Feasibility analysis of a small log sawmill in Southeast Alaska

Executive Summary

Unlike most Southern Yellow Pine sawmills, a small log mill in Southeast Alaska that manufactured lumber from 60-year old trees, would not be profitable. There are many additional operating costs in the remote forests of Southeast Alaska that the Southern Yellow Pine sawmills do not incur. The two most costly disadvantages are;

1. An additional $50 per thousand board feet of lumber that is required to transport lumber from Southeast Alaska to the Pacific Northwest and,

2. The lack of any reasonable economy of scale. The small timber sale volume projected to be available to the manufacturing industry in Southeast Alaska is inadequate to support more than a single mid-size sawmill. Consequently the regions sawmills will not produce any income from the residual products – chips, sawdust and bark. The chips are currently barged to pulp mills in the Pacific Northwest and Canada, while the Yellow Pine sawmills can deliver chips to nearby pulp mills at a much lower cost than the Alaska sawmills. Similarly, there are no fiberboard plants to utilize the sawdust from Southeast Alaska sawmills and there is no market for the bark in Southeast Alaska. Instead, most of the sawdust and bark must be disposed of in landfills.

Introduction

The purpose of this analysis is to compare several financial estimates of the feasibility of manufacturing lumber from immature young growth timber in Southeast Alaska. Four sawmill proformas are examined[1]:

1. A summary of five actual Southern Yellow Pine sawmills. This proforma was used because much of the rhetoric surrounding the Secretary of Agriculture unilateral decision to transition to 60+ year old Alaska young growth was based on assertions that Yellow Pine sawmills harvest their timber before age 60[2]. Other than the obvious difference in tree species, the yellow pine region has much different logistic issues than Southeast Alaska. The comparison proforma clearly demonstrates that, while the yellow pine sawmills can be profitable, those mills have advantages that a small-log, young growth mill in Alaska will not have.

2. In 2009 The Nature Conservancy funded the Beck Group to analyze the manufacturing of commercially thinned logs in Southeast Alaska. The Beck analysis concludes that a small-log sawmill in Southeast Alaska utilizing about 8 million board feet of timber annually would not break even unless the Forest Service paid an additional $140/mbf for the thinning operation and Beck's assumed 12% profit margin would require that the Forest Service paid a total of $232 per mbf for the logging. This conclusion is not apparent from Beck's proforma Income Statement, but can be gleaned from the notes prior to and following the Statement.

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[1] See the proforma income statements at the end of this paper.

[2] Note: Southern yellow pine timber typically reaches maturity (the culmination of mean annual increment) in less than 60-years whereas the softwoods in Alaska do not reach maturity until about age 100.

3. A proforma for a small, young growth sawmill that would require about 20 million board feet of timber per year. This proforma concludes that such a sawmill operation would lose $140 per thousand board feet of lumber (mbm) or about $258 per thousand board feet of logs (mbf) which is about $5 million per year.

4. A proforma for a much larger young growth sawmill that would be comparable in size to the primary competitors in the Puget Sound region. This proforma concludes that the larger scale operation would be able to operate at a reduced loss of $109/mbm or about $202/mbf (log scale). Due to the larger scale of operation, the annual loss for this proforma would be about $22 million per year.

Background and timber manufacturing history for the Southeast Alaska region.

The dominant timberland owner in Southeast Alaska is the USDA Forest Service. The federal government manages about 95% of the land in the region including the 17 million acre Tongass which was formed by proclamation in 1908. From 1910 until about 1930, the agency tried repeatedly to sell large blocks of timber in order to establish a pulp mill in the region. All of these efforts ultimately failed. In 1934 R. F. Taylor did a limited study of 288 plots (varying from 0.1 to 1.0 acres each) of young growth timber and developed some preliminary growth and yield tables for the region. Taylor estimated that the forest contained about 78.5 billion board feet of over-mature timber on about six million acres of commercial (fast growing) timberland.

There were no real efforts to entice timber manufacturing to the region until after 1947. During the long lull in long-term pulp contract offerings, the agency contemplated how best to overcome the financial concerns that were preventing the establishment of a pulp manufacturing industry. The primary economic problems were the economy of scale for an infant industry, an adequate length of time to amortize the immense investment involved in constructing a pulp mill and the uncertain cost of harvesting the timber. These problems were finally resolved in the following manner:

1. The Forest Service planned to sell five pulp timber contracts. These contracts, along with the normal timber sales, would provide around 800 mmbf of timber harvest annually. This was considered ample for a reasonable economy of scale.

2. The Forest Service increased the term of the timber sale offerings from 25-years to 50-years.

3. The Forest Service added a "Puget Sound" contract clause that assured the purchaser that the agency would not select timber nor impose conditions that put the purchasers at a competitive disadvantage with respect to similar enterprises in the Puget Sound area.

An initial 8.25 billion board foot, 50-year timber sale received no bids during the first two offerings, but in 1948 the first large sale was offered a third time and the newly formed Ketchikan Pulp and Paper Company offered the only bid. After numerous delays, the final contract was signed in 1951 and three years later the mill was constructed and had begun operating. Three more pulp timber sales were subsequently sold on the Tongass:

- A 5.25 billion board foot timber sale near Sitka. This pulp timber contract was signed in 1957 and the requisite mill was operating two years later. This contract had an economic timber

clause similar to the Puget Sound Clause that assured the timber provided to the purchaser would be economically comparable to the timber provided to other such timber sales in Alaska.

- A 3 billion board foot timber sale near Wrangell. This timber sale contract required construction of a small pulp mill and a 40 mmbf per year sawmill. The requisite sawmill was constructed and operated, but not the pulp mill. Consequently, in 1967 the contract was downsized to only 1 billion board feet.

- An 8.75 billion board foot timber sale on Admiralty Island near Juneau. This timber sale was turned back to the Forest Service when the purchaser-Georgia Pacific-decided to enlarge an existing mill at Samoa, California instead of constructing a new mill. The Juneau timber sale was offered again in 1965. The second offering was never awarded because the purchaser backed out, citing higher than expected construction costs for the pulp mill. In 1967, the timber sale was offered to the second high bidder from the second offering - US Plywood/Champion Papers - and the sale was awarded in 1968. The Sierra Club challenged the Juneau timber sale and after years of nuisance litigation, the sale was finally terminated by mutual agreement of the purchaser and the Forest Service.

During the late 60' and early 70's, the industry began developing markets for sawn products in order to improve the manufacturing integration and the financial returns to their operations. Spruce lumber was the primary sawn product prior to this period but hemlock is the dominant species in the region; therefore, the new industry effort was focused on selling hemlock sawn products. The Pacific Rim was identified as the most likely customer base because that market allowed the Alaska sawmills to avoid the transportation disadvantage of shipping lumber to the Pacific Northwest markets. The Alaska sawmill manufacturing effort was successful and a market was developed for hemlock cants and flitches. This satisfied the Forest Service primary manufacture requirements and satisfied Japanese customer's desire to retain their sawmill industry by re-sawing the cants and flitches from Alaska. Saw logs that were too small or too rough to make cants or flitches were generally chipped for the pulp mills. In 1980 Congress established several million acres of wilderness and monuments in the region, but also promised that the Forest Service would continue to provide 450 mmbf of timber annually for the manufacturing industry.

Shortly after 1980, the Native corporations began harvest operations on their private timberlands. Most of the sawlog timber from these private timberlands was exported overseas, but there were also a lot of pulp-grade logs that were harvested and the two pulp mills – at Ketchikan and Sitka – were able to purchase most of this fiber. These additional pulp logs helped sustain the pulp mills through a worldwide depression in timber products prices in the early to mid-1980s. During this depression, the Ketchikan Spruce Mill was permanently closed; but by the late 1980s, the markets had rebounded and private pulp logs were still available. This abundance of pulp fiber allowed the two long-term timber sale purchasers to divert even more saw logs to sawmills, thereby further enhancing the manufacturing integration in the region. KPC added a small-log side to the mill it was leasing at Annette Island and also constructed a new small-log sawmill in Ketchikan.

In 1990 Congress enacted the Tongass Timber Reform Act (TTRA) which directed the Forest Service to provide sufficient timber to "seek to meet the market demand". Immediately, the agency reduced its timber sale offerings. After 1990, the industry struggled to maintain operations despite the shrinking

timber supply and as a result, the volume of timber-under-contract was not replenished with new timber sales and quickly plummeted from over 2 billion board feet in 1990 to about 100 million board feet in 2015. Most of the initial decline in timber-under-contract was from long-term timber sale volume; but, the industry had been fully integrated and the long-term timber sale saw logs were commonly traded for pulp logs and chips or simply sold to the other sawmills in Southeast Alaska. Consequently, all of the mills were affected by the loss of the long-term timber sale volume.

In 1997, the Forest Service adopted a new land management plan for the Tongass and the agency announced that it intended to switch to "ecosystem management". Under this new philosophy, timber sales became a by-product of ecosystem management and attention to timber sale economics was abandoned. The new land management plan included extremely costly timber sale design constraints that raised the cost of harvesting timber enormously. These constraints included mandating that 30-50% of the timber in each stand be left uncut in most previously developed areas. The harvesting costs in these areas should have been very low because the roads were already in place; but, the partial-cutting requirement instead made these some of the highest cost areas to operate. Other costly constraints included oversize buffers on non-fish streams, a greatly expanded beach fringe no-cut buffer and a system of old-growth reserves that set-aside over a million acres of the highest value, lowest cost timberlands.

As the pre-1997 timber sales were harvested and the newly designed timber sales were advertised, the economic impact of the 1997 land management plan became apparent and despite good markets for hemlock, spruce and cedar lumber many of the timber sales that were advertised during this period appraised enormously deficit due to the high cost impact of the 1997 land management plan. The region's sawmills initially purchased only the economic timber sales, but as the mills depleted their volume of timber-under-contract, they began worrying about mill closures and losing their customers. In desperation the mills began purchasing marginal and deficit timber sales and by 2001 the bulk of the timber-under-contract was comprised mostly of deficit timber sales and the mills were losing money.

During this same time period the loss of the region's pulp mills and the decline in the number of other west coast pulp mills resulted in a declining market for chips. One operator installed a veneer plant in order to peel small rough logs that had previously been chipped. That veneer operation changed hands several times and ultimately failed due to a combination of poor management decisions, inadequate capital and the dismal outlook for timber supply.

In 2008, with only three sawmills remaining in the region, the Forest Service adopted a new land management plan with additional costly constraints, manufacturing integration, the economy of scale and a supply of timber adequate for normal sawmill operations were all eliminated as the timber supply declined. In 2010 the Secretary of Agriculture abruptly announced that he had decided to implement a Wilderness Society recommendation to end the harvest of old-growth timber and transition immediately to young-growth harvesting. By 2015 only a single mid-size sawmill and a half-dozen micro-mills still survived in the region and the Forest Service subsequently announced a 15-year transition after which only 5 million board feet of mature (old-growth) timber would be available annually.

There are currently only about 462,000 acres of young-growth on the national forest. Much of the young trees are in areas where timber harvest is not permitted under the 2008 land management plan and the oldest trees are still about 30 to 40-years from maturity. Under the existing agency rules only 338,973

acres of young growth are available to be harvested and the current draft Transition Amendment to the 2008 plan anticipates limiting the young growth harvest to 284,144 acres over the next 100-years[3].

The industry believes that due to the young age and small diameters of the young growth, there is no mill in Southeast Alaska that can profitably manufacture lumber from these small trees and there is not sufficient acreage of young-growth to grow an adequate fiber supply for a modern small-log mill. The agency's short-term solution is to allow the export of the young-growth trees to China. This might work in some cases, but it won't provide any year-around manufacturing jobs and harvesting the trees 30-year prematurely will result in reducing the growth potential of the young-growth stands by more than half. The industry believes that the result of the agency's short term log export solution, the manufacturing sector will not survive and any long term solution will be moot.

Young growth timber supply characteristics in Southeast Alaska

Total volume

The Forest Service proposes to provide an average of 23.8 million board feet (mmbf) annually for the next 10-years and perhaps 41 mmbf for years 11-15 and 114.5 mmbf in years 16-20. The agency also proposes to provide an average of 22.2 mmbf of old growth for the next 10 years, then drop the old growth volume to 5 mmbf annually.

Since 2008, the agency has experienced a falldown from its planned old growth timber offerings to the actual volume offered of about 75%. However, the agency is proposing no changes to the Land Use Designations or the Standards and Guidelines that are the primary cause of the falldown and the young growth timber will yield much lower value timber than the old growth timber, so we can expect the actual available young growth volumes to experience at least 75% falldown. In contrast, the Forest Service falldown estimates in the Transition DEIS are mostly far below this experienced level and, the average for the medium volume in the Ketchikan area where the bulk of the young growth exists, is listed as only 19% to 44%.

In addition, the Southeast Conference commissioned a young growth inventory and analysis in 2011[4]. This project examined a 1,400 acre sample of older young growth stands and the primary conclusion was that the growth models used by the Forest Service overestimated the volume on the sampled stands by 37.5%. The agency has recently begun a more thorough inventory of the 60-year and older young growth stands to be followed with a less intensive inventory of 40-year and older stands, but has been unwilling to delay the transition away from mature (old growth) timber until it has the results of a more comprehensive inventory that will provide not just volume but also log grade and logging cost information for all of the young growth timber. This is a great concern to the industry because much of the older young growth is on lower elevation sites where the timber quality, growth rates and harvesting costs are much different than on the remaining young growth in Alaska. In other words, the young growth the agency plans to inventory will not be representative of the bulk of the young growth on the Tongass.

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[3] Page 7 of the June 2016 Draft Record of Decision for the Draft Environmental Impact Statement for the Tongass.
[4] January 2011, Inventory of Young Growth Timber, Cascade Appraisals

All of the young growth studies done in Southeast Alaska have been done on sites that are below 500-feet elevation, however, most of the young growth acres are above 500-feet elevation. In Southeast Alaska, complex and steep topography contribute greatly to the growth of timber. There is an inverse relationship between elevation increase and timber height. The trees become rapidly shorter as the elevation increases until timberline is reached at which point trees no longer exist. The direct correlation of tree height and timber volume results in less volume with short trees. There is a substantial difference in both height and diameter of the same age class of timber on different sites and even if better growth models are developed, there is no accurate way to apply the growth models to the different sites until those actual site classes have been visited, measured and mapped.

In order to have a basis to perform a financial analysis of the proposed early transition, young growth stands in all age classes need to be assessed to determine appropriate site index curves, present age confirmation, height, and present volumes. Additional data in regards to aspect, elevation, slope, soils, and expected harvest costs must also be collected. Since the elevation, growth rates and harvest cost factors from the older stands are not comparable to the remaining stands there is no reliable way to simply apply site index and other information from a limited inventory to the remaining stands without first gathering information from those remaining stands. Hence the need for a more complete inventory of all the young growth stands.

In summary, an inventory of just the 40 year and older stands will not be representative of the bulk of the young growth; we need a complete inventory so a reliable feasibility analysis can be made before fully committing to any early transition to young growth harvesting.

Species mix and sizes

The Forest Service estimates[5] the young growth stands will be 53% hemlock, 41% spruce and only 6% cedar. The low cedar percentage is probably accurate for the oldest young growth stands because it was not until the late 1970s that a significant amount of cedar was included in the timber sales and the early pre-commercial thinning efforts favored retention of spruce trees over either hemlock or cedar.

Logging and transportation costs

There are additional costs that are often incurred logging and manufacturing young growth in Southeast Alaska that are not incurred by Alaska's sawmill's competitors. For instance:

- ✓ The logging costs for remote sites start with the establishment of a campsite. If a logging site is not on the island where the mill is located, then standing booms, shore lines, anchors, anchor lines and boom sticks must be acquired and placed so that barge tie up and staging areas are available when camp and logging equipment arrive. This typically requires 30 boom sticks at $1,500 each, 20 swifters at $200 each, 50 boom chains at $90 each. This will average $45-50,000 plus labor and equipment costs of about $5,000 to $6,000.

[5] DEIS page 3-302

- ✓ If the camp is shore based, a campsite must be cleared and constructed or reconstructed. Move in and set up of the camp bunkhouse, cookhouse and shop will take anywhere from 2 to 3 weeks with men, equipment and materials costing $25,000-$30,000 for reconstructing an existing but idle campsite to $100,000 to $150,000 for a new campsite. A fresh water system must be also set up according to DEC regulations which typically cost $55,000 to $60,000. Sewer systems and waste treatment must also be established. These items will cost $ $30,000 to $35,000.

- ✓ Fuel storage areas must be constructed to DEC specifications. Most remote sites require fuel and other supplies to be delivered by barge every month or two. A typical fuel storage and containment area can cost as much as $ 5,000 to $10,000 to construct.

- ✓ If the timber sale is on a different island than the purchaser's sawmill, then the logs must be towed or barged to the mill. Towing logs requires that a booming and rafting area must first be established which will require boom sticks, chains and swifters. Anchors and shore lines must be acquired and installed.

- ✓ If logs are to be barged to a mill, a barge staging area must be constructed adjacent to the logging site. A ramp for a small ramp barge (usually a 250 thousand board foot capacity) must be constructed or reconstructed for loading the barge. Alternatively, a bulkhead and larger staging area must be established for a larger barge (500,000 to 1 million board feet). These items can cost $150,000 to $200,000.

The cost per thousand board feet for all of these fixed mobilization costs is dependent upon the amount of volume that harvested

Forest Service appraised costs for cutting, yarding and loading young growth ranges from $114/mbf for mechanical harvesting logging to $254/mbf for mechanical harvesting with partial-cut logging. For strip-thinning with a cable system, the costs vary from $350/mbf to $410/mbf. About two-thirds of the young growth is on slopes that are too steep for mechanical harvesting.

Actual young growth logging costs experienced in Southeast Alaska are limited. A couple of industry operators provided their actual costs for a recent young growth State timber sale of 5.5 mmbf and a Forest Service young growth timbe sale of 8.1 mmbf, both hauled to the same log transfer facility on Heceta Island.

- For clear-cut mechanical harvesting (shovel logging) on the *State young growth timber sale* the operator experienced yarding and loading costs of $228/mbf. Felling and bucking added $50/mbf and hauling added another $38/mbf. This resulted in a total cost of $316/mbf for the State timber which was all harvested by clear-cut shovel logging.

- Shovel yarding with corridors on the *Forest Service Heceta timber sale* cost $274/mbf and the total cost to deliver logs to the mill from this Forest Service timber sale was $359/mbf, which converts to about $195/mbm. In contrast, the Beck analysis estimated $300/mbf ($123/mbm).

- The young growth timber from the Heceta Island timber sale (13 million board feet) was rafted and towed to Klawock. In order to build rafts for the tow there were 300 boom sticks at $1,500

each for $450,000, 300 boom chains at $90 each for $27,000 and 150 shifters at $200 each for $30,000. This is a total of $507,000 but these boom sticks, swifters and chains are typically reused about five times so the cost averages about $8/mbf. The front-end loader to put the logs in the water plus the boom boat and the operators together cost about $200 per hour. Tug charges to tow the rafts to Klawock are about $45/mbf. The total cost of transporting the rafted logs from Heceta Island to the Klawock sawmill (about 50 miles) is about $53/mbf, which converts to about $29/mbm. In contrast, the Beck analysis estimated $57/mbf ($24/mbm).

For our cost comparisons, we assumed that about half of the future young growth timber will be barged or rafted and towed to a mill at Klawock for an average combined cost of $14/mbm.

We also noted that Beck addressed logging costs in a different manner in his 2009 Nature Conservancy report - Beck assumes that the old growth timber harvest from Forest Service land will continue at 50 to 55 mmbf per year. This would potentially enable the Klawock sawmill to continue a single shift of high value lumber production and thus offset much of the fixed costs for that sawmill. The Forest Service however has announced that it will provide only 37 mmbf of old growth for the next 10 years and gradually reduce that volume to only 5 mmbf over the subsequent 10 years. At some point, presumably before the total old growth volume declines below about 25 mmbf, the mid-size mill at Klawock will close because it would no longer be able to sustain a single shift operation.

Lumber Manufacturing costs

Green lumber production cost

Other advantages that competitors in areas with a much larger timber supply and manufacturing industry have included:

- Alaska manufacturers currently must purchase timber sales with multiple species and log sizes requiring multiple head rigs and scheduling of species and size runs to accommodate the variety of log sorts. Alternatively, the Alaska manufacturers could export the individual log sorts that they cannot profitably manufacture. Alaska's sawmill competitors in the Pacific Northwest (PNW) operating in a region that has a much larger economy of scale for both their timber supply and manufacturing facilities. This gives them the option to manufacture specific log sorts that fit their specific mill and sell or trade their other logs to nearby facilities.

- Alaska sawmills currently must barge their residual chips some 800 miles to the PNW. This transportation cost greatly diminishes the net chip income that the Alaska mills receive.

- There is a lack of infrastructure due to the small economy of scale in Alaska including a limited pool of skilled workers, equipment suppliers and other service facilities.

- Alaska's PNW competitor's log delivery costs are generally limited to weighing and unloading a truck and putting the logs in either a deck or directly onto the infeed to their mill. In Southeast Alaska the logs often arrive at a mill site in bundle rafts or barges. The barge must be off-loaded into the water or bundle rafts must be broken disassembled and the bundles are the taken out of the water and delivered to a log deck for sorting and scaling. Breaking down a log raft requires a boom boat and operator to uncouple and save for reuse all the swifters, boom chains and boomsticks, then move the bundles to the beach for picking out of the water. This

operations cost about $7.00/mbf. The bundles are picked out of the water and decked with a front end loader, they are then taken from the deck to a log loader for sorting or rolled out for scaling. At this point the banding can be removed from the bundle and disposed of. Taking the bundles out of the water with the front end loader and decking cost another $7.00/mbf, taking the bundle from the deck to a log loader for sorting and scaling is another $7.00/mbf. Removing the bundle banding and disposing of the bands cost another $5.25/mbf. In the process of handling the logs there is about a cubic yard of waste that is produced for every one-thousand board feet of logs handled. This material must be hauled away for disposal at a cost of $10/cu yard or $10/mbf and a cubic yard of replacement rock is needed for every ten thousand board feet of logs. This costs about $20.00/cubic yard or $2.00/mbf. The total cost of handling the barged or rafted logs to get them to the infeed of the mill is about $38.50/mbf.

Transportation to PNW for Drying, Dressing and Marketing

Another cost disadvantage with PNW competitors is the cost incurred preparing for and shipping lumber. In Alaska, lumber must be transported from the mill to the dock where it will be decked and stored for loading on a barge for shipment to market. The lumber is then loaded on the barge after enough lumber has accumulated for a barge load – usually about 1,800 mbm. Operating a single sawmill shift, it takes about 6 weeks to accumulate the 1,800 mbm and 6 days to tow the barge to the Seattle market.

The cost for towing the barge to Seattle is $72.00/mbm assuming a $3.00/gallon fuel cost. To move the lumber from the Seattle port to a mill for drying and dressing is about $22.00/mbm. The cost incurred preparing the lumber and loading is $5/mbm for decking on the dock and another $3/mbf in interest, assuming a 4.5% interest rate for holding an average of 900 mbm of inventory while accumulating the 1,800 mbm for a barge load. This results in an additional cost of $102/mbm that is not incurred by competitors in the PNW[6].

Cost to Dry & Dress

The cost of kiln drying lumber in Alaska is much higher than in the PNW in part because of higher energy costs in Alaska and in part because the temperature is cooler in Alaska and the green-wood moisture content tends to be higher in Alaska.

The cost of final planning and finishing the lumber in Alaska is also higher, primarily because of the economy of scale. The constrained timber supply results in much lower production rates, consequently smaller kilns and planers are utilized to dry and dress smaller volumes of lumber. The costs for a small dry and dress operation in the PNW reportedly averages about $71/mbm while a much large kiln operation associated with a 200,000 mbm sawmill might cost only half that amount. The lower cost at a large mill operation in the PNW is possible because the lumber that comes out of those sawmills is typically fed directly into their adjacent kilns. These large volume kilns typically operate 24 hours per day, whereas the smaller kilns operate intermittently as the green lumber arrives by barge[7].

Marketing/selling costs

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[6] Personal communication with Kirk Dahlstrom, Viking Lumber Company.
[7] Ibid.

We assumed 3% of sales revenue for marketing the lumber and residual chips from small young growth mills and 2% for lumber and chips from a 200,000 mbm sawmill.

Lumber values

In order to develop an estimate of the lumber values from young growth in Southeast Alaska we assumed a 9-inch average diameter log and assumed that size log would be sawn into 4-2X6 pieces, 1-2X4 piece and 1-1X4 piece. That works out to 80% 2X6 volume, 13% 2X4 volume and 7% 1X4 volume.

Random Lengths 10-year average West Coast KD Hem-Fir 2X4 & 2X6 prices range from a 2009 low of $168/mbm to today's high of $355/mbm. The average for the last 10-years is about $265/mbm, but that average was heavily impacted by the 2008 housing market crash. For our comparison, we used the current lumber price of $355.mbm.

For chip revenue we used recent net prices for chips barged to pulp mills in the PNW.

Initial Capital Cost ($ thousands)			$ 31,000	$ 100,000
Annual log requirement (mbf)	12,578	7,998	19,565	108,696
	Actual 1997 Yellow Pine Sawmills	Beck 2009 Retooled Alaska mill	AFA 2016 Small scale Alaska YG mill	New Alaska Large scale Alaska YG mill
	$/MBM	$/MBM	$/MBM	$/MBM
Lumber Sales - mbm	$ 412	$ 315	$ 355	$ 355
Logs - mbm	$ 275	$ 149	$ 195	$ 195
Log handling - mbm	$ 14	$ -	$ 14	$ 14
Total Log cost -mbm	$ 289	$ 149	$ 210	$ 210
Rough Lbr Mfg	$ 43	$ 83	$ 83	$ 83
Mill yard & handling	$ 9	$ 12	$ 10	$ 10
Dry Kiln, planing and sizing	$ 8	$ 35	$ 71	$ 57
Other - environmental	$ 6	$ -	$ 2	$ 2
	$ 91	$ 131	$ 167	$ 153
Depreciation/Long term debt	$ 8	$ 13	$ 41	$ 24
Insurance	$ 7	$ -	$ 2	$ 2
Property tax	$ 1	$ -	$ -	$ -
	$ 16	$ 13	$ 43	$ 26
Inventory change	$ -	n/a	n/a	n/a
Shipping	$ 5	$ 54	$ 55	$ 55
Selling expense	$ 4	$ 4	$ 11	$ 11
Interest on inventory	$ 2	$ -	$ 6	$ 6
Admistrative cost	$ 8	$ 12	$ -	$ -
	$ 19	$ 69	$ 72	$ 72
Lumber operating profit	$ (3)	$ (47)	$ (136)	$ (105)
Chip income (net)	$ 57	$ 21	$ 36	$ 36
Shavings income (net)	$ 6	$ -	$ (10)	$ (10)
Sawdust income (net)	$ 3	$ -	$ (20)	$ (20)
bark income (net)	$ 2	$ -	$ (10)	$ (10)
other	$ 1	$ -	$ -	$ -
Net profit before taxes - lumber scale	**$ 67**	**$ (26)**	**$ (140)**	**$ (109)**
Net profit before taxes - log scale	**$ 160**	**$ (63)**	**$ (257.33)**	**$ (199.69)**
Daily production - mbm	$ 132	$ 84	157	870
Annual production - mbm	30,175	19,354	36,000	200,000
Overrun	$ 2.40	2.42	1.84	1.84
Annual log usage - mbf	12,578	7,998	19,565	108,696

8/23/2016				
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Annual production - mbm	30,175	19,354	36,000	200,000
Overrun	$ 2.40	2.42	1.84	1.84
Annual log usage - mbf	12,578	7,998	19,565	108,696