COPWRR Report Synopsis

Markets and Processing Options for Small Diameter Trees

July 2002

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

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

This study focused primarily on the utilization of small diameter timber (5"- 9" dbh), which makes up the majority of the underutilized, non-timber biomass volume and has the greatest potential for cost effective utilization in commodity and value-add markets. For smaller biomass, several options are being addressed through other projects such as energy generation, compost, or in-field treatments. Of the technologies discussed, Sorbilite could utilize some of the smaller biomass along with residue from processing of the small timber.

The results of resource, processing, and market reviews undertaken for the project suggest there may be an opportunity to create the framework for a more consistent, stable small diameter wood flow from the region's forest by creating higher value markets for small diameter timber sales. Options evaluated for creating higher value products included assisting existing or new industries by stabilizing timber supply; upgrading existing or developing new operations that can profitably process small logs; introducing new smaller-scale value-added process technology for manufacturing products from solid wood and residue derived from small logs; and capturing additional market opportunities resulting from growing product trends and changing trade policy between the US and Canada.

The following synopsis provides an at-a-glance review of the report's findings. The complete July 2002, report for the project is available through the COIC.

At-A-Glance Results for . . .

. . . *Wood Supply* (with focus on the Deschutes, Ochoco, Fremont, and Winema NFs)

1. While large timber sales (>9" dbh) typically predominated timber sales offerings from National Forests (NFs) up to 1999, beginning in 2000, small diameter timber (5"-9" dbh) has comprised just under half of all timber volume sold (between 25-35 million board feet (mmbf) per year).

2. Lodgepole pine has been the predominant species offered for small log sales during the last three years – even though Ponderosa pine and white fir are considered a high priority for fuel removal.

3. For a variety of reasons, as illustrated in the following maps, timber sale offerings for both large and small timber from the region's National Forests have been highly variable between Ranger Districts within each National Forest, and between the four National Forests. Between 1999-2001, few Ranger Districts offered timber sales each year (both large log and small log sales). Of those that did, few offered a *consistent, level volume* of timber sale offerings from year to year.

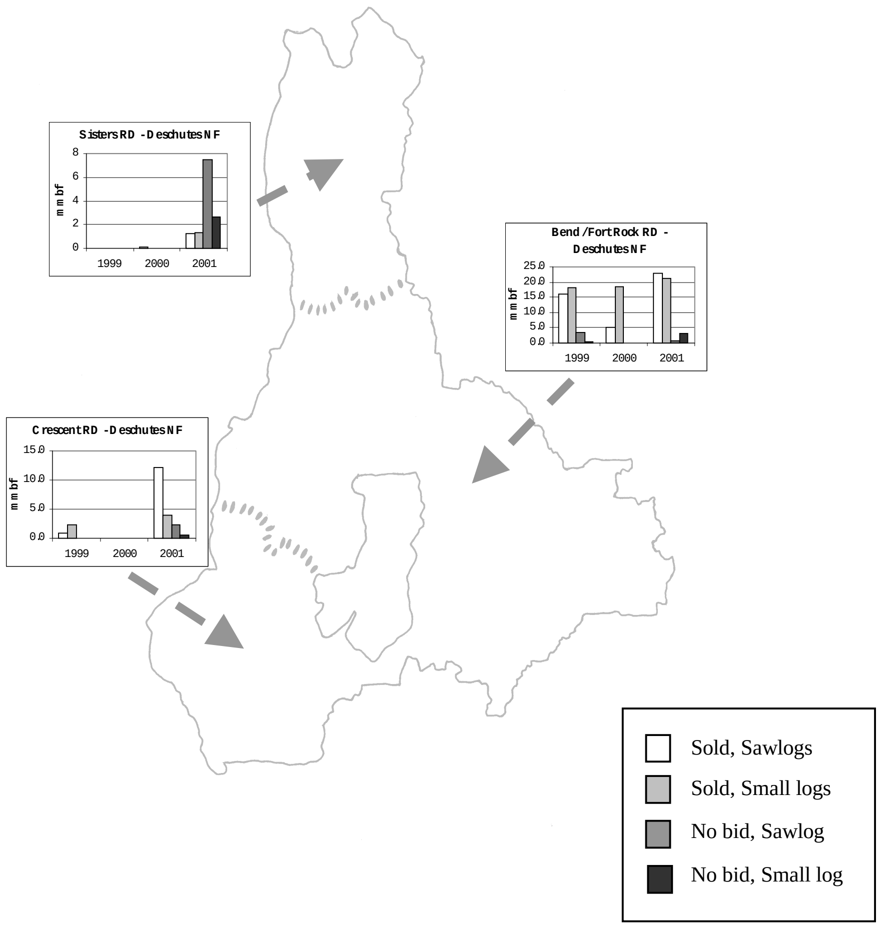
   Of the four National Forest in the region, the Winema-Fremont NF appears to be the only forests that maintains a 2 to 3 year planning process for timber sales. The Deschutes NF employs a 1-year planning process "at most", with sales initiated "as needed", and Ochoco NF timber sales are planned on a month-to-month basis "due to lack of log buyers"(used to be a 1-year planning process). The lack of consistent, level supply of resource offering has contributed to a decline in the timber market for the area, particularly for small timber. In 2001, 42% of all small log sales offered in the four National Forests went unsold.

> Timber vs. Log Measurement
>
> Timber or trees are measured on the stump. A 9" tree is 9" in diameter at breast height (54") (dbh). This diameter includes bark.
>
> Logs are measured for diameter and taper. A 9" log is typically measured as 9" at the small end diameter (sed), inside of the bark. If the log has a taper of 1.5" in 16 ft. then the large end diameter (led) would be approximately 10.5" if the log was 16 ft. long.
>
> A 12" dbh tree may have two logs, one >9" sed and one < 9" sed depending on taper.

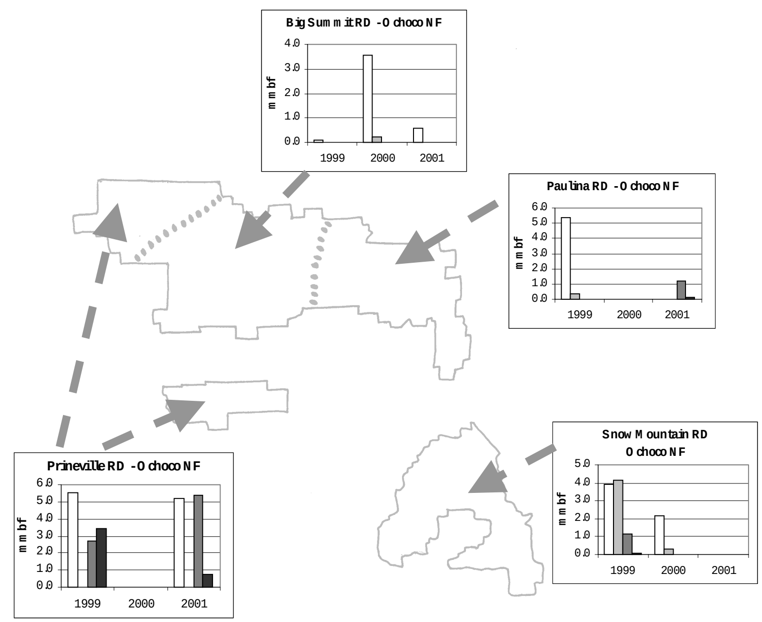
4. Timber sales for small diameter logs are affected by many factors. Consistent supply is a primary factor, but other factors that can equally impact timber sales include distance to log supply, efficiency of processing technology matched to smaller log size, and fluctuations in lumber/chip market prices. Each affects the price a buyer is willing to pay for logs. If the bid price a buyer is willing to pay meets or exceeds the minimum cost recovery price set by the Forest Service, a sale may proceed. If the bid price falls below the minimum, no sale occurs. All of these factors have contributed to decreasing the timber buying potential in the region.

5. National Fire Plan goals for the region will increase the volume of small timber supply that can be utilized by local manufacturers. Projections vary between each National Forest, but it is anticipated that over 80,000 acres will need to be treated annually within the Central Oregon region. As of yet, the National Forests have not calculated how much log volume would be generated from treating these acres under the National Fire Plan.

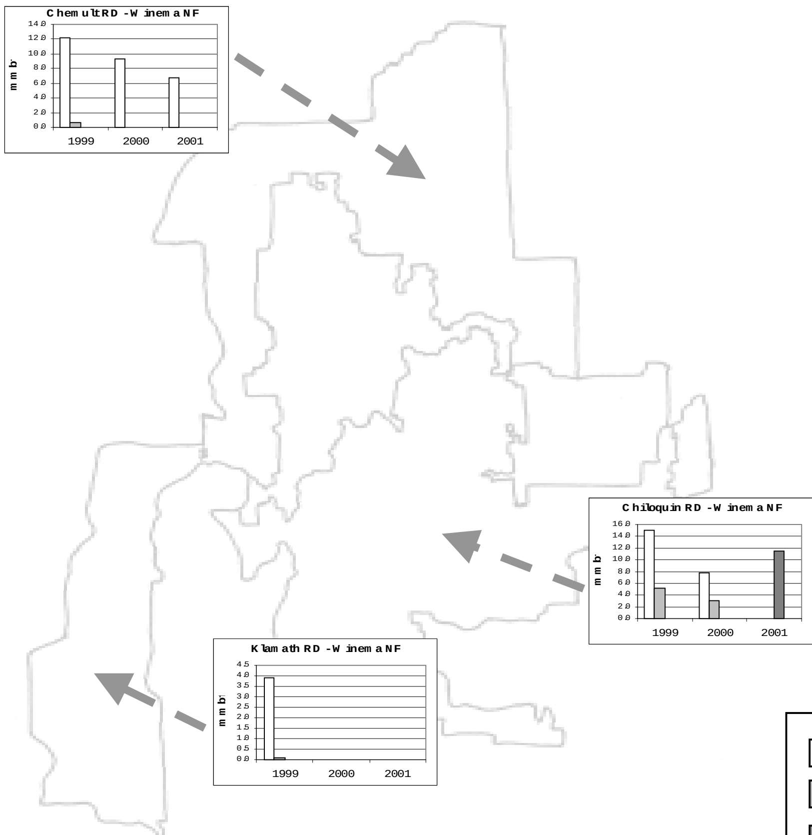
DESCHUTES NATIONAL FOREST



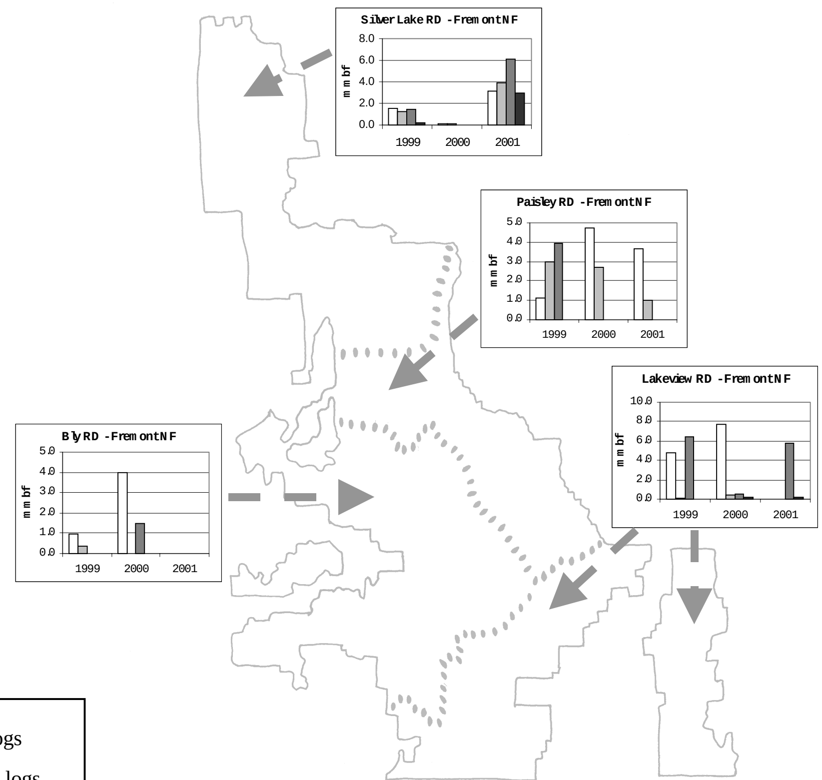
OCHOCO NATIONAL FOREST



WINEMA NATIONAL FOREST



FREMONT NATIONAL FOREST



- Sold, Sawlogs
- Sold, Small logs
- No bid, Sawlog
- No bid, Small log

6. The Confederated Tribes of the Warm Springs anticipates that approximately 10 to 12 mmbf of small diameter timber will need to be harvested from their tribal forestlands each year.

7. Recommendations based on supply findings:

    - Initiate a new intra-regional (multi-District; multi-National Forest) resource offering protocol to levelize supply offering within the region on a long-term basis. This would be a benchmark project not only within the region, but also within the US Forest Service system.

    - Implement longer term (3-5 year) resource planning protocol for sales and fuel reduction projects.

    - Determine resource characteristics coming from National Fire Plan treated acres (species; tree dbh; calculated volumes within the 5" –9" dbh, etc.) Incorporate data within intra-regional resource offering protocol at forest landscape level.

    - Coordinate with the Confederated Tribes of the Warm Springs to ascertain best processing options for small diameter timber to be generated from their future harvests.

. . . Infrastructure

1. With the exception of the Warm Springs' sawmill in Warm Springs, all other primary processing mills in the three-county region have been closed. The Crown Pacific facility in Prineville recently reopened their dry end to process green lumber from their Gilchrist operation. Ochoco Lumber is evaluating the opportunity to reopen their processing facility using radiata pine supplied from offshore sources. (Crown Pacific also operates a sawmill in Gilcrest, Oregon, which is outside of the study area but does utilize some timber from within the region.)

2. While all three primary processing mills in the region process smaller logs along with larger logs, recent interviews with the mills conducted by the USFS indicate that existing processing technology can economically process down to a 9" sed log on a steady volume basis. Smaller diameter logs (< 9" sed) can be processed through these operations, but the costs to do so is often subsidized by the processing of larger diameter logs, especially in times of relatively low lumber and chip prices or high transportation costs.

3. New, efficient, high-speed, small log processing options (see "Technologies" section) that can reduce the cost of small log processing should be evaluated for the region. If found to be viable, incorporation of this new processing technology within an existing regional milling operation may be an attractive option. Investment in this new technology will be predicated on stabilization of regional wood supply and financial viability (evaluated through development of a business plan).

4. Should additional industrial sites be required for new value-added processing, the region appears well suited to accommodate new investment. Many sites within the region appear to be suitable for both new facility construction and existing industrial facility use.

. . . Processing Technologies

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

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

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

   b. **Wood glulam beams made with fiber-reinforced polymer (FRP)**: increases the strength of wood beams made from standard lumber of the grade produced from small diameter logs. With a fiber-reinforced polymer layer, the size of the wood beam can be reduced using up to 40% less wood resource to produce marketable beams. Recent tests conducted on lumber from small diameter Ponderosa pine from the SW region of the US produced results in FRP glulam beams equal to the performance of non-reinforced glulam beams made from Douglas fir.

   c. **New high-compression molding system using wood residual (Sorbilite)**: combines wood residual/fiber, agricultural fiber, shredded tires, etc. with recycled plastics, to produce multiple molded products (cabinet doors, furniture forms, moulding, etc.) The high compression process allows for up to 85% reduction in energy use. This system may prove advantageous not only for residual from small log processing but also for juniper biomass abundant throughout the study region. Recent tests conducted using a mix of sawdust, chips, and bark produced from small diameter Ponderosa pine produced quality moulding and cabinet door parts.

   d. **New lumber hardening process (Indurite)**: employs a non-toxic (soy and corn starch), wood-infusion process to turn "softwood" into "hardwood". Recent tests conducted on lumber produced from small diameter Ponderosa pine resulted in a 27% hardness increase in heartwood and an 89% increase in hardness in sapwood. Further, the wood hardening process increased the fire resistance of the wood to the highest possible standard index for any wood species.

   e. **New lumber stress grading technology (E-Grader)**: affordable in-line processing technology that improves the grading of lumber over traditional visual grading practices. Recent tests conducted on lumber produced from small diameter Ponderosa pine resulted in approximately 30% of visually graded lumber being upgraded to higher value products.

3. Manufacturers offering these new technologies have indicated an interest in being able to invest in targeted communities to introduce their technology. Investment and partnership considerations will be predicated on resource stabilization and completion of marketing due diligence.

4. Recommendations based on new technology findings:
    a. Evaluate the viability of introducing high-speed, single-pass, small log processing into the region at existing operations or in a new facility through development of a business plan. The purpose of the business plan is to evaluate the potential for this new technology to reduce small log processing costs over existing production options in the region.
    b. Invite technology investment into the region through testing of the region's timber resources employing the new value-added technology identified for this project. In other regions of the US, the companies owning these technologies have helped pay more than 50% of the product testing costs.

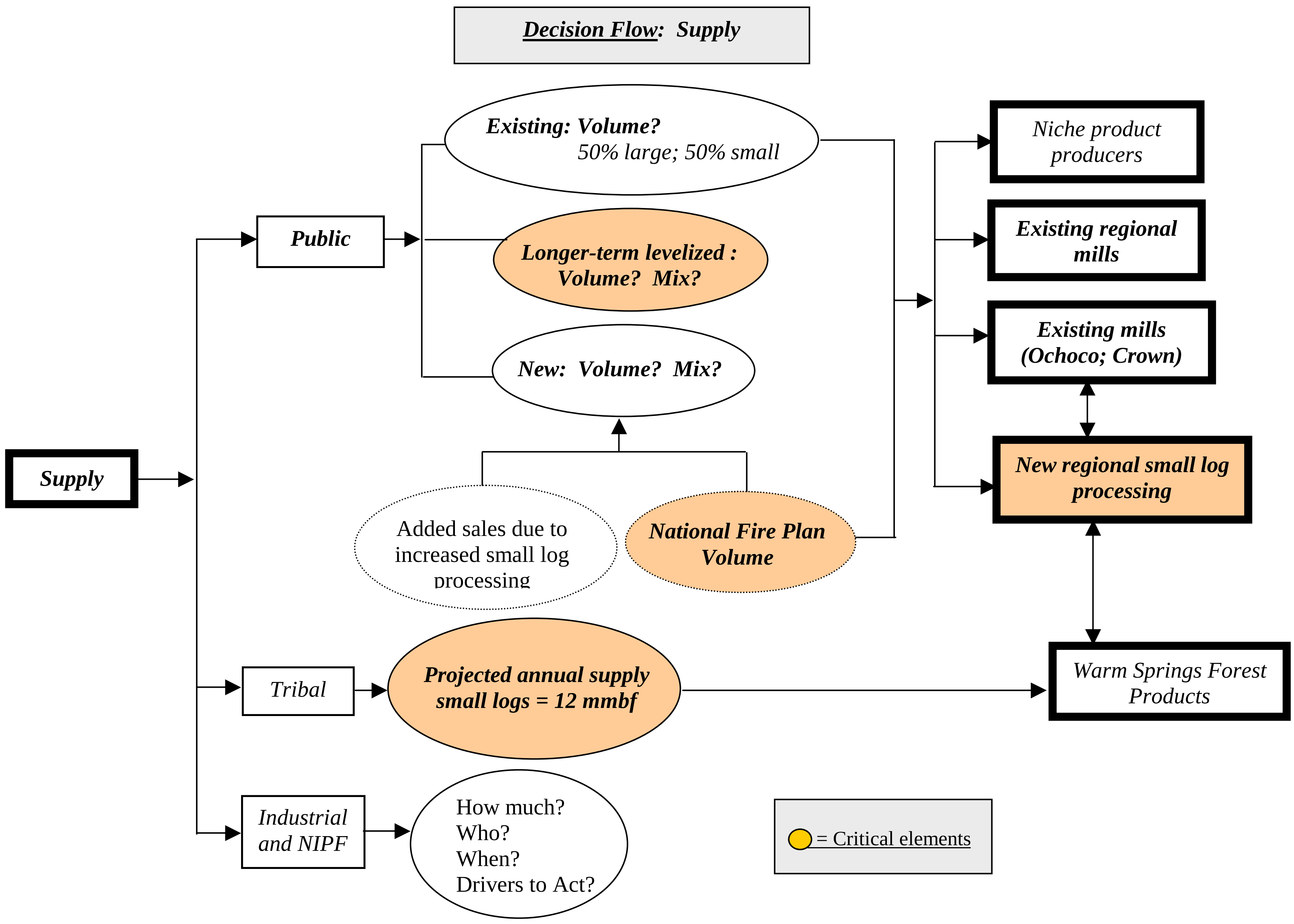
. . . General Markets Overview

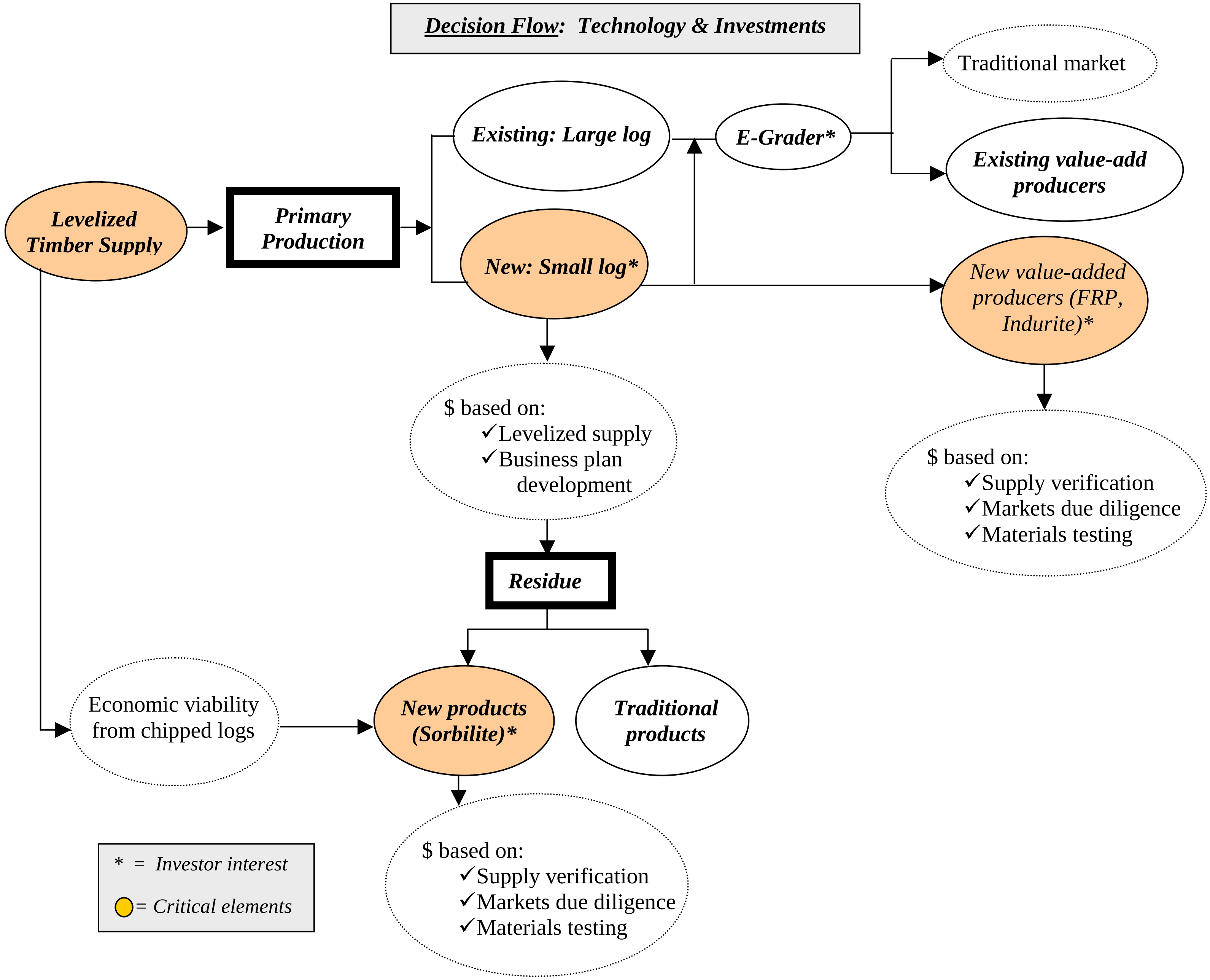
While the scope of the project did not allow for detailed product market analysis, general market reviews did identify trends that could beneficially impact the region's efforts to produce commercially-viable, niche and commodity products from small diameter logs:

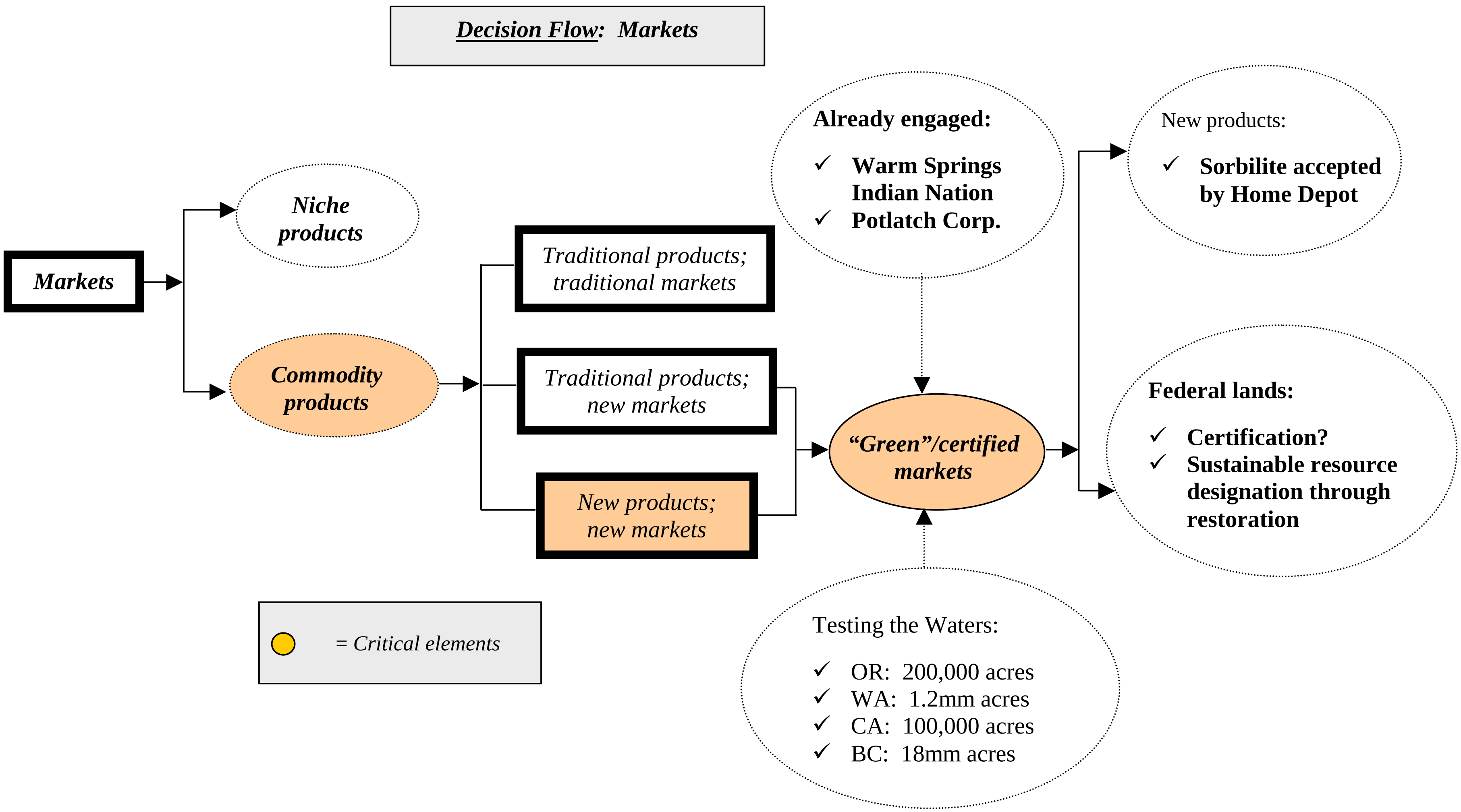
1. The tariffs on Canadian softwood lumber of 27% impact approximately $6 billion worth of lumber flow into the US providing a unique opportunity for US lumber producers to recapture US commodity markets.
2. Experts are forecasting favorable wood product markets in the US as a result of rebounding housing starts and the growth in the repair and remodel industry (positively impacted by the low interest rates).
3. Growth in specific wood product sectors may complement introduction of new value-added processing to the region:
    - Kitchen cabinets; bathroom vanities (Sorbilite products): 15.5% sales increase over the last 12 months.
    - Wood component parts (Sorbilite, Indurite products): 7% sales increase over the last 12 months; over 50% of current buyers in US plan to increase their component purchases.
    - Wood flooring (Indurite): growing with remodeling projects in US (70% of 2001 sales was for remodeling projects)
    - Moulding/Millwork (Sorbilite): growing with remodeling projects in US
    - Structural products (FRP): rapidly expanding; expected to grow by 500% between now and 2010.
    - "Environmentally-friendly" and "certified" wood products: market demand is growing substantially – especially within the home repair and remodel sectors.

. . . Visualizing Next Steps

The following decision-flow diagrams help visualize recommended next steps for the region:


Decision Flow: Supply
Existing: Volume?
50% large; 50% small
Public
Longer-term levelized : Volume? Mix?
New: Volume? Mix?
Supply
Added sales due to increased small log processing
National Fire Plan Volume
Niche product producers
Existing regional mills
Existing mills (Ochoco; Crown)
New regional small log processing
Tribal
Projected annual supply small logs = 12 mmbf
Warm Springs Forest Products
Industrial and NIPF
How much?
Who?
When?
Drivers to Act?
= Critical elements


Decision Flow: Technology & Investments
Traditional market
Existing: Large log
E-Grader*
Existing value-add producers
Levelized Timber Supply
Primary Production
New: Small log*
New value-added producers (FRP, Indurite)*
$ based on:
✓Levelized supply
✓Business plan development
$ based on:
✓Supply verification
✓Markets due diligence
✓Materials testing
Residue
Economic viability from chipped logs
New products (Sorbilite)*
Traditional products
* = Investor interest
= Critical elements
$ based on:
✓Supply verification
✓Markets due diligence
✓Materials testing


Decision Flow: Markets
Markets
Niche products
Commodity products
Traditional products; traditional markets
Traditional products; new markets
New products; new markets
Already engaged:
✓ Warm Springs Indian Nation
✓ Potlatch Corp.
"Green"/certified markets
Testing the Waters:
✓ OR: 200,000 acres
✓ WA: 1.2mm acres
✓ CA: 100,000 acres
✓ BC: 18mm acres
New products:
✓ Sorbilite accepted by Home Depot
Federal lands:
✓ Certification?
✓ Sustainable resource designation through restoration
= Critical elements

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