars. That is a 2.5% increase over the Census Bureau's reported inflation-adjusted expenditures of \$147.3 billion in 2002, a record high. The analysts' forecasts for 2004 average \$155.5 billion in spending, a 3% gain over the 2003 averaged estimate. Resource Information Systems Inc. forecasts growth in spending through the first half of 2004. However, it projects that the end of the refinancing boom will begin to be felt in the second half of 2004, resulting in about a 1% drop in spending for the year.

Source: *Random Lengths, January 16, 2004*

KITCHEN

- Cabinet sales for November 2003 increased by 13.4 percent relative to November 2002, according to the Kitchen Cabinet Manufacturers Assn.'s monthly Trend of Business survey. KCMA results show the year-to-date sales were up 12.4 percent over 2002. Participating members in the survey represent more than 50 percent of the U.S. cabinet market.
- Source: *iswonline – Industry News, January 2004*
- Kitchen and bath countertop demand is forecast to increase more than 2 percent annually to 467 million square feet in 2007, according to the Freedonia Group, an industrial market research firm. Kitchen and bath remodeling expenditures are expected to improve somewhat over the forecast period, Freedonia said. Adding to that number is the trend toward larger kitchens and more bathrooms, the Ohio-based firm added. However,

Freedonia said declines in new single unit housing completions will limit gains through 2007. Despite this expected decline, inflation-adjusted residential kitchen and bath renovation expenditures are projected to improve.

Source: *iswonline* – *Industry News*, January 2004

- When it comes to construction of the cabinets, face frame has grown to represent 76 percent of the cabinets displayed, up from 57 percent last year. Frameless construction was seen in only 16 percent of the kitchens displayed compared to 22 percent last year. Face frame with full overlay dropped from the 14.7 percent last year to only 4 percent this year.
Source: *Cabinet Maker*, August 2003
- Eighty-one percent of the time the drawers in the kitchens were solid wood construction, usually dovetailed. This is a solid increase when compared to the 63 percent last year. Metal drawers were used in 9 percent of the kitchens compared to almost 15 percent last year. Only very small percentages of plywood, laminated and other drawers were used.
Source: *Cabinet Maker*, August 2003
- A number of companies such as KraftMaid Cabinetry, Wellborn Cabinet Inc. and Yorktowne Cabinets have added more doors to their lines and now feature mitered doors, doors with wider stiles and rails and doors with interesting new details.
Source: *Cabinet Maker*, August 2003

FURNIT

- The Business and Institutional Furniture Manufacturer's Assn. announced that U.S. office furniture sales are predicted to increase 5.6% to \$8.95 billion in 2004, the *Holland (MI) Sentinel* reports. This prediction, based on the research of economic consulting group Global Insight, is greater than the one Insight made three months ago; the previous prediction was a 2.4% increase. If the forecast holds true, it will be the industry's first increase in four years. In 2000, the industry reached a record \$13.3 billion in sales.
Source: *iswonline* – *Industry News*, February 2004
- According to AKTRIN Furniture Information Center, American consumer spending on furniture and bedding, evaluated at retail prices and including all sales taxes, will rise 0.5% this year to \$67 billion. Next year, with an anticipated growth rate of 4.3%, the market would reach a new all-time high of \$69.9 billion, AKTRIN says.
Source: Wood & Wood Products, December 2003
- Prepared by the economic consulting organization Global Insight, the most recent forecast for 2003 predicts an 8.5 percent decline in shipments to a level of \$8.14 billion. This projection is consistent with the previous forecast from April 2003. On a year-to-year basis, the industry is expected to see an improvement in shipments during the first quarter of 2004. The outlook for business investment will continue to improve during the year,

contributing to a potential double-digit increase in 2004 shipments to a level of \$9.2 billion, according to the report.

Source: Cabinetmaker, August 2003

- European home sizes are significantly smaller than the typical U.S. home. Another difference is that European furniture, as are European homes, is purchased 'for life.' Yet, countries such as Germany (above \$400 capita/year), Austria (\$390 per capita/year), and Luxembourg (\$350 per capita/year) have higher per-capita spending on furniture than the U.S. (about \$250 per capita/year). Such comparisons indicate the potential for the U.S. industry to grow its markets in the future, especially given the fact that in the U.S. houses are larger and ownership of second homes is more widespread.

Source: Timber Processing, November/December 2003

- Consolidation is strong and distribution channels are changing at a fast pace. In 1999, 48% of all residential furniture was sold through conventional furniture retailers. However, specialty stores like Office Depot or Staples, and mass merchants like Wal-Mart or Kmart have increased their share of the market in the past few years ...

Source: Timber Processing, November/December 2003

WINDOWS &

- Worldwide demand for windows and doors is projected to rise 5.7% per year to \$146.5 billion in 2007, according to World Windows & Doors, a new study from the Freedonia Group Inc. World demand for windows is projected to reach \$74.6 billion and \$71.9 billion respectively. Turkey, China, India, Brazil and Mexico expected to record some of the best market gains. For example, window and door demand will climb in excess of nine percent annually in China, which is the second largest market in the world behind the US.
- North American demand for windows and doors is projected to grow 4.9% annually to \$36.2 billion in 2007. Asia/Pacific demand is seen growing by 7.4% annually to \$58.6 billion.
- Global demand for vinyl, fiberglass and other plastic door products will outpace increases in other product types. However, wood and metal products will continue to account for a larger share of window and door demand in many areas; sales of these items will rise along with construction activity. In 2002, residential building accounted for two-thirds of all window and door sales.
Source: iswonline – Industry News, February 2004
- The residential building market dominates global window and door demand, accounting for two-thirds of sales in 2002. However, demand for windows and doors used in nonresidential buildings will climb at a faster pace through 2007, driven by growth in nonresidential construction spending in developing regions.
Source: the-infoshop Online –World Windows and Doors, December 2003

- According to WDMA's Statistical Review & Forecast, out of the 59.1 million units of windows shipped last year, 13.4 percent more windows were used in remodeling and replacement applications last year (31.4 million units) than for new construction (27.7 million units). This trend is predicted to continue for the next few years, with 17.5 percent more growth expected by 2006 for the remodeling market (34.3 million units of windows), compared to new construction (29.2 million units).
- Vinyl is expected to continue its dominance in terms of market share, particularly in the remodeling market, where the WDMA says it outsold wood products by 58 percent in 2002. However, wood seems to be the preferred material for new construction. According to the WDMA's report wood window units outsold vinyl by 31 percent in 2002 in that sector and is predicted to continue its dominance over the next few years.

Wood is also the preferred choice for residential passage doors, accounting for nearly 100 percent of the market. For residential entry doors shipped in 2002, steel was used in 66 percent of the applications, with wood accounting for 22 percent and fiberglass representing the remaining 12 percent. For non-residential passage doors, the report says, wood was also the top choice in 2002; out of 7.3 million units shipped, wood accounted for 40 percent of the market. Out of the \$24.5 billion market in 2002, imports accounted for \$900 million, Freedonia reports. Imports have had a greater effect on doors than on windows.

PAN

- Particleboard shipments in January 2004 were 4.1% higher than January 2003. These strong shipments mark the third consecutive month of increases in year-over-year shipments comparisons. Medium density fiberboard shipments in January 2004 were 9.2% higher than January 2003, continuing the strength shown in the fourth quarter of 2003 and marking the fourth consecutive month of increases in year-over-year shipments comparisons. Other fiberboard shipments, which include hardboard and high density fiberboard shipments, also began 2004 ahead of 2003 levels. January 2004 shipments were 3.9% ahead of January 2003.

Source: iswonline – Industry News, February 17, 2004

- North American structural wood production (plywood and oriented strand board) totaled a record-setting 40.9 billion square feet (3/8-inch basis) in 2003, up about 186 million feet from 2002. It was the third consecutive year that production exceeded 40 billion feet. Panel consumption exceeded production by 482 million feet, with most of the increased demand coming in the second half of the year. Production and consumption were about equal in 2002. OSB production increased almost one billion square feet while plywood production declined by approximately 450 million feet.

Source: apawood Online – 2003 Panel Production Sets Record

- The first sustained strength in particleboard markets in more than three years has propelled prices of many key items to levels that represent a sharp contrast to January 2003, when prices were the lowest since the mid-1990s. Strong demand in various market sectors continues to fuel the price surge. Many producers said sales in December were the strongest they had ever seen for that month. A brisk pace has continued through January.
Source: Random Lengths, January 30, 2004
- North American structural panel mills responded to 2003's record prices with record output. Still, 40.86 billion square feet (3/8-inch basis) of output fell short of estimated consumption, according to figures from APA - The Engineered Wood Association.
- The 2003 production total surpassed 2002 by 502 million square feet. OSB gained 956 mmsf; plywood declined by 454 mmsf. Total consumption exceeded production by 482mmsf, according to APA figures.
Source: Random Lengths, January 30, 2004
- After a dip from last fall's 10-year highs, prices for plywood and other wood panel materials have shot up again – by as much as 43% – raising the cost of both building homes and do-it-yourself projects. Builders aren't finding any bargains in the typically less expensive strand board, known as OSB, either. For the first three weeks of March, the national average wholesale mill price for 1,000 square feet of 7/16-inch OSB was \$495, compared for 15/32-inch, three-ply plywood, according to Random Lengths, which tracks prices in the U.S. lumber market.
Source: LBMDaily Online – Knight Ridder News Service, March 25, 2004
- Companies continue to develop value-added construction products, such as foil surfaced roofing panels which help control heating and cooling, and pest-resistant products. There are several niche products that could be made of OSB suppliers, like boxes, crates, pallets, and furniture frames. They won't be huge volumes, but they do represent untapped opportunities. We're also seeing companies offer high-performance flooring packages which include both rim boards and subfloor panels. And at least two companies, Louisiana-Pacific and Martin Companies, are marking panels with one-inch gridlines to ease job of framers.
Source: Wood Based Panels International, February/March 2004
- The packaging industry may offer the greatest potential for OSB, given its weak penetration. Structural wood panels only account for 7 percent of container production and 4 percent of pallets, according to APA - the Engineered Wood Association. But more manufacturers are substituting plywood and OSB for lumber and plastic. Agricultural bins made out of OSB are another application. 'These are niche markets,' said Jack Merry, the association spokesman. 'But cost savings are always a consideration with manufacturers. OSB has another advantage as a shipping material, according to Campagna: it meets overseas requirements for insect-free wood. Anything that's been through a heat process is automatically exempt,' he explained.
Source: Home Channel News, November 3, 2003

- Residential construction in the U.S. and Canada combined is forecast to consume 21.2 billion square feet of structural panels, including 15.3 billion feet of OSB and 5.9 billion feet of plywood. While demand for panels in residential construction is expected to be down about 2.8 percent from last year, demand is forecast to rise in each industry's other major domestic markets – remodeling, nonresidential construction, and industrial.

The remodeling market this year is forecast to consume 9.7 billion feet, up 1.8 percent; the nonresidential construction market 3.2 billion feet, up 4.6 percent; and the industrial market 7.1 billion feet, up 3.2 percent. Those increases are based on the expectation that the economy will continue to improve, spurring increased capital spending in the manufacturing sector. Exports also are expected to climb, from 641 million feet in 2003 to 752 million this year.

Source: Paperloop Online – March 18, 2004

- Oriented strand board production is forecast to rise this year to 24 billion feet, up about 1.5 percent, while plywood production is expected to total 16.9 billion, down approximately 1.5 percent. The structural wood panel industry as a whole is forecast to operate this year at 91 percent of capacity, compared to 92 percent last year. Industry production capacity is expected to increase by approximately 600 million square feet this year, or about twice the growth last year. Plywood and OSB imports, meanwhile, continue to rise, the result of increased global production capacity, particularly in South America and Europe. Although a weaker dollar suggests that exports this year will rise and the pace of imports will slow, imports over the longer term are forecast to increase. Softwood plywood and OSB imports last year totaled 1.1 billion square feet, representing a 2.3 percent share of the North American market. Imports are expected to reach 1.5 billion feet or more within five years, increasing their share to nearly 3.5 percent.

Source: Paperloop Online – APA Press Release, March 18, 2004

FINGERJOINT

- What might have developed as a positive demand side for mouldings & better and shop this year has been masked by the pain and losses on the production side says Crow's, including both sawmills and remanufacturing in the primary supplying nations, as well as domestic losses. Establishing a balance has been difficult. Crow's emphasizes that demand for finished mouldings has been excellent, with sales activity from distribution centers and retail outlets moving at near-record levels in most areas and record levels in places. Attempts to secure stronger prices have failed because production levels were too high for exorbitant demand. Now the finished side has the added competitive element of MDF mouldings. Crow's warns that as composites replace solid woods as moulding substrate, the question of 'survivability' will intensify for some producers, both US and offshore. The market appears to be less well defined than before, although demand for mouldings is good. One reason for confusion around finger joint mouldings could be the strong

emergence of MDF mouldings, which reportedly now hold up to 40% of the huge Californian market and 20% nationally.

Source: New Zealand Forest Online – Crow’s Corner, June 2003

I-JOISTS,

- Among other engineered wood products, glulam production rose 2.5 percent to 343.6 million board feet. Wood I-joist output increased almost 10 percent to just over one billion linear feet, and laminated veneer lumber production climbed eight percent to 67.5 million cubic feet.
Source: apawood Online – 2003 Panel Production Sets Record
- A major manufacturer of LVL and I-joists in the West is shifting from Douglas fir veneer to a thicker peel of hemlock in the LVL flanges of its I-joist products. While a spokesman declined to discuss the move much further, industry observers widely perceive it as a cost-cutting measure. I-joist producers have confronted stiff competition from solid-sawn lumber, especially in recent years in which lumber prices sank to a 10-year trough. Additional pressure has been exerted on LVL-based joists by engineered joists made with solid-sawn flanges. Veneer traders are watching the move closely and say it could significantly change their market, especially if Trus Joist competitors follow suit. Sources say it will take more hemlock timber to yield the same volume for veneer that grades out for LVL compared with Douglas fir. Plywood manufacturers say they can use the falldown as inner plies; the .150 thickness can be used in the lay up of most western plywood sheathing items. But some traders are wary about the increased .150 volume and how it might affect sales and prices of fir 1/10 and 1/8 inner plies.
Source: Random Lengths, February 13, 2004
- I-joist manufacturers raised prices in mid-February, and a major producer has some customers on allocations. The rising prices and tightening availability have caused some scrambling, but few manufacturers or buyers foresee I-joists losing market share to solid-sawn lumber. In fact, just the opposite is happening for some I-joist producers, who are picking up market share at the expense of competitors unable to fulfill their commitments. Traders agree that once end users shift from solid-sawn to I-joists, few go back to 2 x 10s regardless of price.
Source: Random Lengths, February 20, 2004
- I-joist prices rose 3-5% in September and gained an additional 8-10% earlier this month. Manufacturers cited increasing demand and soaring costs of OSB and LVL, key web and flange components in I-joists.
Source: Random Lengths, February 20, 2004
- Another producer termed the current market ‘a delicious dilemma’ taxing the demand/supply equation with record housing starts, extended mill order files, a rising stock market, trucking and railcar shortages, and a thinly supplied distribution pipeline. Some

traders say the wider flanges now being used in Trus Joist products are consuming more LVL, contributing to supply shortage.

Source: Random Lengths, February 20, 2004

- The manufacture of glulam timber, wood I-joists, and laminated veneer lumber (LVL) is expected to remain the same as last year or rise just slightly. Engineered wood products of all kinds now command about six percent of the wood framing market, and that share is expected in the long term to continue rising. Glulam production, which peaked in 2000, is still being impacted by the downturn in nonresidential construction and by lower exports resulting from increased competition in Japan. Wood I-joists, which command a 44 percent share for the raised wood floor market, have for the most part been adopted by large builders, leaving increased market share dependent on converting smaller firms. Approximately half of LVL production is used for flanges in I-joist production, although that application has declined from previous years as a result of increased use of solid sawn and composite lumber flanges. The use of LVL as beams and headers continues to rise, however.

Source: Paperloop Online – APA Press Release, March 18, 2004

LUM

- Lumber imports to the U.S. are expected to decrease to nearly 21 billion board feet in 2004, according to WWPA. While shipments from Canada will be down 1.7 percent to 19 billion board feet, non-Canadian imports are expected to rise 5 percent to 1.87 billion board feet, spurred by higher volumes from European lumber mills.
Source: Western Wood Products Association Online – October 10, 2003
- The domestic market for softwood sawlogs in the Pacific Northwest in the first six weeks of 2004 has been under pressure, driven by strong demand, low inventory, and seasonal expectations. Wood product demand has been very strong as market price reporters, such as Random Lengths and Crow's Publications, detailed again this week. In reviewing the week, analyst Chip Dillon, managing Director for Smith Barney, pointed out OSB prices are at new all-time record highs and lumber price indices are moving higher.
Source: Global Wood Online – Industry News and Markets, February 16, 2004
- Prices of 9-foot studs went on a run in many species, driven by increasing homeowners preferences for higher ceilings. Output of 9-foot trims, meanwhile, has lagged demand due to tight log supplies and inflexible log purchasing programs at some stud mills.
Source: Random Lengths Yardstick, Volume 14, Issue 2, February 2004

KEY PRICE INDICATORS (\$ PER THOUSAND FEET)

Random Lengths Lumber Composites³	Feb 2004	Jan 2004	Feb 2003
Framing Lumber²	\$376	\$341	\$300
Random-Length Dimension	364	331	284
Stud	368	322	300
Low-Grade Random Dimension	239	220	195
Board	540	506	457
Shop and Mldg&Btr	773	720	625
Coast Dry Random and Stud	353	307	270
Inland	451	396	338
Southern pine	341	328	297
Western S-P-F	356	317	265
Eastern S-P-F	385	349	318
Green Douglas fir	397	343	306
Key Lumber Prices			
2x4 #2&Btr. KD Western S-P-F	\$386	\$338	\$257
2x4 Std.&Btr. Grn. D. fir (Portland)	410	336	286
2x4 #2KD SYP (Westside)	351	361	303
2x4 8' PET KD Western S-P-F	347	307	288
1x12 #3 KD Ponderosa pine	534	439	410
Random Lengths Panel Composites³			
Structural Panel²	\$554	\$427	\$263
Oriented Strand Board	547	394	225
Southern pine Plywood	629	516	358
Western fir Plywood	688	580	378
Key Panel Prices			
1/4 AC Sanded	\$467	\$449	\$306
1/2 4-ply CD Exterior Western	530	387	274
15/32 3-ply CD Exterior Southern	470	353	243
1/10 CD Mix Veneer	52.25	49.75	42.25
7/16 OSB (North Central)	473	344	194

2 – The lumber and structural panel composite prices are designed as broad measures of price movement in the framing lumber and panel markets. They represent weighted averages of key lumber and structural panel items, chosen from major producing areas and species.

3 – For a list of items included in each composite, go to www.randomlengths.com and click on in Depth > Useful Data > Monthly Composite Prices

Source: Random Lengths Yardstick, Volume 14, Issue 2, February, 2004

Task 3: Conduct a Small Log Processing Equipment Review

For this task, Mater Engineering was to focus primarily on the small log breakdown center in the processing line assuming a proposed small log line would be incorporated into an existing milling operation in the COIC region (Warm Springs Forest Products or WSFP). Basic background information regarding WSFP as it affects the COIC CROP project includes:

- The mill has been in operation for several decades
- Currently the operation produces ~ 60 mmbf of lumber product annually.
- The mill relies on resource provided by 430,000 acres of forestlands owned and managed by the Warm Springs Indian Nation
- In 2003, the Warm Springs Indian Nation received FCS-certification of all their forestlands and are now able to offer FSC-certified wood product into domestic and international markets
- It is estimated that the Warm Springs Indian Nation forestlands will be harvesting approximately 12 mmbf annually of small diameter logs which currently are not able to be efficiently processed at WSFP due to lack of processing technology designed to handle a steady diet of small logs.
- The mill is currently evaluating the feasibility of establishing a dedicated small log processing line within their existing sawmill operation. As such, representatives of the WSFP have been active participants in the development of the CROP protocol in the region

General Technical Information on Small Log Processing Lines

HewSaw Machines Inc.
Unit 10 – 2337 Townline
Abbotsford, BC
Canada V2G 6G1
604-852-7293, ext. 3
info@hewsaw.com

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

Small log and curve saw machinery is **designed to process small logs down to 3” dbh, and produce cants and lumber in a one-pass operation.** The name “curve saw” indicates that the machinery can cut logs curved like a C (“sweep”) and like an S (“snake”) by sawing along the grain and **producing longer, higher-value lumber from small logs than conventional mills.**

Curve sawing reduces the downfall resulting from trying to cut a straight piece of lumber from a curved log. Small log and **curve saw equipment also processes small logs very quickly**, compensating for the low board-feet per log, and produces lumber volume at rates similar to conventional mills.

Benefits (varies with brand):

- Efficient, fast processing of previously unusable logs;
- Can produce long lumber (has a higher value);
- Incorporation of curve saw systems are widely in use;
- Mills report increased recovery from between 5% to 30%;

Operating Characteristics (varies with brand):

- Cuts small logs in lengths of 4' to 20'
- Cuts small logs from 3" diameter to 12" diameter depending on equipment brand
- Proven production rates of 300 to 500 feet per minute (fpm)
- *Available optimizing systems can greatly increase efficiency because they use a computer that instantly scans each log and sets the cutter heads to cut for the highest value per piece. This system can also eliminate the extra step of presorting the logs.*
- ***Can process lumber from 1x2 to 1x6, and 2x4 to 2x6***
- Can process cants from 2x2 to 6x6

Drawbacks:

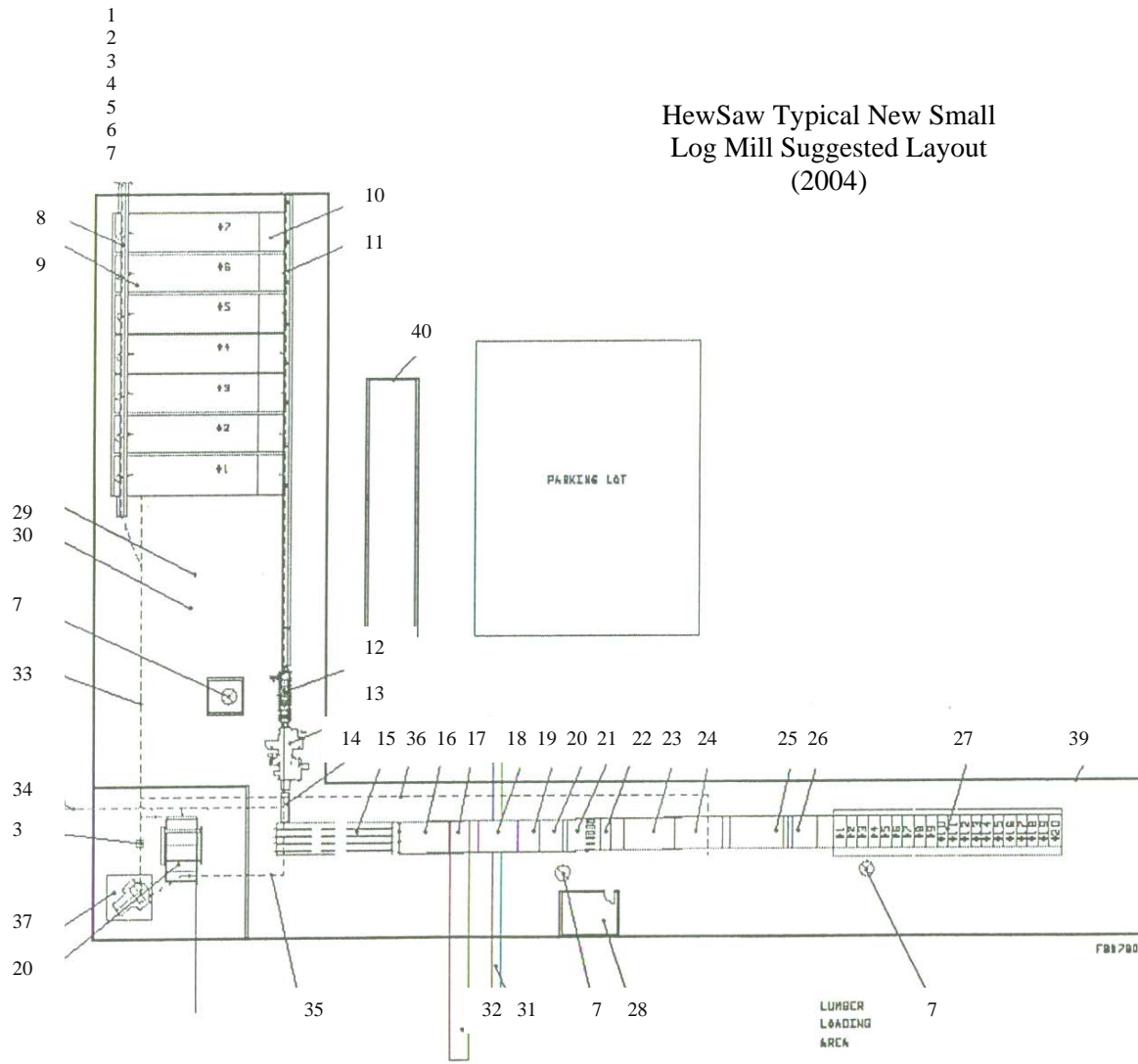
- Does not eliminate problems with wane or knots.
- Lumber will continue to bow or twist in the kiln because natural stress might still exist in the wood. This may be less of an issue in wood derived from suppressed trees and not juvenile trees.
- Some systems cannot saw logs of 10" dbh and up

A typical full line layout for a small log processing mill is represented in ***Exhibit G***, attached, as provided by ***HewSaw***. Approximate cost and cost categories to set up a stand-alone small log mill (*Note: 2002 costing data*):

Example Equipment Prices, HewSaw Machines, US\$

Bare machine:	\$578,000	
Separate edger:	101,000	
Simple mechanical prefeed:	62,000	(single sweep, horns up)
Single rotary prefeed:	160,000	(large diameter or double sweep logs)
Double rotary prefeed:	180,000	(small wood, very high volume, 450-600 fpm)
Chipper knife grinder:	14,500	
Edger knife grinder:	14,500	
On-hand operating equipment:	25,000	(extra saw assembly, etc.)
Spares:	30,000 to 40,000	

Exhibit G



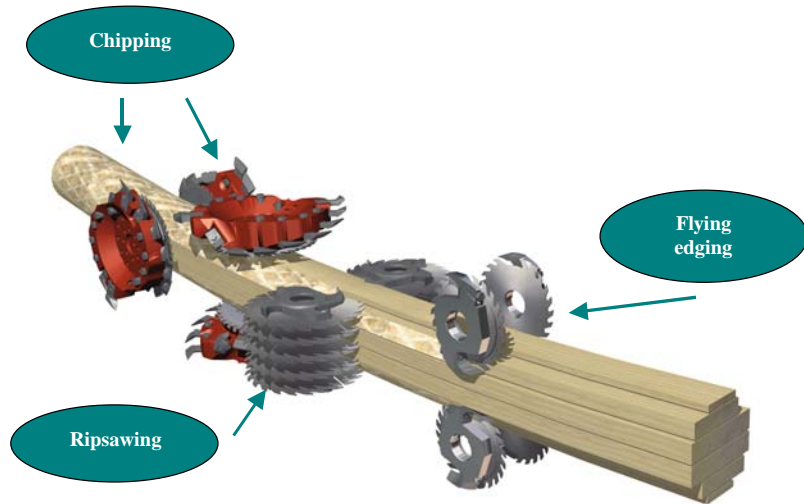
**HewSaw Typical New Small
Log Mill Suggested Layout
(2004)**

Ref	Description	Quantity
1	Log Loader	1
2	Optimized Scanner	1
3	Metal Detector	2
4	Reject Cradle	1
5	17" Debarker	1
6	Waste Conveyor System	1
7	Operator Booth	4
8	Log Sort Conveyor System	1
9	Sort Bin	7
10	Step Feeder	7
11	Infeed Log Conveyor System	1
12	Prefeeder	1
13	HewSaw R200 S.E. Machine	1
14	Outfeed Conveyor	1
15	Board Transfer	1
16	Board Unscrambler	1
17	8' Deck	1
18	10' Deck	1
19	6' Deck	1
20	Lug Loader	1
21	Scanner Transfer	1
22	Scanner	1
23	Positioning Transfer	1
24	Trimmer Transfer	1
25	Ending Transfer	1
26	Sorter Feeder	1
27	Sort Bin	2
28	Computer Room	1
29	Filing Room	1
30	Millright Room	1
31	Stick Cart Transfer	1
32	Bundle Outfeed Rollcase	1
33	Rejected Log Conveyor System	1
34	Fines Conveyor System	1
35	Chip Conveyor System	1
36	Block Conveyor System	1
37	Chipper	1
38	Chip Screen 8' x 14' 2-Deck	1
39	Insulated Steel Building	1
40	Service Trailer	1

HewSaw Options – Not all options are necessary, many are “either/or”:

Double axis scanner:	\$ 65,400	(includes all software, may need 2 for presorts)
Single axis scanner:	19,000	(same as above)
Basic control system:	68,600	
Servo cylinders:	22,750	
Hydraulic power unit:	23,450	
Labor and materials:	20,000	(installation)
Separate edger:	33,800	(variable speed controls to match through-put)
Independent outfeed wheels:	66,850	(+ controls, reduces gap by 4', max.)
Frequency drives:	32,000	(with speed controls)
Chipper head frequency drives:	98,000	(RPM is set to match through put speed)
Single rotor controls:	80,000	
Double rotor controls:	105,000	

The internal process design of the small log breakdown unit is illustrated in the picture below (note: **HewSaw** technology shown here). It is easy to see why the unit is able to produce quality lumber from a single-pass process.



Typical cutting options produced by the small log technology based on diameter sizes are reflected in the table below. The cutting options are based on the **HewSaw R200 Plus** system operation:

Note:
 1 mm = .03937 inches
 Eg: 80 mm = ~ 3"

	Cutting Option #1 (mm)	Cutting Option #2 (mm)
8" Diameter 6 boards 2 cutting options	22 x 100 25 x 150 44 x 200 44 x 200 25 x 150 22 x 100	15 x 100 32 x 175 44 x 200 44 x 200 32 x 150 15 x 100
6" Diameter 4 boards 2 cutting options	25 x 100 50 x 150 50 x 150 25 x 100	25 x 75 50 x 150 50 x 150 25 x 75
5.5" Diameter 5 boards 2 cutting options	27 x 100 32 x 145 19 x 145 32 x 145 27 x 100	27 x 75 32 x 145 19 x 145 32 x 145 27 x 100
3.5" Diameter 4 boards 1 cutting option	12 x 70 32 x 90 32 x 90 12 x 70	0
3" Diameter 2 boards 1 cutting option	32 x 75 32 x 75	0

Technical improvements in the small log processing technology have occurred within the last year. **HewSaw** has introduced their **R200 Plus** system that significantly improves production efficiency in feed rate, overall higher performance resulting from a heavier weight production center, and significantly improved maintenance designed features that make access in and out of the machine more highly efficient and safe.

CAE/Neunes (McGehee) has also made technical improvement to their system with the "Robo Guide Gang System". This redesign removed the typical "wobble box" configuration and instead slewed and skewed the saws to follow the log. The Robo Guide is a more expensive component but capable of a high piece count. **A complete machine costs between \$ 750,000 to \$1 million** depending on options. A regular linear system needs 120 feet of floor length, a transverse loading system needs 40 to 50 feet, and a "Quikscan" scan system needs 60 to 70 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.

Quick Comparison of Saw Equipment Specs				
Manufacturer	Log/Cant Lengths	Diameter Range	Feed Rate	Other Info
HewSaw Machines Unit 10 – 2337 Townline, Abbotsford, BC Canada V2G 6G1 604-852-7293, ext. 3 info@hewsaw.com	Logs: 4' to 20'	2.5" to 12"	Logs: 250' to 700' fpm Cants: 400 fpm	Can supply entire system Cutting width: 1.7" – 8" Cutting height: 1.7" – 8.9" Optimization available
CAE/Neunes (McGehee) International, PO Box 970 Sherwood, OR 97140 503-625-4703	Logs: 8' to 12.6' <u>(gang saw system)</u> Cant curve saw system	3" diameter on up	500 fpm 33 9' pcs/min, or 33 8' pcs/min when optimized (300 fpm)	Can supply entire system, including optimization controls Best with logs w/significant sweep Allows bucking to longer lengths

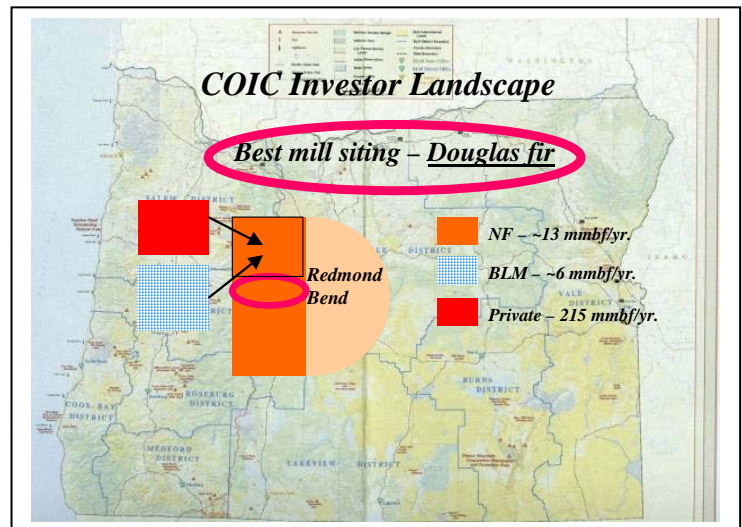
Task 4: Conduct a Facility Siting Review Based on CROP Projected

Under this task, the COIC advisory council for this project determined that for the small diameter logs (4"-12" dbh) to be offered within the CROP investor landscape, only one mill site would be considered for potentially constructing a small log processing plant – that site being the existing Warm Springs Forest Products processing plant located to the North of the Bend-Redmond area. Even so, it is important to understand where a large percentage (at least 60%) of annual volume by species and diameter size is projected to come from. That datum might then be viewed within the context of ‘best bet’ locations for facility siting if the investment intent was specifically directed toward targeted species. Based on the CROP analysis conducted for this project, species-specific best mill siting determinations within the defined investor landscape focusing on where at least 60% of the projected small log volume annually will come from might be as follows:

(Note: the 160-mile investor landscape is depicted as the “Bend-Redmond” circle in “landscape” maps below.)

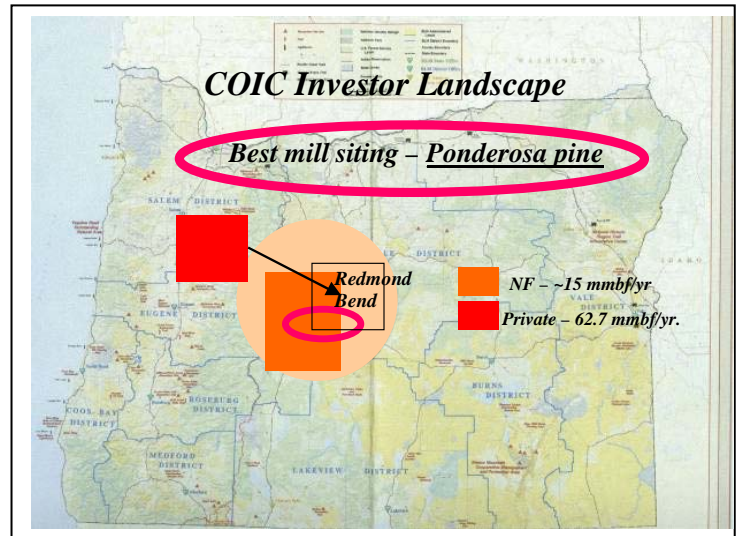
Douglas fir:

- Largest amount of annual volume will come from all four ranger districts of the Willamette NF.
- Within the four ranger districts, projected harvest volumes will be fairly equally distributed each year.
- BLM will also contribute on an annual basis, but the Salem District will be the primary contributor from year to year.
- Note: private lands contributions are historical snapshots only and include all diameter classes



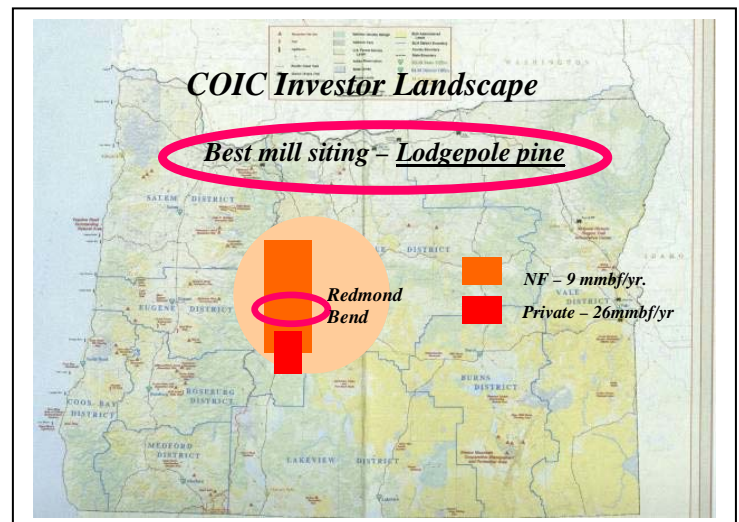
Ponderosa Pine:

- Largest amount of annual volume will come from all three ranger districts of the Deschutes NF.
- Within the three ranger districts, the Bend / Fort Rock RD will provide ~ 50% of the projected annual harvest volume.
- The Silver Lake Ranger District from the Winema-Fremont NF will also contribute to the annual volume.
- *Note: private lands contributions are historical snapshots only and include all diameter classes*



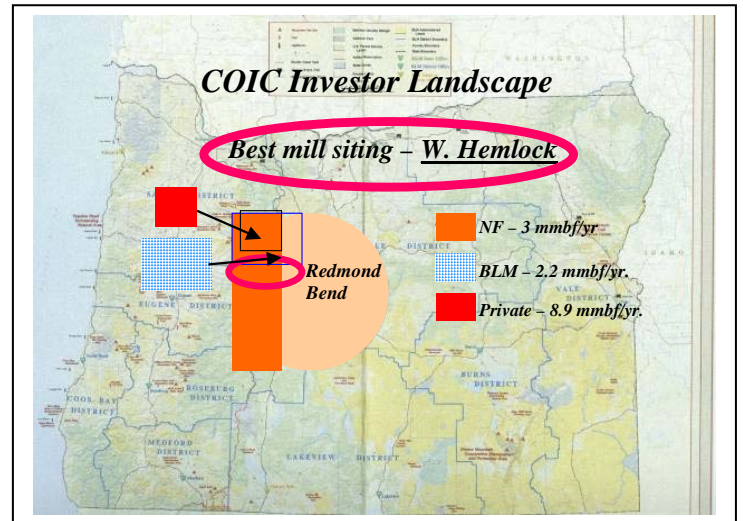
Lodgepole pine:

- Largest amount of annual volume will come from all three ranger districts of the Deschutes NF.
- Within the three ranger districts, projected harvest volumes will be fairly equally distributed each year.
- The Silver Lake Ranger District from the Winema-Fremont NF will also contribute to the annual volume.
- *Note: private lands contributions are historical snapshots only and include all diameter classes*



Western Hemlock:

- Largest amount of annual volume will come from all four ranger districts of the Willamette NF.
- Within the four ranger districts, projected harvest volumes will be fairly equally distributed each year.
- BLM will also contribute on an annual basis, but the Salem District will be the primary contributor from year to year.
- *Note: private lands contributions are historical snapshots only and include all diameter classes*



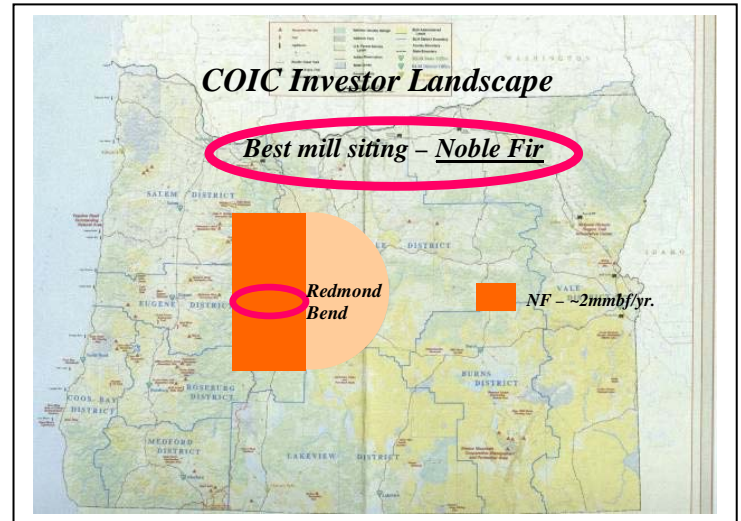
Juniper:

- Largest amount of annual volume will come from two BLM districts, but the Lakeview District will contribute the lion's share of the annual volume.
- No other public or private lands are projected to offer juniper for purchase during the project planning period within the investor landscape.



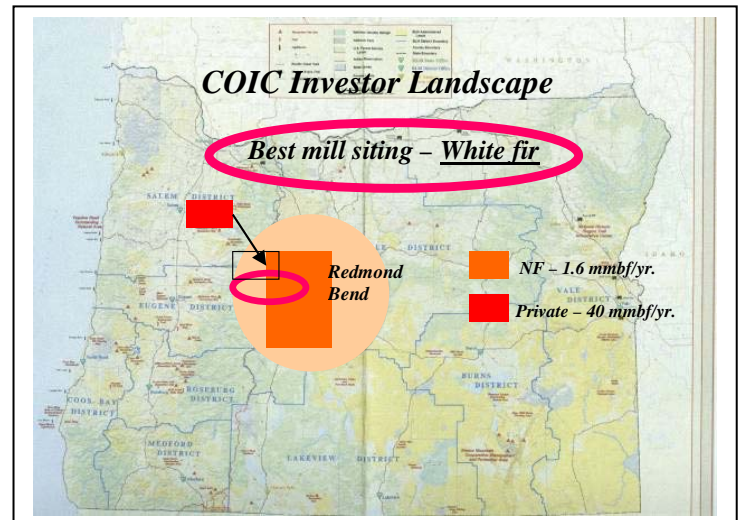
Noble Fir:

- The four ranger districts of the Willamette NF will be providing 100% of the volume being offered in this species.
- Within the four ranger districts, projected harvest volumes will be fairly equally distributed each year.



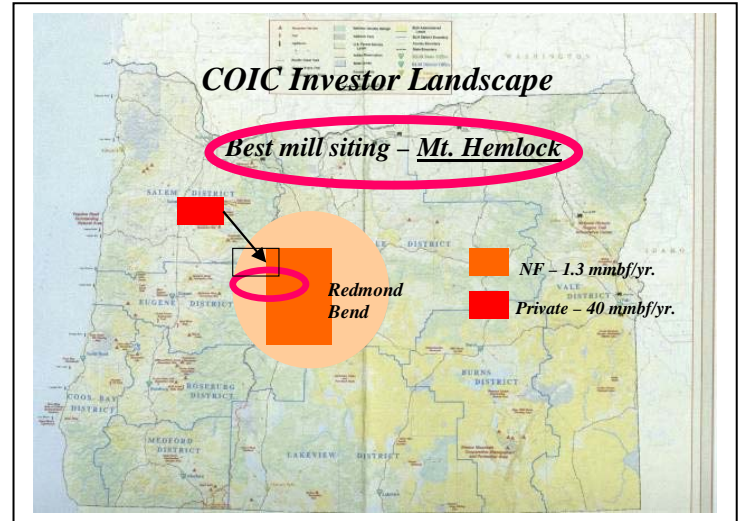
White Fir:

- Largest amount of annual volume will come from all three ranger districts of the Deschutes NF.
- Within the three ranger districts, the Bend / Fort Rock RD will provide over 50% of the projected annual harvest volume.
- *Note: private lands contributions are historical snapshots only and include all diameter classes*



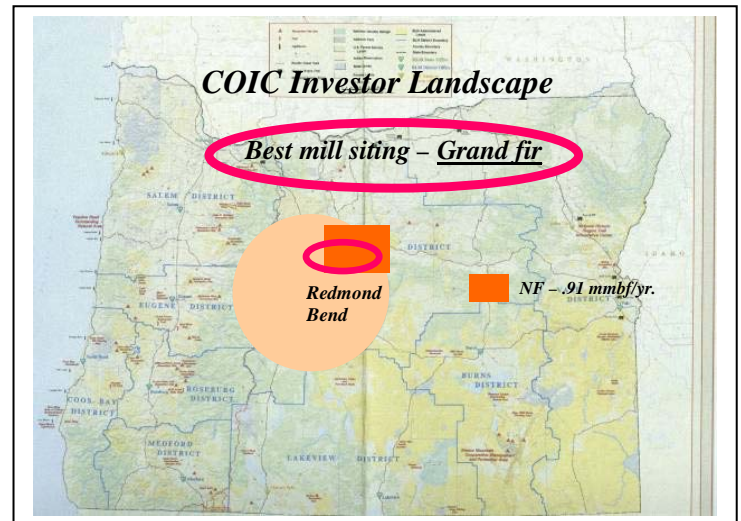
Mt. Hemlock:

- Largest amount of annual volume will come from all three ranger districts of the Deschutes NF.
- Within the three ranger districts, the Bend / Fort Rock RD will provide over 50% of the projected annual harvest volume.
- *Note: private lands contributions are historical snapshots only and include all diameter classes*



Grand Fir:

- The two ranger districts of the Ochoco NF will be providing the only supply of this species in the investor landscape during the next five years.
- Within the two ranger districts, the Lookout Mt. RD will provide over 70% of the projected annual harvest volume.



Task 5: Develop Mill Options Datum for Facility Set-up

Under this task, Mater Engineering was to prepare options for small log processing mill consideration, including identification of basic equipment criteria, and development of a preliminary staffing list identifying the number of people, general positions, and estimates of probable project costs. Assumptions and background information used for analyses under this task include the following:

1. Small log processing would occur within an existing milling operational set-up in or near the investor landscape determined for this project (~ 80 radius from the Bend/Redmond site). For this project, the Warm Springs Forest Products mill to the north of the investor landscape was determined by the COIC project advisory team as the potential target site for construct of small log processing line to an existing milling operation. As a result, the projected equipment and labor costs detailed under this task assume construction would occur within such existing operation.
2. The CROP analysis within the investor landscape for this project determined that approximately 377 mmbf of small diameter resource (up to 12" dbh) would be offered for sale and/or harvested during the next 5 years. Of that volume, ~ 295 mmbf (or approximately 59 mmbf per year) would be in the 4"-12" dbh range encompassing eight (8) baseline species: Douglas fir, ponderosa pine, lodgepole pine, western hemlock, noble fir, white fir, mountain hemlock, and grand fir. Mixed hardwoods, "other" species combinations, juniper and "minor" species would fill out the coordinated resource offering. Save for grand fir, the Willamette and Deschutes National Forests would provide at least 60% of the total projected annual volume in the other species for removal within the investor landscape.
3. For purposes of conceptual analysis, we have assumed that a small log breakdown line would process approximately 50 mmbf yr., or approximately 100,000 board feet per shift. The primary small log breakdown equipment (HewSaw, McGehee, or equivalent) would average approximately 9,000 log segments per shift. This would equate to approximately 22 logs per minute on a 400 minute shift basis.
4. The small log processing line would be operated on a two-shift basis: regular and swing shift.

Table 1, attached provides a breakout of potential material and labor costs to construct a 50 mmbf/yr small log mill within an existing plant in central Oregon. Cost estimates are based on other similar small log construction projects that have occurred in the western part of the US during the last few years. As such, **the costs are approximate only**. They are to be used as starting points to confirm and verify assumptions and calculated costs associated with undertaking the actual design and construction of a small log processing line.

TABLE 1:
APPROXIMATE MATERIAL & LABOR COST RANGES TO CONSTRUCT A 50
MMBF/YR.
SMALL LOG MILL AT AN EXISTING PLANT IN CENTRAL
OREGON:

	<i>MAT</i>	<i>LAB</i>
<u>DEMOLITION:</u> POSSIBLE CONCRETE REMOVAL; MODIFICATIONS OF FLOORS & WALLS.		\$3,
<u>CIVIL:</u> ALL BACKFILL REMOVAL & COMPACTIONS (PRICE FOR ~1,000 YARDS).		\$8,
<u>STRUCTURAL:</u> INCLUDES LOG DECK AND INFEED, DEBARKER FRAME, SLASHER DECK SUPPORT, SLASHER OF, REJECT, INFEED BINS, DEBARKER; MCGEHEE OR HEWSAW SUPPORT FRAME, MCGEHEE OR HEWSAW FLOOR STEEL, LANDING DECK.	\$1	\$4
<u>STRUCTURAL PACKAGE:</u> ADDED DOORS, LIGHTING, WALKWAYS, FLOOR GRATING, HAND RAILS, STAIRS, DEBARKER JIB.	\$8	\$4
<u>FOUNDATIONS:</u> INCLUDING LOG DECK AND INFEED, DEBARKER AND FLOOR, SLASHER DECK, SLASHER OUTFEED, MCGEHEE OR HEWSAW LINE, LANDING DECK AREA, STACKER & OUTFEED, CHIPPER AREA, CONVEYOR TO BIN, BARK BUNKER.	\$6	\$7
<u>MECHANICAL:</u> 1) Main log deck refurbish 2) Split log feeder 3) Debarker Infeed: ~110' vertical take up; 24" belt; Vee Roll; two speed drive; sissy bar.	\$8,000 \$30,000 \$45,000	\$12,000 \$3,000 \$11,000
4) NICHOLSON A5B (DEBARKER)	\$1	
5) DEBARKER OUTFEED CONVEYOR ~80': GRAVITY TAKE UP & TUNNEL; BELT; 2 LOG SWEEPS; TWO SPEED DRIVE.	\$3	\$6,

6) <i>SLASHER INFEEED DECK: RUNS; CHAIN; LOG STOP AND LOAD; USED DRIVES; ROLLS, GATES, SAWS; CHAIN; DRIVES; USED HPU; 48" SAWS.</i>	\$2	\$2
7) <i>SLASHER OUTFEED: ~140' PAN AND CONVEYOR; 16" BELT; DOUBLE ACTING SWEEPS; USED HPU FOR SWEEPS; USED DRIVE.</i>	\$5	\$1
8) <i>SCANNER</i>	\$4,	\$5
9) <i>METAL DECTECTOR WITH FIBERGLASS SECTION</i>	\$1	\$4,
10) <i>DYE SPRAY SYSTEM</i>	\$7	
11) <i>BIN ACCELERATOR ROLLS</i>	\$4,	\$7
12) <i>OVERSIZE AND METAL BIN</i>	\$1	\$2,
13) <i>STEP FEEDER:</i>		

A. LANDING DECK: CHAIN; SWEEP BOARD; USED DRIVE; HEAD PLATE CHUTING.	\$1	\$2,
AGE DECK; ~15": CHAIN; USED DRIVE.	\$4	\$4,
C. 5 STEP STEP FEEDER WITH DRIVE AND ROLLCASE.	\$6	\$2,
14) MCGEHEE OR HEWSAW INFEEED BELT CONVEYOR ~50': 16" BELT; USED DRIVE.	\$1	\$4,
15) TWO ARM LOG SWEEP	\$5,	
16) REJECT BUNK	\$1	\$2,
17) SMALL LOG PROCESSING:		
A. MCGEHEE OR HEWSAW MACHINE WITH OPTIMIZER & PLC	\$7	\$2
ATOR BOOTH AND OPTIMIZER ROOM	\$1	\$1,
18) OUTFEED:		
A. MCGEHEE OR HEWSAW OUTFEED ROLLCASE: USED DRIVE	\$4,	\$1,
B. OUTFEED LANDING TRANSFER WITH DRIVE	\$1,	\$3,

<i>C. SORT CHAIN: CHAIN; USED DRIVE; DRIVE ROLL.</i>	\$1	\$2,
<i>D. DIVERTER GATE</i>	\$3,	\$7
<i>E. 2 TRAYS ~90': CHAIN; USED DRIVES.</i>	\$3	\$6,
<i>F. TIPPLE 4 ARM: USED DRIVE.</i>	\$1	\$9,
<i>19) LANDING TRANSFER: A. LANDING TRANSFER: CHAIN; USED DRIVE.</i>	\$1	\$1,
<i>B. DECLINE BELTS: CHAIN; USED DRIVE.</i>	\$5,	\$2,

Table 1cont.:

	MATE	LAB
20) GREEN CHAIN: CHAIN; USED DRIVE.	\$10,0	\$3,
21) STACKER: OUTFEED; WALKWAY; STAIRS; AND ROOF.	\$45,0	\$1
TOTAL MECHANICAL	\$1,62	\$1
SYSTEM:		
22) DEBARKER CONVEYOR ~60': CHAIN; USED DRIVE.	\$20,0	\$5,
23) SLASHER DECK FLOOR CHAINS: CHAIN; USED DRIVES.	\$35,0	\$1
24) CHIPPER INFEED CONVEYOR; ~150': 16" BELT; CHAIN; USED DRIVES.	\$35,0	\$1
25) BALANCED VIBRATING CONVEYOR ~40' WITH METAL DETECTOR.	\$22,0	\$2,
26) 66" CHIPPER WITH DRIVE	\$45,0	\$6,
27) CHIP SCREEN: 104 FINES CONVEYOR; CHAIN; USED DRIVE.	\$26,0	\$4,
28) WASTE CONVEYOR ~100': CHAIN; USED DRIVE.	\$21,0	\$6,

29) CHIP CONVEYOR ~80': CHAIN; USED DRIVE.	\$20,0	\$6,
30) FINES CONVEYOR TO BIN: SUPPORTS; CHAIN; USED DRIVE.	\$36,0	\$1
31) CHIP CONVEYOR TO BIN: SUPPORTS; CHAIN; USED DRIVE.	\$36,0	\$1
32) FOUNDATION WORK FOR CHIP & FINES BINS	\$15,0	\$4
33) CHIPPER ROOF	\$30,0	
34) CHUTING	\$18,5	\$3
SUB TOTAL CLEAN UP SYSTEM	\$359,	\$1
35) AIR COMPRESSOR	\$23,0	\$5,
36) DRYER	\$16,0	\$4
37) AIR TANK	\$2,00	\$4
38) AIR PIPING	\$12,0	\$1

<i>SUB TOTAL AIR SYSTEM</i>	\$53,0	\$2
<i>S: ~15 VALVE AND PLUMB STATIONS.</i>	\$21,0	\$1
<i>L: ~3000 HP; CONTROL WIRING; POWER WIRING; PROCESS CONTROL FOR STACKER.</i>	\$330,	\$4

Summarizing, the potential costs to develop a small log processing center within an existing manufacturing facility in the study region might be in the \$4 million range, with approximate material and labor costs as follows:

	Cost \$
Engineering	\$180,000
Site & Project Management	\$55,000
Freight	\$54,000
Demolition	\$3,500
Civil	\$8,500
Structural	\$285,000
Mechanical	\$1,780,800
Clean Up	\$508,500
Air System	\$77,300
Hydraulic System	\$39,000
Electrical	\$780,000
Foundations	\$135,000
Fire System	\$75,000
Total	\$3,981,600 or ~\$4 MM

Based on a two-shift operation, it is estimated that ~ 65 employees would be required to operate the small log processing line. **Table 2**, below, provides an estimated employee requirement breakout per sawmill workstation:

	# of Employees
<i>Regular Shift:</i> Log Yard	2
Sawmill	10
Saw Maintenance	6

	Filing Room	2
	Dry Kiln/Boiler	4
	Mobile Equipment	3
	Planer	11
	Shipping	2
	Sawmill Supervision	2
	Planer Supervision	1
	Admin	7
	Subtotal	50
Swing Shift:	Log Yard	2
	Sawmill	10
	Saw Maintenance	1
	Sawmill Supervision	1
	Subtotal	14

Approximate hourly and salaried rates for employee types are detailed in **Table 3**, (attached).

Table 3

		<i>~Base Rate Per Hour</i>
Payroll – Hourly:		
Log Yard	Operator	\$12.00
Sawmill	Debarker	\$12.00
	Cutoff Saw	\$10.50
	Bin Tender	\$10.00
	Small Log Machine	\$14.00
	Edging Picker	\$10.00
	Stacker	\$12.00
	Lift Truck	\$12.00
	Chipper c/u	\$10.00
	Sidecut Handler	\$10.00
	Extra	\$9.00
Sawmill Maintenance	Shift Millwright	\$14.00
	Millwright	\$14.00
	Electrician	\$16.00
Filing Room	Sawfiler	\$14.00
Dry Kiln/Boiler	Operator	\$12.00
Mobile Equipment	Mechanic	\$14.00
Planer	Forklift	\$12.00
	Infeed	\$12.00
	Setup	\$14.00
	Grader	\$14.00
Other Production:	Pull Chain	\$10.00
	Stacker	\$12.00
	Paper Wrap	\$10.50
	Clean Up	\$9.00
Shipping	Shipper	\$14.00
Payroll – Salaried:		<i>~ Base Rate</i>
Sawmill	Supervisor	\$4,000.00
	Supervisor	\$3,400.00
Planer	Supervisor	\$3,600.00
Administration	Clerical	\$1,700.00
	Clerical	\$1,700.00
	Office Manager	\$3,000.00
	President	\$8,000.00
	Vice President	\$8,000.00
	Exec. Support	\$3,600.00
	Forester	(contract)

Task 6 – Determine Preliminary Baseline Feasibility for Establishing a Small Log Processing Facility in the COIC Region

For this task, Mater Engineering was to provide a conceptual economic framework that could be used in the development of a ‘bankable’ business plan to construct a small log processing facility in the COIC region. As noted earlier, the preliminary financial analysis would assume that such a processing facility would be sited at an existing private or tribal mill in the area – in this case the Warm Springs Forest Products mill located to the north of the defined CROP investor landscape. Baseline assumptions for employee and equipment requirements and costs to be used in the conceptual economic model development have been detailed under Task 6 of this report (~ **\$4 million in construction requirements; ~65 employees; a 2 shift operation with 100 mbf production per shift; ~ 50 mmbf production per year**).

Other key assumptions used in the conceptual economic model include:

Key Assumptions	Base Case		
Production per shift	(mbf/shift)	100	(Assumes 2 shifts after 1st month)
Tons of Logs per mbf	(tons/mbf)	4.00	
Trim Allowance		5%	
Down time	Per day	~30 min.	
Cost of Logs	(\$/ton)	\$ 40	(Price increased every 12 months by \$2/ton)
Price per mbf		\$ 300	
Value of Residuals/mbf		\$ 25	
Selling Expenses		3%	
Loan Value		\$5,000,000	
Interest Rate		11.5%	
No. of Years		10	(Payable monthly after startup)

Summarizing and as shown in **Table 4**, below, the conceptual economic model developed for this project suggests that a small log processing operation could be successfully operated in the COIC CROP region:

Table 4: Summary

	<i>(Approximate values)</i>		
	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>
<i>Annual Production (mmbf)</i>	~22	~50	~50
<i>Annual Sales</i>	\$6,400,000	\$16,000,000	\$16,500,000
<i>Annual Log Costs</i>	\$3,500,000	\$8,600,000	\$8,940,000
<i>Annual Cost of Goods Sold</i>	\$5,408,000	\$13,900,000	\$14,110,000
<i>Annual Gross Margin</i>	\$992,000	\$2,100,000	\$2,400,000
<i>Gross Margin/mbf</i>	\$45	\$45	\$40
<i>Annual Production Cost/mbf</i>	~\$120	~\$100	~\$100
<i>Pre-operating G&A</i>	\$280,000	0	0
<i>Interest</i>	\$404,000	\$540,000	\$507,000
<i>Annual Net Profit</i>	\$308,000	\$1,560,000	\$1,890,000

An explanation of key technical/operating assumptions used in the conceptual economic model and conclusions of preliminary financial analyses follows:

1. *Production Levels:*

For the purpose of the analysis, a 100,000 bf per 8 hour shift was used. This typically is a lower production number based on what the small log processing technology can produce. This assumed production level will require an average of approximately 9,000 log segments per shift with an average small end diameter of approximately 5” (or approximately 22.5 logs per minute on a 400 minute shift basis.) Both the McGehee and HewSaw small log processor equipment have demonstrated ability to handle over 25 logs per minute in other mills. Potential bottlenecks in the operation will need to be identified and the design of the small log processing line layout will be important in assuring production ‘fit’ with existing milling operations and projected production levels. The mill itself should be designed to handle a continuous feed speed through the operation of over 25 log segments per minute.

2. *Recovery:*

Recovery projections are based on manufacturing 1,000 bf of lumber from every 4 tons of logs. This recovery level should be achievable with the small log processing equipment available coupled with a well-designed manufacturing flow. Given the fact that the small log line will likely be initially cutting for the commodity market with standard wane allowances, the line should not have difficulty in achieving a 4.0 or better recovery in a short period of time.

3. *Log Supply and Price:*

Discussion of log supply is covered in detail under Task 1 of this report. Here is a snapshot of the CROP analyses results for the COIC region that the proposed small log processing line will rely on:

- The timber this operation will be purchasing is timber commonly known as “underutilized” because it primarily goes for paper chips or is left in the woods. The small timber, 4” to 7” is typically not sought after by most solid wood processing mills.
- Within the defined investor landscape during the next five years, over 377 mmbf of small diameter logs is scheduled to be removed from public forestlands: BLM, and the Willamette, Mt. Hood, Ochoco, Deschutes, and Fremont-Winema National Forests. Of the 377 mmbf, 95% of the entire volume (or 358 mmbf) will be comprised of wood resource 4”-12” in dbh. Approximately 73% of the 358 mmbf (or ~ 262 mmbf) will be comprised of wood resource 7”-12” in dbh.
- Twelve different species and species combinations comprise the CROP analyses within the COIC investor landscape. But likely only five of these species/combinations will be of import to the small log operation: **Table 5**, below, provides an overview of the projected 5-year volume for these targeted species. The 7”-12” volume is a critical component for the proposed small log operation, and sets the framework for the size of operation to be constructed. For this economic model, it was determined that a small log line should produce ~ 50 mmbf of lumber on an annual basis. The needed volume would come from targeted species from the ~75 mmbf annual volume (377 five-year volume) projected for offering within the investor landscape, matched with the ~12 mmbf/yr. small log volume estimated to be harvested off the Warm Spring Indian Nation’s own forestlands:

Table 5: 5-yr. projected volume in COIC investor landscape

Species	4”-7” dbh (mmbf)	7+”-9” (mmbf)	9+”-12” (mmbf)	Sum: 7”-12” (mmbf)
Douglas fir	17.34	33.44	47.89	81.33
Ponderosa pine	31.9	34.9	22.4	57.3
Lodgepole pine	18.39	20.35	11.38	31.73
W. Hemlock	7.02	8.45	11.49	19.95
Combined species	13.49	19.14	17.69	36.83
				227.13 or ~ 45 mmbf/yr.

- As noted earlier, a \$40/ton log purchase price was used in the project economic model.

4. Lumber Prices:

The base price used for the finished studs was \$300. This price is conservative when looking at price histories for 8 and 9 ft. studs, which have averaged closer to \$350 over between 1999 through 2003. The use of this conservative figure is advisable, even though 2004 prices have been appreciably higher.

This proposed small log line will have a significant advantage over most startup operations. By utilizing the existing and well-established market network of Warm Springs Forest Products, the operation will not have to discount their lumber significantly to establish a market presence. Startups typically need to discount approximately 10% for 6 months to a year to establish a presence in the market place.

5. *Production Costs:*

Table 6, attached, provides a breakout of estimated total production costs for start-up and follow-on years for a small log production line. The table also provides typical percentage allocations for payroll, insurance, depreciation, operating and maintenance supplies, fuel, and power for each workstation area in the processing line. The financial cost calculations indicate that the production costs for the mill will be approximately \$100 per mbf. This is on the low end of production costs for Western mills, however, it is not out of line given the efficiency of the equipment proposed. It is assumed that the wage rates estimated will be adequate to attract a good crew of approximately 65 employees given the experience of the Warm Springs Forest Products management.

6. *Capital Cost Structure:*

Task 6 of this report details the estimated equipment needs and capital cost structure to construct the small log line within an existing milling operation in Central Oregon. The estimated construction cost is ~\$4 million.

7. *Economic Viability:*

Table 7, attached, provides an overview of estimated revenue and cost of goods that might be realized with construction of a ~50 mmbf/yr small log processing line within an existing wood processing operation in Central Oregon. Given the assumptions used in the economic model, the operation has the potential for 'bankable' success – showing gross margins/mbf of \$41 to \$45 for the first three years. Again – it should be noted that prices used in the economic model for this project are based on small log mill construction costs evidenced over the last few years and should only be used as baseline start points for acquiring updated costing data.

8. *Conclusions:*

The potential to establish a dedicated small log processing operation in the COIC region has many elements that increase the opportunity for business success. While no business is risk free, some of the key elements that improve the potential for such a project in the region include:

- An existing sawmill facility (Warm Springs Forest Products) in which to construct a small log line. This will save a significant amount of time in construction and provides the required infrastructure for the mill at a relatively low cost.
- A management team that is experienced in the industry and the area.

(approximate values)

Table 6: Estimated Manufacturing Costs

	Year 1 12 months	Year 2 12 months
Manufacturing Costs (Approximate % Breakouts)		
Log Yard & Mobile Equipment	\$215,000	\$390,000
Payroll Cost	65%	67%
Operating Supplies	6%	6%
Maint. Supplies	16%	15%
Fuel	3%	3%
Depreciation	9%	9%
Sawmill	\$1.3 mm	\$2.4 mm
Sawmill Payroll Cost	44%	47%
Taxes & Insurance	3%	3%
Depreciation	33%	31%
Operating Supplies	4%	4%
Maintenance Supplies	5%	5%
Fuel	1%	1%
Power	6%	6%
Other Fixed Costs	3%	3%
Sawfiling	\$66,000	\$115,000
Payroll Cost	68%	70%
Operating Supplies	21%	20%
Maintenance Supplies	11%	10%
Dry Kilns & Boiler	\$205,000	\$365,000
Payroll Costs	37%	40%
Taxes & Insurance	3%	4%
Depreciation	17%	16%
Operating Supplies	8%	8%
Maintenance Supplies	17%	16%
Fuel	3%	3%
Power	10%	10%
Other Fixed Costs	3%	3%
Planer	\$470,000	\$880,000
Payroll Cost	46%	49%
Taxes & Insurance	4%	4%
Depreciation	14%	13%
Operating Supplies	9%	8%
Maintenance Supplies	12%	11%
Fuel	3%	3%
Power	8%	8%
Other Fixed Costs	4%	4%
Shipping	\$50,000	\$95,000
Payroll Cost	59%	62%
Operating Supplies	29%	25%
Maintenance Supplies	12%	13%
G & A Expenses (Allocated to Cost of Goods Sold)	\$395,000	\$710,000
Salaries	53%	55%
Dues & Misc S & E	47%	45%

(approximate values)

Table 7: Conceptual model

* = model % of revenue

** = model % of cost of lumber produced

		Year 1 12 months	Year 2 12 months	Year 3 * 12 months
PRODUCTION INFORMATION	Base Assum.			* \$2/ton increase in log purchase cost
Production Days		136	~250	~250
Production Per Shift (mbf)	100			
Production (mbf)		~22,000	~50,000	~50,000
Lumber Volume sold		17,700	50,000	50,600
Accum. Inventory		18,000		
Log Volume Purchased (tons)	4.00	86,000	200,800	18,400
Log Cost/Ton	40			
Lumber Sales/mbf	300			
By-product Income/mbf	25			
Revenue				
Lumber sales *		84%	92%	92%
By-product Sales *		7%	8%	8%
Other Income *		9%		
Total Revenue		~\$6,400,000	16,000,000	16,500,000
Cost of Goods Sold				
Cost of Logs Purchased **		55%	63%	64%
Log Yard & Mobile Equipment **		3%	3%	3%
Sawmill**		22%	18%	17%
Sawfiling **		1%	1%	1%
Dry Kilns & Boiler **		3%	3%	3%
Planer **		8%	6%	6%
Shipping **		1%	1%	1%
G & A Expenses (Allocated to Cost of Goods Sold) **		6%	5%	5%
Cost of Lumber Produced		\$6,200,000	\$13,500,000	\$13,700,000
Cost of Lumber Sold		\$5,250,000	\$13,500,000	\$13,700,000
Selling Expenses	3%	~\$158,000	~\$400,000	~\$410,000
Total Cost of Goods Sold		\$5,408,000	\$13,900,000	\$14,110,000
Gross Margin		\$992,000	\$2,100,000	\$2,400,000
Production Costs/mbf		~120	~100	~100
Gross Margin/mbf		~45	~45	~40

- The use of existing marketing and product distribution channels for lumber products that can be manufactured from small diameter logs in the region.
- The use of high tech equipment that can efficiently process the presently underutilized log resource.
- A mill location in the center of a significant timber producing area with a significant amount of small logs to be offered over the next five years based on the CROP analysis. This small diameter resource is presently being underutilized.
- A strong potential to hire experienced sawmill workers from the local area due to the location and long-term history of the existing mill.