Growing Poplar for Growing Markets: Pacific Albus Market Analysis

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Please Note: Confidential information has been redacted.
1. Executive Summary

GreenWood Resources (GWR) is a global timberland investment and asset management company specializing in the acquisition, development, and management of forestry assets.\(^1\) Assets under GWR management and committed capital total approximately $800 million with the company specializing in fast-growing, short-rotation hardwood tree farms.\(^2\) As of June 2014, GWR manages approximately 57,700 acres in five countries, with an active acquisition program in North America, Latin America, Europe and Asia. The largest North American asset is the Boardman Tree Farm (BTF), a 26,000-acre FSC-certified hybrid poplar plantation in eastern Oregon. The BTF was acquired and built through a GWR investment entity, the Greewood Tree Farm Fund (GTFF). In addition to the tree farm, GTFF built and operates one of the largest hardwood sawmills in North America, the on-site Upper Columbia Mill (UCM), with mill management and lumber sales provided by the Collins Companies.

BTF’s fast-growing trees are a hybrid of cottonwood and poplar developed in the 1980’s for the pulp market and, as a result, have historically had a poor reputation in the lumber industry. Under GWR management, the hybrid poplar was rebranded Pacific Albus\(^*\) and hybrid poplar lumber is currently being sold and marketed as an alternative to alder and aspen. As Pacific Albus becomes increasingly competitive across a range of applications, the market price of Pacific Albus is increasing and converging toward traditionally higher-valued competing species.

Building on past work by GWR, in the fall of 2014 a Duke University master’s student Michael Rinaldi initiated a two-part Masters Project investigating: (1) the statistical relationship between log inputs and lumber outputs at the Upper Columbia Mill; and (2) supply, demand, and price dynamics of Pacific Albus. The following report represents the market analysis portion of this project.

The objective of the present study is to gain a better understanding of Pacific Albus lumber markets—supply, demand, and price. To this end, we examine the factors that determine market supply and demand, historical pricing, and growth opportunities for Pacific Albus. We pay particular attention to the relative competitiveness of Pacific Albus with red alder, aspen, and other species, in terms of both end-use functionality and price. Key findings of the market analysis include the following:

- Pacific Albus’s competitive advantage lies in its strength-to-weight ratio and FSC certification;
- Sustainability supply constraints may be a limiting factor for growth; and
- Pacific Albus is increasingly price competitive with many aspen, cottonwood, southern poplar, and alder products.

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2. Introduction

Pacific Albus is a hybrid poplar grown in the Pacific Northwest, near Boardman, Oregon. Owned by the GreenWood Tree Farm Fund (GTFF), the Boardman Tree Farm (BTF) is managed by GreenWood Resources (GWR), which manages approximately 57,000 acres in five countries and with an active acquisition program in North America, Latin America, Europe, and Asia. The FSC certified plantation is now 26,000 acres and has an estimated capacity to produce up to 80 million\(^3\) MBF (thousand board feet) per year.\(^4\) The on-site, state-of-the-art, Upper Columbia Mill (UCM) was built in 2008 and is one of the largest hardwood sawmills in North America. Mill management and lumber sales are provided by Collins, the first privately owned forest products company in the United States to have all of its hardwood and softwood forests certified by the Forest Stewardship Council (FSC).\(^5\)

The objective of this market analysis is to gain a better understanding of Pacific Albus supply, demand, and price. Using publicly available data, independent market research, expert knowledge, and GreenWood Resource’s internal analysis, we present a robust evaluation of current market conditions and the market outlook for Pacific Albus.

The present study is divided into four sections. **First**, we assess Pacific Albus in terms of its physical properties and potential applications. **Second**, we investigate demand in both domestic and export markets, and explore opportunities for growth. **Third**, we examine current and future supply of Pacific Albus. And **fourth**, we analyze historical prices and price trends compared with competing species. Finally, we conclude with a discussion of the key findings.

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\(^3\) Current production ranges from 40–60 million MBF a year
\(^5\) Collins, 2014
3. Market Analysis

3.1 The Product: Pacific Albus

History
In the early 1990’s Potlatch Corp., a diversified forest products company, planted 18,000 acres of hybrid poplar on a defunct potato farm near Boardman, to provide a sustainable flow of chips to a pulp and paper plant in Lewiston, Idaho. As the pulp market declined, harvesting and transporting the fast-growing hybrid poplars became more expensive than using waste from sawmills and the trees remained untouched.\(^6\)

In 2007, GWR’s GTFF purchased the hybrid poplar tree farm and on-site chip mill from Potlatch. Subsequent, nearby acquisitions brought the total plantation area to over 26,000 acres. And in October of 2009, GWR opened a $35 million sawmill on-site. Management of the sawmill and a nearby planer mill was awarded to Collins, the owner of timber land and mills in California, Pennsylvania, and Oregon.\(^7\)

Historically, the fast-growing hybrid poplar has not been highly regarded within the lumber industry. Because hybrid poplars were originally planted for pulp production, many believed the wood did not have higher-value uses. However, Collins and consumers alike have found that the wood, now marketed as Pacific Albus, is a good alternative to many hardwoods such as alder, aspen, and cottonwood and even some western softwoods.\(^8\)

Hybrid Genetics
The Pacific Albus is generally described as a cottonwood-poplar hybrid. Technically however, the hybrid poplars that are commercially planted at the Boardman Tree Farm consist of the following hybrid taxa.\(^9\)

- **Populus × Generosa**,  
  o one parent is *Populus trichocarpa* (black cottonwood) – native to western North America, including the lower Columbia River drainage, and  
  o one parent is *Populus deltoides* (eastern cottonwood) – native to eastern, central, and southwestern United States, the southernmost part of eastern Canada and northeastern Mexico

- **Populus × Canadensis**,  
  o the female parent is *Populus deltoides* (eastern cottonwood) – native to eastern, central, and southwestern United States, the southernmost part of eastern Canada and northeastern Mexico, and  
  o the male parent is *Populus nigra* (European black poplar) – native to Europe, southwest and central Asia, and northwest Africa.

In addition to two hybrid taxa described above, GWR’s tree improvement group conducts a program of poplar genetic improvement that continuously develops and deploys elite plant material. Individual clones are selected for growth, form, and disease resistance among other factors. The aim of

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\(^8\) The Forestry Source, 2009

\(^9\) Provided by Cory Boswell, Greenwood Resources Portfolio Manager
the selection process is to minimize the risk of operational failures due to growing risks and maximize economic value.

**Practical Advantages and Physical Properties**

As identified by Collins, Pacific Albus as a product has the following favorable characteristics that make it a good alternative or upgrade to many softer hardwoods:

- Physical properties: lightweight, straight grain, medium to fine texture, very light in color
- Takes and holds paint, stain, and enamel exceptionally well
- Ideal for machining, gluing, sanding, boring and turning
- Hypo-allergenic
- Edge-glues well; very stable due to very low radial/tangential shrinkage factor (1.16)
- Economical transportation by rail, barge and truck
- FSC "Pure" including mill residuals (chips, saw dust, bark)
- For U.S. customers, no issues with ports, lead times, exchange rates and ship fuel surcharges

**Product Mix**

Collins also provides a specification sheet outlining the following products that can be produced from Pacific Albus:

- Lumber: 4/4 and 5/4 depth and lengths up to 13' (4 meters).
- Cants: Up to 6" x 8" x 13'
- S4S and millwork up to 8" wide
- Pallet shook

All products are available kiln-dried, air-dried, heat treated, or green. Kiln-dried lumber is surfaced on both sides with an abrasive planer.

**Applications**

As identified by the Collins Company, Pacific Albus has the following applications:

- Cants
- Moulding
- Pattern stock
- Landscape timbers
- Pallets, crates, boxes
- Edge-glued panels
- Recreation vehicle parts
- Turned items, such as balusters
- Veneer

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11 Meaning 100% of the products are FSC certified and not mixed with uncertified wood


13 Collins, 2014
• Furniture
• Ceilings
• Saunas
• Cosmetic pencils

**Grading**

Pacific Albus is sawn at the UCM to optimize volume recovery given the geometric dimensions of logs, as is typical in a softwood mill. However, as a hardwood, Pacific Albus is sold on the basis of an appearance grading system. Due to its hybrid nature and the lack of hardwood market depth in the west, Pacific Albus, like western red alder, has its own proprietary grading system that isn’t perfectly comparable to other hardwood grades. Pacific Albus lumber grades are described in Table 1 and include: Superior, Superior 1 Face, Custom Cabinet, Com Shop, Premium Frame and Standard Frame, Economy, Jacket Board, and #3 and Better.

**Table 1: Pacific Albus Grading System (From Highest to Lowest Grade)**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior (SUP)</td>
<td>Long and wide clear face cuttings; high yield for users requiring multiple rips and chops; compares to NHLA PCA Superior</td>
</tr>
<tr>
<td>Superior 1 Face (SUP-1F)</td>
<td>High yield to long and wide face cuttings, compares to NHLA Western Select and Better Grade</td>
</tr>
<tr>
<td>Custom Cabinet (CUST-CAB)</td>
<td>Designed to yield clear 1-face or 2-face cuttings; generally, each piece will contain 3-4 clear face cuttings; used in cabinet doors, case goods, panels, and millwork</td>
</tr>
<tr>
<td>Com Shop (COM SHOP)</td>
<td>Used in cabinet doors, case goods, panels, and millwork; compares to NHLA Western #2 shop grade</td>
</tr>
<tr>
<td>Premium Frame (PRE FRAME)</td>
<td>Used for rustic and distressed furniture, mouldings, cabinets and doors; cut from the heartwood; structural and appearance grade with scattered sound and unsound defects</td>
</tr>
<tr>
<td>Standard Frame (STD FRAME)</td>
<td>Allows larger defects than Premium Frame for cabinets and upholstered furniture; structural and appearance grade with scattered sound and unsound defects</td>
</tr>
<tr>
<td>Economy (ECONO)</td>
<td>Structural and appearance grade with scattered sound and unsound defects; admits greater amount of unsound defects than Standard Frame; cuttings will admit sound knots, bird pecks, stain, streaks or their equivalent</td>
</tr>
<tr>
<td>Jacket Board (JB)</td>
<td>Cut from the outside jacket of the log, narrow widths and often contain larger amounts of wane; designed for rip and cut to length for cabinets, panels, and case goods</td>
</tr>
<tr>
<td>5/4 x 4, #3 and Better (#3 better)</td>
<td>Structural and appearance grade with scattered sound and unsound defects, primarily coming from heart wood of the tree; admits greater amount of unsound defects than Standard Frame; cuttings will admit sound knots, bird pecks, stain, streaks or their equivalent</td>
</tr>
<tr>
<td>KD/HT Lineal Pallet Stock (4” or 6” PALLETS)</td>
<td>Pallet stock</td>
</tr>
</tbody>
</table>

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3.2 Understanding Demand

Market Potential and Opportunities

Because hybrid poplar has historically been used for pulp prior to investment in the BTF and UCM by GTFF, there was very little known about its potential use in solid wood products markets. Given the multitude of products and applications of hybrid poplar and its rebranding as Pacific Albus, the marketing and sales team at Collins now seeks to gain market share from lumber species that have similar characteristics and uses. Pacific Albus shares many of characteristics of, and can often be used as a substitute for, alder, aspen, basswood, paulownia, cottonwood, southern yellow poplar, and balsawood.

In Table 2, the Pacific Albus products are listed next to its competing species to show which species it shares the most products with. The two species that it seeks to be most competitive with are alder and aspen, which can be explained by those two species sharing the most products with it.

Table 2: Species Comparison by Product

<table>
<thead>
<tr>
<th>Pacific Albus Products</th>
<th>Aspen</th>
<th>Alder</th>
<th>Cottonwood</th>
<th>Southern Yellow Poplar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cants for reprocessing</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Ceilings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furniture</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Kitchen utensils</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Landscape timbers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millwork</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouldings</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pallets/crating/boxes</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Panel stock</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pattern stock</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Picture frames</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreational Boards</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>RV parts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sauna Laths</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnings</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Veneer</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>


**Domestic and Export Markets**

Domestic markets for lumber are largely driven by the housing sector, which accounts for about 70% of total consumption. The Western Wood Products Association (WWPA) reports that US lumber demand is expected to continue strengthening with home construction, which experienced modest growth in 2014. To meet demand in 2014, US lumber production increased 4% from 39.5 billion BF in 2013 to 41.34 billion BF in 2014. For 2015, the WWPA expects continued strength in the housing markets and predicts lumber demand will rise 8% to 44.87 billion BF. This growth will provide a direct support for Pacific Albus demand.

Recent growth in export markets also supports demand for Pacific Albus. In 2014, US exports of hardwood lumber grew to 3.901m m³, a 13% increase from 2013. At $2.337 billion, the value of exports rose even more sharply than volume, with a 26% increase. Almost all species and sales regions contributed to this growth in volume and value. End-use markets for hardwood lumber in export markets are primarily furniture and housing.

The relative strength of domestic and export markets determines the share of Pacific Albus lumber that is exported. The UCM initiated production when the US housing market collapsed and the resulting weakness in domestic markets for lumber encouraged the Collins marketing and sales teams to look for markets outside the US. Between 2012 and 2013, about XX of production was exported. By 2014, following a few years of incremental recovery in the US housing market, Collins re-focused on the domestic market. And in 2014, about XX of sales volume was exported and Collins estimates exports will make up about XX of sales volume in 2015. Continued strengthening in the US economy and the regional housing market will provide sales opportunities in markets closer to the mill where Collins has a freight advantage over competitors. However, maintaining a diversified customer base mitigates market risk in the case of a downturn in either the domestic or export market.

**Market Areas of Strength and Growth**

While Pacific Albus is still a relatively new species in the hardwood market, there are a few niche areas where it has excelled. By continuing to focus on and cultivate these higher-value markets, GreenWood Resources has the opportunity to increase average realizations for Pacific Albus.

**Recreational Boards**

One opportunity that Pacific Albus has found a niche to sell at a premium price is in the recreational board industry. In the snowboard industry, Pacific Albus is gaining traction as a choice core material for both domestic and foreign manufacturers. The core is the central structure of a snowboard and is where the main strength of a snowboard lies. Most snowboard cores are made of strips of laminated woods like beech, birch, aspen, bamboo, or poplar, with beech and poplar being the most commonly used natural material. Compared to foam or plastic, wood is often preferred used as it gives

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20 Provided by Lee Jimerson, Collins Pacific Albus Product Manager

a lively feel with good vibration damping, keeps its shape well, and produces less resonance. Its favorable strength-to-weight ratio makes Pacific Albus an attractive core material. Currently 4/4x6 Superior and Premium Frame Pacific Albus are sold for snowboard cores.

Concerns about sustainability and climate change in the snowboarding community have also supported demand for Pacific Albus in snowboard applications. In 2007, professional snowboarder Jeremy Jones started the non-profit, Protect Our Winters (POW), after witnessing first-hand the impact of climate change on mountains. With a mission of reducing climate change’s effect on winter sports and local economies, POW seeks to be the environmental center point of the global winter sports community.

Alongside this organization there many other sports companies that are striving to produce products that are less damaging to the environment. Their technology includes sustainably harvested poplar wood cores, along with recycled materials, “hempop stringers” (a carbon fiber substitute), Magma Fiber (a fiberglass substitute made from Basalt), bio-resins (replacing petroleum-based alternatives), and bamboo topsheets. If Pacific Albus can prove as effective as poplar in snowboards, it has the opportunity to establish itself as the superior sustainable source for snowboard cores amongst top manufacturers. Top snowboard companies such as Burton have realized that ensuring sustainability throughout the supply chain is core to their sustainability strategy and may soon be looking for sustainably harvested wood cores as well. As such, Pacific Albus has the opportunity to fulfill this unique demand.

**Sustainability and Green Building Materials**

FSC certification of the BTF allows products produced from harvested material to be labeled as such and thereby distinguished from other, non-certified products. This labeling generates value either through providing market access or a market premium for certified products. Further, logs from the fast-growing, high-yield plantations at the BTF can reduce pressure on natural forests, providing a sustainable alternative source of hardwood lumber products. Pacific Albus can grow to harvest height in 12 years and is harvested at its rate of replenishment, about 7.5% per year or 7 acres a day. The FSC certification of Pacific Albus gives it the opportunity to used to take advantage of the growing green building materials market place. Although wood products are rewarded by LEED in many ways, FSC remains the only recognized forest product certification standard.

LEED certification has built a solid market for FSC materials, as LEED points are earned for using products that meet leadership extraction practices, either recycled or FSC certified for wood products, for at least 25% of the total value of building products in a project. There are now 50,000 LEED projects worldwide, representing 10.1 billion square feet of commercial and institutional construction space. The growth in LEED certified building projects presents substantial growth opportunities FSC-certified wood products, including Pacific Albus.

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22 Mechanics of Sport, 2014
9Wood, an Oregon based manufacturer of custom architectural ceilings, is one such company taking advantage of FSC-certified Pacific Albus as a green building material. Committed to promoting transparency and environmental stewardship across product lines, 9Wood is an FSC-certified manufacturer that sources a significant amount of its raw materials from the BTF and other sustainably managed forests in the Pacific Northwest. Many of its products have contributed to the LEED certification of building projects, and several others have been incorporated into projects declared Living Building Challenge Red List Compliant by the International Living Future Institute.29

In addition to FSC certification, the BTF became the first short-rotation forest plantation to earn certification under the Roundtable on Sustainable Biomaterials (RSB). Together, these two certifications recognize GWR’s efforts to manage the timber resource sustainably, maintain biodiversity, protect water resources, account for greenhouse gas emissions, treat workers fairly, and benefit the community.30

Sales Analysis
To fully understand its demand, it is useful to look at the sales history of Pacific Albus. **Figure 1** shows the annual volume of each Pacific Albus grade sold between 2010 and 2014, and **Figure 2** shows the annual net sales of by product grade for the same time period.31

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31 Net sales as specified by Collins sales data
32 Provided by Lee Jimerson, Collins Pacific Albus Product Manager

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Figure 2: Pacific Albus Annual Net Sales by Product Grade

Table 3: Percent Sales and MBF by Year and Grade

In Table 3, we can see how Pacific Albus sales have been growing in the last few years. Since 2010, MBF has more than doubled, and net sales have more than tripled. In Figure 7, we see that net sales of Standard and Premium Frame have been growing at a much higher rate than any other grade. Though it’s the third grade as far as average realization is concerned, Standard and Premium Frame has grown from XX to XX of annual net sales from 2010-2014. Table 3 also shows the phasing out of green cants. Once responsible for XX of volume sold in 2010, green cants dropped to XX of sales and XX of MBF sold in 2014.

Another interesting trend from Figures 1-2 and Table 3 is the rise of the “Other” product category to the highest percentage of sales (XX) and MBF (XX) in 2014. The most interesting fact about this trend can be seen in Figure 3.

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33 Provided by Lee Jimerson, Collins Pacific Albus Product Manager
34 Jimerson, 2014
The sales of the top ten “other” products of 2014 were largely new sales that didn’t exist in 2013. Though “other” category consistently comprises a large proportion of sales and MBF, its top products appear to be quite variable and new each year. This observation illustrates the fact that Pacific Albus remains a relatively new product, without a fixed set of products or end-use markets, highlighting the ongoing need to evaluate the product mix and strive to increase average realizations.

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35 Provided by Lee Jimerson, Collins Pacific Albus Product Manager
3.3 Understanding Supply

In the West, lumber production is expected to climb from 13.49 billion BF in 2013 to 14.1 billion BF in 2014, an increase of 5%.\textsuperscript{36} To get a closer look at how the BTF fits into this supply picture, \textit{Table 4} lists sawmills in the Pacific Northwest that process red alder. Of the 15 mills identified, only 5 have annual production rivaling that of the UCM.

\textbf{Table 4:} Sawmills That Cut Red Alder in the Pacific Northwest\textsuperscript{37}

<table>
<thead>
<tr>
<th></th>
<th>Company</th>
<th>Sawmill</th>
<th>Annual Production Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Northwest Hardwoods</td>
<td>Eugene, OR</td>
<td>60mmbf</td>
</tr>
<tr>
<td>2</td>
<td>Northwest Hardwoods</td>
<td>Coos Bay, OR</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Northwest Hardwoods</td>
<td>Myrtle Point, OR</td>
<td>10mmbf</td>
</tr>
<tr>
<td>4</td>
<td>Northwest Hardwoods</td>
<td>Garabaldi, OR</td>
<td>25mmbf</td>
</tr>
<tr>
<td>5</td>
<td>Northwest Hardwoods</td>
<td>Longview, WA</td>
<td>60mmbf</td>
</tr>
<tr>
<td>6</td>
<td>Northwest Hardwoods</td>
<td>Centralla, WA</td>
<td>70mmbf</td>
</tr>
<tr>
<td>7</td>
<td>Northwest Hardwoods</td>
<td>Mt Vernon, WA</td>
<td>70mmbf</td>
</tr>
<tr>
<td>8</td>
<td>Cascade Hardwood Group</td>
<td>Port Angeles, WA</td>
<td>40mmbf</td>
</tr>
<tr>
<td>9</td>
<td>Cascade Hardwood Group</td>
<td>Chehalis, WA</td>
<td>60mmbf</td>
</tr>
<tr>
<td>10</td>
<td>CW Specialty Lumber</td>
<td>Mill City, OR</td>
<td>7mmbf (one shift)</td>
</tr>
<tr>
<td>11</td>
<td>Rose City Wood Products</td>
<td>Powers, OR</td>
<td>4mmbf (one shift)</td>
</tr>
<tr>
<td>12</td>
<td>Smith Street Sawmill</td>
<td>Everett, WA</td>
<td>7mmbf (one shift)</td>
</tr>
<tr>
<td>13</td>
<td>W&amp;L Lumber</td>
<td>Myrtle Point, OR</td>
<td>10mmbf</td>
</tr>
<tr>
<td>14</td>
<td>SeaPort Lumber</td>
<td>Raymond, WA</td>
<td>30mmbf</td>
</tr>
<tr>
<td>15</td>
<td>Olney Mill</td>
<td>Astoria, OR</td>
<td>.5mmbf</td>
</tr>
<tr>
<td>****</td>
<td>GreenWood Resources</td>
<td>Boardman, OR</td>
<td>60-80 mmbf</td>
</tr>
</tbody>
</table>

\textsuperscript{36} Western Wood Products Association, 2015.
\textsuperscript{37} Provided by Gwen Busby, GWR Economist.
There is the possibility that some of these mills aren’t currently operating at capacity and could produce additional supply, given the availability of alder logs. However, because alder is not typically grown in tree farm settings and instead harvested along with Douglas-fir in largely conifer stands, its supply isn’t guaranteed. If lumber market growth for western hardwood species in 2015 is to be greater than or equal to nearly 5% growth in 2014, Pacific Albus has an opportunity to be in high demand for lumber production, but only if it is truly seen as an alternative to alder.

**Boardman Tree Farm Supply**

Pacific Albus can be grown to harvest height in 8-12 years and is harvested sustainably, at its estimated rate of replenishment, about 7.5% per year or about 7 acres per day. GTFF managers originally estimated that the ceiling for annual production be at approximately 80 million MBF. However, due to several factors (e.g., poor tree form and bucking regime) the threshold for annual production may be in the below the 60-80 million MBF range. A combination of these events has left the mill in such a place where production levels are not meeting expectations. This makes pricing of Pacific Albus more important than ever.

**Tree Form**

One of the most significant issues affecting lumber recovery at the Boardman Tree Farm is trees growing with “hook butt.” Hook butt is used to describe the phenomenon where the bottom 4 feet or so of the trees are curved, or hooked, before the tree continues its upward growth. This occurs when the trees experience high winds during the first few years of growth before straightening out. The hook greatly reduces the amount of product that can be recovered from the first log section cut from the tree. The GWR tree improvement group works on creating and selecting clones that produce straight stems. In spite of these efforts, hook butt remains an issue and other, complementary management options need to be explored.

**Bucking Regime**

In the field, trees are pruned up to 24 feet to reduce the amount of knots in the wood. Current bucking regimes send the first 8-foot cut (including the hook butt) and a second cut to the saw mill. The third cut is 9’ and meant to include the whirl of first branches at 24’ and sent to the veneer mill, and any remaining viable cuts are sent to the sawmill after that.

A proposed alternative bucking scheme could work to increase the recovery from trees with hook butt. The first cut would be made at 9’, include the entire hook, and be of the right dimensions to be used in the veneer mill. The second cut would be 13 feet and include the straightest and widest section of the tree. The third cut would include the whirl of branches and be sent to the veneer mill again, while the following cuts would be sent to the saw mill. With this bucking scheme, higher value logs would be recovered from the 13’ section that were previously limited due to the taper of the hook butt.

Additional analysis into this alternative bucking regime is currently underway and results will help improve lumber recovery. Alternative bucking schemes have been experimented with in the field, and if a large enough data set is collected, the scheme’s impact on recovery could be studied econometrically and compared with the current operations.

**Optimistic Models and Experimental Plots**

Another factor that has contributed to lower-than-expected lumber production is overly optimistic models of lumber recovery. The models that projected 80 million MBF per year assumed straight trees and uniform growth rates. But as was discovered, many acres of trees exhibit hook butt,
and many other acres of productive land have been dedicated to experimenting with different clones of Pacific Albus or different spacing patterns. Decreased growth of productive trees led to shorter rotation cycles to fulfill order volume.
3.4 Pricing

In the first five years of operation, the priority for GTFF was to build sales volume in order to run the UCM at or near its estimated capacity. To do so, Pacific Albus lumber was deeply discounted compared to other hardwood species of similar grades. With the desired sales volume having been achieved, now the priority is to narrow the price gap with competing hardwood species.³⁸

Historic Market Pricing

We begin our discussion of Pacific Albus lumber pricing with a description of historical pricing for competing hardwood species: alder, cottonwood, aspen, and southern poplar (Figures 4-7). Prices are reported for three grades of cottonwood, aspen, and southern poplar products, but for just two grades of alder. Price is a function of grade, with higher grades receiving higher prices. As such, premium grades (Sel/Btr or FAS/1F) have the highest prices, followed by #1 Com, and then #2 Com. Within each grade, products of larger dimension (e.g., 5/4 depth compared to 4/4 depth) typically have a higher price.

Figure 4: Alder - Quarterly Average Price (USD/MBF)³⁹

Figure 5: Cottonwood - Quarterly Average Price (USD/MBF)\textsuperscript{40}

Figure 6: Aspen - Quarterly Average Price (USD/MBF)\textsuperscript{41}


After prices dropped during the financial crisis between 2008 and 2010, alder has had the greatest growth in price, increasing by XX for #1 Com and by nearly XX for #2 Com during 2011-2014. Cottonwood had the least price volatility with slight growth over the last 15 years. But since 2012, it appears that this trend is changing with prices showing stronger growth. Aspen prices were a bit more volatile and higher on average, while southern yellow poplar had the price for its premium grade steadily growing since a market bubble crash in 2010.

**Current Trends**

As Pacific Albus has its own proprietary grades as described in Table 1, it’s not directly comparable to the grades shown in Figures 4-7. But as shown in Figure 8, there are clear price differences between most of the grades of Pacific Albus, similar to the differences seen in Figures 4-7.

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Figure 8: Pacific Albus Average Realization by Grade

Average realizations shown in Figure 8 tells us a good amount about the pricing history of Pacific Albus and gives us something to compare to the alder, cottonwood, aspen, and southern yellow poplar price histories. As the gap between Pacific Albus prices and its competitors is still vast, it isn’t too helpful to compare them directly. To determine if Pacific Albus is closing the pricing gap against its competitors, their price growth by grade, from 2011-2014, was calculated and compared in Table 5.

Average realizations shown in Figure 5 tells us a good amount about the pricing history of Pacific Albus and gives us something to compare to the alder, cottonwood, aspen, and southern poplar price histories. On an absolute level, Pacific Albus prices still lag behind targeted competitors. To determine if Pacific Albus is closing the price gap with competitors, next we compare the price change by grade for Pacific Albus and competing species, from 2011-2014 (Table 5). Because of the unique grading systems by species, the comparisons in Table 5 are simply meant to illustrate differences in price trends across species and do not necessarily represent a comparison of equivalent grades.

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43 Provided by Lee Jimerson, Collins Pacific Albus Product Manager
### Table 5: Price Change by Grade, 2011-2014

<table>
<thead>
<tr>
<th>Pacific Albus Grade</th>
<th>Pacific Albus</th>
<th>Other Species’ Comparable Grade</th>
<th>Aspen</th>
<th>Alder</th>
<th>Cottonwood</th>
<th>Southern Poplar</th>
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</thead>
<tbody>
<tr>
<td>Superior &amp; SUP 1 Face</td>
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<td></td>
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<tr>
<td>Custom Cab</td>
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<tr>
<td>Com Shop</td>
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<tr>
<td>Standard and Premium Frame</td>
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<tr>
<td>Green Cants</td>
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<tr>
<td>Other</td>
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</tbody>
</table>

*Note: Price changes for aspen, alder, cottonwood, and southern poplar are a simple average of 4/4 and 5/4 products.*

#### Superior & SUP 1 Face

Superior and SUP 1 Face compare most closely with the premium hardwood grades (Sel/Btr or FAS/1F). In the last four years, Superior and SUP 1 prices have grown XX. This percent growth is greater than the growth for similar grades of aspen XX and cottonwood XX over the same time period, but not as great as for southern poplar XX. This comparison suggests that Pacific Albus is closing the price gap with aspen and cottonwood for this grade category.

#### Custom Cab

Custom Cab is most comparable to the #1 Com hardwood grade. Custom Cab prices have grown XX in the last four years, which is better than aspen and cottonwood, but less than alder and southern poplar that have much greater growth. Once again, this would lead us to believe that Pacific Albus is closing the price gap with aspen and cottonwood for this grade category, but still needs to work on reaching alder and southern poplar.

#### Com Shop

The last Pacific Albus grade that parallels its competitors is Com Shop, which compares most closely with the #2 Com hardwood grade. This grade category has the highest percent growth over the past four years at XX, making it much better than aspen and southern cotton, and just better than alder. As before, Pacific Albus’s price is closing the gap with aspen and cottonwood, as well as with alder for the Com Shop product category.

### 4. Discussion and Concluding Remarks

Our investigation into Pacific Albus lumber markets reveals a number of both opportunities and challenges for future growth. Through the experience of GTFF, Pacific Albus has been found to have numerous higher-value applications compared to pulp and is competitive with many traditional hardwood species. Since 2010, Pacific Albus sales volume has more than doubled and net sales have nearly tripled. Sales of lower-value products, such as green cants, are being phased out and replaced by higher-value standard and premium frame products as well a mix of “other” products. This dynamic sales program reflects a strategy that continually seeks to increase the profitability of the enterprise. Against this background, we present the key findings from the market analysis:

- Pacific Albus’s competitive advantage lies in its strength-to-weight ratio and FSC certification;
- Sustainability supply constraints may be a limiting factor for growth; and
- Pacific Albus is increasingly price competitive with many aspen, cottonwood, southern poplar, and alder products
With an evolving product mix, Pacific Albus has opportunities to expand in a number of directions. However, two characteristics set Pacific Albus apart from others are: an exceptional strength-to-weight ratio and FSC certification. Focusing product growth and development on the competitive advantage afforded by these characteristics will provide the greatest opportunities for increasing profitability. In particular, the green building materials and recreational board markets are potential growth areas for Pacific Albus.

Sales history has also shown that prices of Pacific Albus products have been growing by a greater percentage than many of its competitor species in recent years. Given time and its product strengths, the expectation is for Pacific Albus to continue gaining market share in hardwood lumber markets, increasing average realizations, with prices converging toward traditionally higher-valued species.

From a supply point of view there are a few concerns. There is no other accessible supply of Pacific Albus except for that grown and processed at the BTF. The lack of other suppliers makes it a risky proposition for buyers to switch to Pacific Albus, despite all of its positive qualities, as there is only one supplier and a limited supply. The supply situation is further compounded by the fact that the maximum annual output of the UCM may not be as large as anticipated due to several factors. Just as demand is growing for Pacific Albus, output may not be able to keep pace. This of course, presents an opportunity to focus on shifting production to higher-value products rather than increasing production of lower-value products.

In conclusion, Pacific Albus is well poised for growth and to take market share from its competing species from a product, demand, and pricing point of view. Pacific Albus is a substitute as well as an upgrade for many products made from cottonwood, alder, aspen, and southern poplar. It also has several unique niche areas of demand that have the potential to grow. While currently discounted, the pricing of Pacific Albus follows similar trends to that of its competitors, and current growth rates show its price slowly converging to that of its competitors.
5. Bibliography


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