

Red Alder: A Qualitative Supply Chain Analysis in Coastal British Columbia, Canada

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ABSTRACT

Red alder (*Alnus rubra*, Bong.) has been identified as a potentially important species in the literature related to climate change in coastal British Columbia. This research project was conducted to address the question, “What steps are needed to develop an integrated hardwood supply chain in coastal BC?” Using multiple informant interviews, and combining these with secondary data sources and a social and historical context, the aim of this study was to generate recommendations on what steps would be needed to develop a viable hardwood supply chain on the coast of BC. The major issues that were identified during the literature review were combined with ones that emerged during the interviews, and together, form the results of this study. Specifically, key emergent issues revolved around timber supply, products, markets, production, and the supply chain for red alder. The results of the study shed light on a perceived conifer bias, the need to evaluate the existing red alder forest inventory, variation in hardwood harvest methods, the potential impacts of climate change, and the impact government forest policy has on the hardwood industry in BC. Further results pertained to the manufacturing and marketing of non-commodity (value-added) wood products, and the challenges to actors throughout the hardwood supply chain in 2011. Based on the review of existing literature and the results of this study, a large and coordinated effort will be required to adequately develop the supply chain given the existing economic conditions. Strategic decisions need to be implemented at many different levels to foster a vibrant hardwood supply chain. The current hardwood supply chain in coastal BC is weakening, and inefficiencies are present throughout the supply chain. Transforming this body of knowledge into a cohesive plan is what is needed to foster a vibrant and competitive hardwood manufacturing industry on the coast of BC that includes red alder.

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1.0 Introduction

1.1 Overview

Red alder (*Alnus rubra*, Bong.) has been identified as a potentially important species in the literature related to climate change in coastal BC. One of the more pronounced outcomes of climate change models is the likely expansion of the range and potential increases in growth for red alder (Cortini et al., 2012). Studies suggest that the variation in climate conditions could lead to a doubling of alder volume and incidence over time (Cortini et al., 2012). Climate change and its potential impacts on red alder prompted an FFESC-funded research project. A Climate Change Strategy for Red Alder in British Columbia (BC) was developed as a multi-objective research project that was intended to be a multi-disciplinary approach to the discourse related to climate change (Farnden et al., 2012). This analysis of the hardwood supply chain on the BC coast became an important factor in projecting alder's potential futures.

The supply chain structure of the hardwood industry on the BC coast had to be examined as part of the broader research question related to climate change. Many factors — including changing environmental factors on the land base, the rising market demand for alder, and the recognition of the need to diversify the wood products that we manufacture in BC (BC Ministry of Forests and Range, 2009) — came together to force a discussion regarding the future of the coastal hardwood supply chain.

The research question that this study set out to address was “what steps are needed to develop an integrated hardwood supply chain in coastal BC?” The first step in this research was to establish the make-up of the current hardwood supply chain actors on the coast. This was approached by identifying the structure of the hardwood supply chain on the coast and examining the existing literature to identify major actors. Once these actors had been identified, a series of semi-structured interviews was conducted with the aims of identifying emergent issues related to the supply chain and informing a series of recommendations based on these results to facilitate the development of a viable hardwood supply chain in coastal BC.

1.2 Research Objective

The objective that guided this research was:

- To identify and analyze the issues that need to be addressed to develop an integrated hardwood supply chain in coastal BC.

1.3 Project Goals

The project goals of this research that influenced the methods, results, and recommendations were:

- To identify the relevant stakeholders in the BC coastal hardwood industry by conducting a literature review and through discussions with relevant actors in the BC coastal forest industry.
- To conduct qualitative semi-structured interviews with identified stakeholders using a consenting and ethical approach to conducting research on human subjects.
- To present the issues that emerged as the results of the semi-structured interviews.
- To make a series of recommendations that address the research question based on the results of the literature review and the semi-structured interviews.
- To add new knowledge to the existing literature regarding red alder and the broader BC coastal hardwood industry.
- To help invigorate the local hardwood industry by providing recommendations that serve to build the capacity of the existing supply chain and provide economic benefits to forest dependent communities in coastal BC.

1.4 Thesis Organization

The following chapter gives background information based on the existing literature on red alder and elements of marketing theory and supply chain actors in the forestry industry. Chapter three discusses the methodology that informed the research approach and subsequent methods that were used to collect and analyze the data. Chapter four consists of the results of this research. Chapter five is a series of recommendations that are the based upon the results of the literature review and semi-structured interviews. Chapter six provides a conclusion to this research, describes its limitations, and recommends objectives for future research projects.

2.0 Background

2.1 Historical and Political Context

During the past decade, red alder (alder) log prices have been steadily increasing, from an average of \$55 a cubic meter in 2000 to an average high of \$75 a cubic meter in early 2008 (Buss & Brown, 2008). As a result, perceptions that alder was little more than a weed on the landscape that should be eradicated in favour of establishing conifer stands have been challenged (Deal, 2006). When the value of alder logs surpassed that of second-growth western hemlock in 2001, it became obvious that this perceived weed species was starting to look more like a market opportunity, especially in light of the fact that current inventory estimates on public and private lands on the British Columbia (BC) coast put its volume at approximately 44 million cubic meters (Buss & Brown, 2008).

Not surprisingly, the role of alder in the coastal forests of BC has become a more prominent discussion among forest land managers, formally being acknowledged by the Minister of Forests in the Coast Forest Action Plan in October 2007 (BC Ministry of Forests and Range, 2007). Part of that plan included a component to “encourage deciduous harvest” and subsequent utilization. This made it clear that alder would have to be addressed less as a scourge on the landscape and more as an opportunity to contribute to a competitive and sustainable coastal forest sector.

2.2 Forestry Context

Many of the pressures that have led to a negative view of alder have been economic in nature. However, benefits of red alder are some of the best documented of any of our coastal tree species. Its predominant benefit is in fixing nitrogen from the soil and storing it in its roots, stem, and leaves (BC MoF Research Branch, 2002). Nitrogen is the most limiting growth factor on the coast of British Columbia, so there is an obvious benefit to having alder growing in our forests. Red alder is also resistant to conifer root rot diseases such as *phelinus wieri*, and can be used as a sanitization technique on areas that are being adversely affected by root rot (BC MoF Research Branch, 2002). Alder can also provide valuable wildlife habitat as it decays, and is useful to woodpeckers, nesting birds, and subsequent mammals that use the created cavities (Deal et al., 2006). Alder can also add high nutrient leaf litter (Massie et al., 1994) (detritus) to streams that

are valuable to fish species and other aquatic ecosystems. When alder falls into these streams at the end of its life cycle, it can add valuable stream characteristics in the form of coarse woody debris (CWD). The shorter rotation of alder also means that these ecological benefits can be contributed on a shorter time scale than its conifer counterparts (Massie et al., 1994).

All that said, for many years red alder has been viewed as a weed or nuisance species on the coast of British Columbia. It has often been removed with a hack and squirt¹ technique to reduce the brush competition on the planted conifer trees that were expected to bring in high value returns. Compared to its conifer counterparts, alder has rarely been acknowledged as a preferred crop species (Massie et al., 1994), but rather as an acceptable crop species in low densities. The reason for this view was that alder was not fetching a higher return per cubic meter in the market than its conifer counterparts at the time. At a time when licensees were achieving their allowable annual cut, alder also represented volume that could be better allocated towards conifer extraction.

The concept of a “conifer bias” has been widely reported in the discussions of BC’s coastal forests (Buss & Brown, 2008). The conifer bias describes a mindset that is geared towards the harvesting, processing, and delivery of softwood products to the marketplace. It is based on the idea that time and resources are better allocated to the delivery of conifer products rather than hardwood products. This view is largely related to the fact that companies have forest licenses that support sawmills that are built for the manufacturing of softwood products, that is, dimension lumber products often used for structural products in the home building industry of North America. In such a scenario, it is in the best interest of the licensee to provide fibre to these existing operations rather than providing hardwood fibre to operations that they do not have an economic stake in (Per. Comm. Interviewee, 2011).

The view that conifers provide the best economic return to the licensee has only recently started to change (DeBell, 2006). In the past 10–15 years, the price of alder has been rising considerably (Buss & Brown, 2008). At one point, it was fetching as much as second-growth Douglas-fir in the Pacific Northwest of the USA (Debell, 2006). This created an opportunity for licensees to

¹ “Hack and squirt” or frill treatment, as it is sometimes called, is a simple method of applying chemicals to kill unwanted or undesirable trees.

harvest stands that were previously considered uneconomical. This brought red alder into the discussion regarding how to best manage our forest lands in the new global marketplace. The province of BC laid out frameworks to “encourage the utilization of deciduous tree species” and started allowing for opportunities that were more hardwood-specific (BC SWG, 2007).

2.3 Alder Products

Alder is the most abundant hardwood species on the coast. It is part of a larger group of commercially valuable deciduous species that includes maple, birch, and black cottonwood/hybrid poplar (Buss & Brown, 2008). Alder is often described as a “poor man’s cherry” as its wood properties allow it to take a stain very well (BC Wood, 2002) and it is often sold under the guise of another species. Alder is the softest of the hardwood species, which allows it to be used in many different types of applications (FP innovations, n.d., Weyerhaeuser, 2011).

The types of products that can be created from red alder are varied, and include furniture, flooring, cabinets, and veneer, as well as woodenware and toys. High-value products include doors, shutters, mouldings, and panel stock. Lower-value products include plywood core stock, chips for pulp and paper, firewood, and chips for smoke curing (FP Innovations, n.d.). There are threats to the alder market in the form of global competition and product substitution. Many products are now being developed for use as substitutes for solid wood products, on both the softwood and hardwood sides of the supply chain. Engineered wood products and reconstituted wood panels are just two examples of such products. There is also strong competition in the wood flooring markets, especially at the lower price points (USITC, 2008.; Per. Comm. Interviewee, 2011).

Alder products are often used in residential markets for interior finishing products. Alder products can also be used to supply non-residential markets including office furniture and appearance products. Alder veneer panels can also be used in non-residential applications, such as office doors and in place of using standard drywall for wall panels. Although these panels are more costly than other lower-value non-wood products, various positive attributes, such as the reduction of human stress levels in a built environment (Fell, 2010), may serve to convince consumers to pay a premium and utilize greater volumes of higher value wood products.

Another market for hardwood products like alder is the construction industry. Hardwoods, such as maple, can be used as temporary structures during initial construction phases of bridges, as drilling mats in the oil and gas exploration industry, and as inputs for the railroad maintenance industry (Per. Comm. Interviewee, 2011). Although these applications are not particularly well-suited to alder, creating these products with other hardwood species can allow producers to supply a larger array of products to varied types of markets and consumers. This type of diversification builds resiliency into the individual manufacturing operations, as well as the industry as a whole.

2.4 Supply Chain Overview

One of the most significant aspects of manufacturing products from alder is the discolouration that can occur during the drying process (Thompson, 2005). This phenomenon is well documented by Thompson (2005), and, for the most part, producers in the region have been able to manage the challenge this presents. To gain the full value from alder products in the marketplace, this issue must be systematically addressed by log suppliers and manufacturers (Per. Comm. Interviewee, 2011). Otherwise, the price that the product fetches and its related market share can quickly deteriorate.

The hardwood supply chain in coastal BC can be largely divided into the following steps: 1) establish crops; 2) harvest crops; 3) make logs; 4) convert logs to lumber; 5) cut and dry lumber; 6) create components; 7) create finished products; 8) distribute products; and finally 9) retail sales (Karlsson, 2006., MIFO, 2008). Research and development is another element that can affect any step in the hardwood supply chain (Per. Comm, Interviewee, 2011).

The establishment of tree crop species has been an important aspect of forest management in BC for many years. Silviculture prescriptions set targets for reforestation that are fulfilled by planting crews and followed up with silviculture surveys and stand maintenance activities to ensure a viable crop species is established on the landscape after a harvesting pass. These decisions and activities have long-term consequences for the future quantity and quality of

available feed-stock for industrial activities farther along the supply chain (Per. Comm. Interviewee, 2011).

The harvesting of red alder has many issues that precede the falling and continue after the tree is felled. Compared to its conifer counterparts, the logging process for alder is significantly different. The timing of harvest is also critical with hardwood tree species as they degrade at a more rapid rate than conifers after being felled, especially during the summer months (Per. Comm. Interviewee, 2011). There are different safety hazards associated with falling hardwoods, and hardwoods are more difficult to directionally fell. In most cases, hardwoods will fall in the direction in which they are leaning, which can create practical yarding issues unique to hardwood species. Red alder is usually felled first, along with the smaller conifers, and a second pass is then made for the larger conifer trees in the stand (WCB, 2001). Once felled, bucked, and decked on the roadside, the logs can be loaded onto a truck and either transported to a dry land sort or directly to a mill. From there, logs are typically put in booms² and transported via waterways to awaiting processors.

Once in a log yard, producers will buck the logs to the length desired for their manufacturing operation. The logs are then fed into a mill where they are converted into lumber. The lumber recovery factor in hardwoods tends to be lower than that of softwoods due to the smaller log diameters (Steele, 1984). This can cause waste and by-product volumes to build up, so it is necessary to develop a strategy to deal with these waste products, often by selling into pulp and paper or chips markets. In other cases, the waste cannot be sold and has to be recorded as an expense to be trucked away from the mill (Per. Comm. Interviewee, 2011).

After it is cut into lumber, the alder product has to be kiln-dried. There are specific staining issues that are unique to alder in the drying process (Thompson, 2005). Extra care has to be taken in this step to ensure that the resultant products meet market standards. These can then be shipped to other manufacturers, where they are developed into many types of component pieces for a wide range of consumer products. These component manufacturers often have high standards for quality, especially in operations where the alder is being used for face and appearance products. In this regard, quality control in the cutting and drying phases become very

² A “boom” is used to describe logs that are packaged together in a floating parcel. Booms are used when transporting raw logs using waterways. Booms can often be seen being pulled by tugboats all along the coast of BC.

important in delivering consistent quality products to other supply chain actors (Per. Comm. Interviewee, 2011).

Component pieces are eventually combined to create products to be sold to the end user. These users can include product manufacturers (such as furniture factories), distribution warehouses, architects and designers, building contractors, and retail stores. All of these types of markets can be very lucrative, economically speaking, but they are also subject to the highest levels of competition and product substitution. Securing and maintaining these markets over time is one of the biggest challenges to overcome in the supply chain. Effective marketing strategies and well-developed business-to-business relationships are keys to maintaining market share (Per. Comm. Interviewee, 2011).

Research and development is another element that can affect all of the steps in the supply chain. Innovation can occur throughout the supply chain and can take multiple forms. Technology is always evolving and can create new opportunities, as well as threats to existing market share. Investing in research and development can help to exploit these new opportunities, as well as mitigate impacts to market share by capitalizing on the latest in emergent technologies (Per. Comm. Interviewee, 2011).

Marketing theory provides valuable insight on supply chain considerations. The marketing mix is divided into four broad categories: product, place, price, and promotion (Zikmund, 2000). These elements can be applied to supply chain actors throughout the hardwood industry. To have the correct marketing mix, a company (or industry) must create the right product, sold at the right price, in the right place, and using the most suitable promotion. Applying this theory to the coastal hardwood industry, we can see the importance of these four principles in the creation of a viable, sustainable, hardwood supply chain. Developing the right type of product is an essential first step that impacts decisions at the landscape level. Knowing the price point of where a product will compete is also integral to the health of a supply chain. The goods must also be in the right place at the right time; this is especially true in the context of red alder because of its rapid degradation after falling and the seasonality of its end product markets (Per. Comm. Interviewee, 2011). Promotion is the final aspect of the marketing mix to consider. Targeting the

correct markets to promote to is essential in developing effective marketing and supply chain strategies (Per. Comm. Interviewee, 2011).

3.0 Methods

3.1 Introduction

In this study, a post-modern approach to research was used. Using multiple-participant interviews and combining these with a social and historical context, the hope was to generate recommendations on what steps would be needed to develop a viable hardwood supply chain on the coast of BC. This process is often described as theory building or grounded theory, or called an inductive approach to research (Zikmund, 2000., Strauss & Corbin, 1990). This approach is particularly useful when researching topics that are not well established in existing literature. This process also helps to synthesize existing data as opposed to just testing existing theories, but it also can be less focused, and it is often not possible to be completely objective (Ikebuchi, 2011). Another important factor in the methodology was dealing with the ethics related to conducting research on human research subjects. A large part of this process is to ensure that the anticipated benefits of the research are greater than the foreseeable harm that could result from the research.

We built in safeguards to try and protect the research subjects and protect their anonymity. Our consent form was the guiding document in this regard, with the confidentiality statement being the most significant of the safeguards that were established.

3.2 Methodology

The methods that were used to conduct this research were qualitative in nature. This approach produces findings that are not arrived at by statistical procedures or other means of quantification (Esterberg, 2002). Some of the significant benefits of conducting qualitative research are that: it can give an in-depth understanding of the issues surrounding a topic of interest; it requires a relatively small sample size; and it can allow for close contact between the researcher and the subject, which often results in data that is extensive and rich in information (Ikebuchi, 2011). In this qualitative study, semi-structured interviews of key informants were used. Semi-structured interviews are useful, effective, and are widely regarded as an effective research technique within the disciplines of sociology and market research (Zikmund, 2000).

The geographic region of interest in this study began with the Strathcona Timber Supply Area (TSA), but was expanded to include the southern and central coastal regions of BC. This included Vancouver Island and the south and central coast of the mainland. The Pacific Northwest of the USA was also included in the geographic area as it houses supply chain actors that are very significant to the hardwood industry in BC. Based on the initial research done on the supply chain related to hardwood tree species on the coast, 29 potential key informants were identified who were positioned to contribute significant data to the research questions at hand. Most were from the BC coastal forest industry, with others from private research institutes and business associations on the BC coast. Of these 29 potential interviewees, six (21%) were able to give interviews, two (7%) wanted to participate but could not find the time, two (7%) gave negative responses to the request, three (10%) gave positive responses but did not feel knowledgeable enough to contribute, and 16 (55%) did not respond at all to the request for an interview despite multiple attempts at contact.

The areas of the supply chain that we considered were forest licensees, forest operations and engineering, wood-products manufacturing and value-added operations, wood-products marketing and sales, and wood-product research and innovation.

The steps that were taken to conduct this qualitative research were as follows:

1.) Identify the geographic region of interest.

- Using the Strathcona TSA as a starting point, the region for analysis was expanded to include the districts in the South and West Coast forest regions and the Pacific Northwest of the USA. The reason for this decision was that the major actors of the supply chain for the coastal hardwood industry were spread throughout these regions and their interactions occurred in a larger region than those denoted by a single forest region, district, or TSA.

2.) Develop a series of questions that guide the interviews with supply chain actors.

- Based on the literature reviewed and the research question at hand, a set of nine questions was developed to guide the semi-structured interviews (Appendix I). The questions that were asked revolved around to the contribution of alder to each supply chain actor's activities and revenue

streams. Any knowledge related to existing hardwood manufacturing infrastructure in the study area was also investigated. Information on the harvesting of alder was sought, as well as information related to manufacturing and product attributes of alder. Finally, opinions were sought in regards to developing a viable coastal hardwood supply chain.

3.) Receive approval from the Behavioral Research Ethics Board at the University of BC.

- An application was submitted to the BREB and, after minor amendments, the research was approved.

4.) Identify and contact potential participants (multiple contact attempts).

- A list of potential interview candidates was developed and each was contacted via letter of intent, supported by a consent form (Appendix II), as well as the interview script to be reviewed prior to the interview. These documents were sent out via email and followed up with personal phone calls to potential interviewees. After a period of time, non-respondents were contacted a second time. The list of interviewees was then finalized.

5.) Conduct the interviews, record the audio of these discussions, and transcribe the data.

- Interviews were conducted in private rooms at UBC and in offices of participating businesses. A digital audio recording device was used to capture the audio data, which was later transcribed into text for further analysis. A total of six interviews were conducted, resulting in eight hours of digitally recorded audio data.

6.) Use a three-step analysis approach of coding, sorting, and writing up the data.

- The transcripts were then analyzed and coded according to issues identified prior to the interviews. This coded data was then sorted into a table (Appendix III) and used to identify common issues among the interview responses. The process of coding took the form of reading through the transcripts and identifying the information most relevant to the hardwood supply chain. When an interviewee described an issue that pertained to the coastal BC hardwood supply chain, that section of the interview was highlighted and was grouped into a major issue, and categorized into a unique result group within the major issue. These issues and results emerged during multiple evaluations of the audio transcripts over a two-month data-analysis period. This

process helped to guide the sorting of the data by making the common issues across the interview data stand out.

7.) Identify the emergent issues related to the subject.

- Once the interview data was coded and sorted, further data analysis was undertaken. Using the researcher's existing knowledge about forestry-based activities, and based on the analysis in Step 6, the issues were summarized and conveyed in the subsequent results that follow. After each summary section, a series of anonymous quotes from the interviews were added to provide support for the summarized issues. In some instances, the quotes in the results section were distilled down to convey the significant points that were captured during the interviews and provide clarity to the reader.

8.) Make recommendations and disseminate the results.

- Based on the results of the analysis of the interview data (primary data source) and the literature review (secondary data source), a series of recommendations were developed to address the research question. The completed findings of this research were then disseminated for review to stakeholders throughout the industry and summary works were developed for the research benefactors and industry journals.

4.0 RESULTS

The six respondents to the interview request were spread throughout the areas of the hardwood supply chain on the coast of BC and in the Pacific Northwest. Collectively, they represented over 100 years of experience in the hardwood forest industry and, specifically, in areas related to hardwood management and utilization. The major issues that were identified during the literature review were combined with ones that emerged during the interviews, and together, make up the results of this study. It is important to note that statements that are not referenced in this chapter are distilled from the semi-structured interview data. The issues in this section are organized so that each issue (and related result) helps to inform the ones that follow. The order in which the interview questions were asked (Appendix I) also affected how one issue discussed informed the next. The major issues that emerged in this study were:

- Timber supply
- Product issues
- Markets
- Production issues
- Supply chain issues

Each of these issues is discussed in turn.

4.1 Timber Supply

4.1.1 Conifer Bias

The conifer bias relates to so much of the coast of BC being dominated by conifer stands. Because these stands drive the vast majority of the forest industry's economic activity, the need to allocate significant resources to non-conifer forest resources is relatively insignificant to the financial health of a forestry-based company or industry. This bias creates hurdles in the attempt to develop a long-term, viable supply of hardwood fibre to potential users. It serves to lower the perceived quality of such species and can hinder the establishment of crop species to feed the producers who require the inputs.

“...the big companies weren’t the least bit interested in alder, in fact their idea of alder was to hack and squirt it and get rid of it.”

“...even though there was a lot of alder in the inventory, the tradition within the business is that alder is regarded as being worthless, or just a nuisance...”

“...there is still a mindset throughout the industry, force it to coniferous.”

“I don’t think they are wasting it [alder] any more. But it certainly has been in the past.”

4.1.2 Forest Inventory

Existing forest inventories of red alder and other hardwood species are underdeveloped. There is no clear strategy for hardwood management on the coast in the form of a timber supply analysis. As the price of red alder increased between 2000 and 2008 and operations in the Pacific Northwest of the USA began to see a rationalization in their domestic supply, many of the best alder stands in BC were cut and sold. In many ways, this was a financial decision to sell off perceived liabilities. However, there are neither the rules nor the tools readily available to convince licensees and forest professionals to re-establish hardwood stands. The lack of acceptance for establishing alder-leading stands and years of conducting forest operations based on conifer management has created a climate where it is difficult and unpredictable to plant red alder stands.

Another element of forest operations that was identified as an issue was the layout of red alder blocks by forest engineers. The association of red alder blocks with riparian areas (Ahrens, 2006) was expressed as a concern. Other major factors were the wildlife and species-at-risk elements associated with block layout. Targeting of alder-dominated stands is a relatively new operational process. Amphibian species, such as red-legged and tailed frogs, can often be found in alder stands in wet areas or in riparian management zones (McComb et al., 1993). Alder can also provide nesting cavities for woodpeckers that may later be utilized by other bird and mammal species once they have been established.

“...these were naturally regenerated stands, very few of them were pure alder stands, most of them are mixed stands, conifer/hardwoods...”

“...every now and then, you hear people talking about alder filling in midterm timber supplies, you know it could, it can, but again alder is only ever going to be a niche market, and you can easily flood that market, we need to know how big it should be and how big it could be.”

“...our company anyways, don’t have any, or very limited, pure alder stands left.”

“...a lot of it (deciduous stands) is untenured, it’s uncharted and I think it also just not really been quantified...”

4.1.3 Harvesting and Transportation of Alder

Harvest operations associated with red alder were also discussed by the interviewees. Concerns related to falling dangers were expressed; these dangers included the “barber chairing³” of the trees and the issues associated with directional falling. The timing of falling the red alder portion of blocks in mixed stands can cause some operational constraints. Red alder (and smaller conifers) will often be felled first as part of the safety protocols of falling (WCB, 2001). Large conifer trees will be felled in the second pass and sometimes the red alder is used as puncheon for skid trails for the yarding of the conifer. This will degrade the alder logs to pulp quality, and they are often just left behind. Dropping the alder first may also mean that it remains on site for a prolonged period before it is yarded and transported from the block, which degrades the log quality due to the sap run and discoloration that occurs during that time.

Other yarding issues related to the machine handling of red alder and some adaptations have been made to harvesting equipment. Specifically the rollers have to be fitted with rubber covers

³ “Barber chairing” refers to the configuration of a tree stump (shaped like a chair) resulting from a tree splitting as it is felled; usually the result of poor falling cuts (WCB, 2001).

to prevent the checker boarding⁴ of the alder logs (this will not become visible until the logs have been processed into lumber and dried, and does not meet the quality requirements for face and appearance products). As alder is a medium–soft density hardwood, the handling of these logs requires more care and, therefore, more time and harvesting resources. This issue can be managed, but requires the dissemination of handling information and protocols to harvest operators. Because of its distinct attributes compared to conifers, a specific contractor is used in some instances to handle the alder.

“...we always would use machine falling as much as we could and falling [is] kind of dangerous, you can’t directional fall alder very well, it’s pretty much going where it is leaning. Barber chairing is a big problem, fallers have to be very, very careful with it.”

“...you want to replace all your metal rollers, or cover them with a rubber pad... otherwise those lovely little knobby bits just ruin the outer log, and the outer grade which is your most valuable [part of the] log.”

“...[a difficulty with alder harvesting is] the drive wheels on processors, which is what you want to use in second growth harvesting and alder harvesting... you have to make sure you don’t bruise the alder [with the processor heads].”

“It’s all checkered, you can see every tooth, and it goes in a couple of inches, and the high value wood is on the outside clear, so it [not adapting the processor heads] is very destructive in terms of [log and lumber] value.”

The transportation of alder logs from the harvest site can be either incidental to the softwood counterparts or as pure loads of alder. In most cases on the coast, whole logs are taken to a log sort and put into booms to be sent to market. This adds a cost and increases the handling of the more delicate hardwoods. Costs can be reduced significantly (\$5–\$10 / m³) if pure loads of alder are truck delivered to the appropriate mills in the region.

⁴ “Checker boarding” is the result of machine processor heads damaging the outer alder log during harvest operations. It becomes the most apparent after being kiln dried.

“...it oxidizes very quickly... either you get it to the mill fast or keep it wet when you are storing it, otherwise it will get stained very quickly, and stained wood is of no use, well not that it is of no use, but it is unfavorable for open-face furniture.”

“...offloading at our dryland sort, sorting it there, loading it back on a truck, hauling it back up to his mill site, there is \$5–\$10 [per cubic meter] there that can get cut out of the system by going direct to [a] mill.”

“...alder does not do well with the handling, it is easy to damage.”

“...we are successful at a.) keep[ing] the log fresh and b.) not damaging it with processors.”

Another issue related to harvesting and transportation is that there is much alder that exists along old, deactivated roads in BC. The alder seeds in on the exposed mineral soil (Klinka et al., 2000) and acts as a pioneer species on those particular micro-sites within previously harvested blocks (Donovan et al., 2003. Pojar, 1994. Per. Comm. Interviewee, 2011). Old roadways can often be identified on inventory maps by the different forest cover along these corridors. These old roads can easily be harvested by machine feller-bunchers and pure loads of red alder can be delivered to waiting log processors. It would not be economically viable to “chase” these logs up the roads, but in an operation targeting second-growth conifers, these initial loads of alder could provide an early economic benefit to the harvest operation and generate early revenues for the licensee.

“Fantastic alder has grown in on these road beds.”

“...so much of the [alder] volume was on those old roads, and you come back at 80 years and it is beautiful big alder.”

“...the alder gets going far quicker on the roads than conifers next to it. So the outer row is often limby and ugly, or the roads come in so thick that the alder is very dense as it takes a long time to self-prune and grow.”

“...basically what I found is that we can tolerate a little bit of road building [in terms of alder block development costs], but not a lot...”

4.1.4 Seasonality

The seasonality, and subsequent timing, of red alder harvesting was identified as a significant issue in the red alder supply chain. Once felled, there is a finite amount of time that alder can be left in the block before the sap begins to run and discolour the log, significantly degrading its market value. This issue is most significant in the summer months when both biotic and abiotic factors exacerbate this process.

Another feature is the operational timing of harvesting. In the summer, much of the harvesting equipment moves into blocks and areas that are difficult to access due to snowpack during the winter months. Alder blocks can be used in the fall and winter as lower-elevation projects to keep crews busy, but during the fall, many of these sites become extremely wet and issues of trenching⁵ and site degradation come to the forefront.

The shelf life of red alder logs is much shorter than that of conifer logs, so they should not be left in the block during the summer months, or stacked along roadsides awaiting transportation many months into the future. At most, the alder can be felled in the fall and can overwinter along the roadside, but a log buyer needs to be available or the quality will be lost over time and the log will be worth little more than pulp.

“It [alder] stains with age very quickly, or starts to decompose very quickly. So you have got to move it from cutting it down to the mill site very, very quickly, particularly in the summer.”

“You have to be cognizant that they are on wet sites and so you have to adjust your season of harvesting, and that forces you into harvesting in the summer, when you don’t particularly want to be harvesting alder because of the stain and freshness issue.”

⁵ “Trenching” is the result of heavy machinery operating on wet harvest sites. Trenches are formed on the site, from machine wheels and logs dragging on the ground, which degrade the overall site quality.

“...we’ve got July, August, September, half of the alder is going to come out. And so that’s to address the operating on wet sites [as these months average the least amount of precipitation].”

“...if you don’t get it [alder] into a mill quickly, it goes bright red and there is a seasonality to it, which we have to wrap our head around [for] a timber sale, because there is the whole tendering, logging, and all that stuff, so we have to line it up properly...”

4.1.5 Economic Issues

4.1.5.1 Value versus Volume

The forestry paradigm in BC has been largely based on volume with the penultimate metric being dollars per cubic meter. The concept of log value versus log volume was acknowledged as a major paradigm difference between hardwood and softwood stands. In general, the volume of an alder stand is less than that of a softwood stand. This can impact any current calculations based on the cost per cubic meter of existing stands. In some cases, the low volumes create an environment where road building cannot be tolerated at the stand level. But when looking over a rotation period, there are strong arguments that show that the net present value (NPV) and internal rate of return (IRR) of red alder are greater than those for Douglas-fir stands, and in a shorter time-span (Mason, 2003). For example, the net present value of a 30-year-old red alder stand has been shown to be greater than that of a 50-year-old Douglas-fir stand (Zobrist, 2005).

“...you can log alder at 30 years and get more value then conifer at 40 or 50, maybe even 60, but if you are growing mixed stands and you are harvesting at 50 or 60 years old, I don’t think that there is any doubt that alder will [still] be a valuable component in that stand.”

“...our focus is on trying to get out of a volume-based industry and turn to a value-based one...”

“...we will focus less on cost reduction in producing those high-volume items and we will focus more on value maximizing and when we do that, species like this [alder] are going to become more and more and more important.”

“...basically, all of your costs that we traditionally deal with are now double, our road building costs double, our silviculture costs roughly stays the same, but layout, just [be]‘cause the volume is so much lower, but it is the exact same amount of area, and it’s the same amount of work to do for conifer, but you are talking about half the volume...”

“...if you looked at the time it took to grow the [Douglas] fir stand versus the alder stand and then you factored in reforestation costs, I’m sure that alder has a higher NPV, and that is at today’s pricing.”

4.1.5.2 Stand Maintenance, Log Quality, and Rotation Age

Red alder stands will require some site maintenance. In some cases, deer browsing on alder seedlings have been a serious consideration for forest licensees (Harrington, 2006). Sometimes alder has had to be coned⁶ to reduce the browse damage. Another element is that of brush concerns — on many alder sites, the moisture and nutrient regimes are high and create competition issues with the planted stock (either conifers or deciduous). Planting tall alder saplings may help to reduce this competition and may be more cost-effective than trying to force these sites to coniferous stands.

“...if you got one of these really tough sites, and you plant conifer and it is struggling to get established and you have got really dense alder coming in, manage for alder, mixed stand, just switch your topic⁷, I wouldn’t be wasting time, effort, and money trying to grow lines of conifer.”

⁶ “Coning” is a technique used in reforestation operations. A plastic cover or “cone” is placed over the seedling to reduce browse damage by wildlife species (usually ungulates).

⁷ “Topic” here represents the type of tree species composition that is being prescribed for a site after harvest.

“...the brush issue is so challenging, and then the other issue we have got is those alder sites, elk love them, and elk management is a huge issue on those sites.”

Log quality will have a significant impact on the total value realized from alder stands in the future. There are silvicultural treatments that can improve the amount of clear wood and log quality (DeBell et al., 2006). High planting densities and pre-commercial thinning can improve the log quality and resultant grades further along the supply chain. In some cases, natural regeneration can produce good-quality alder stands, but licensees should consider the return on investment of some intensive management of very good alder sites.

The rotation age for an alder stand can be varied depending on the growing site and the stand composition. The optimal rotation age was described as being around 35–40 years old, but the alder can hang on in mixed blocks until age 70 or 80. In many cases, the existing alder is a legacy of past forest practices and much of it has regenerated naturally. If licensees moved towards a plantation approach to planting and growing pure alder stands, the rotation ages would be much lower.

“...If you are growing it [alder] for fibre, you don’t care how big it is, you can cut it down [in] 15, 20 years, but to get a decent sawlog or start to be a decent sawlog, you are going to have to be [at] 35–45 years old .”

4.1.5.3 Roundwood Volume as Feed Stock

Based on the interviews, the current volumes of red alder that are being harvested are low. Most of the volume harvested is being shipped into the USA as raw log exports. Currently, BC producers are consuming less than 50,000 m³ of hardwood per year, a low amount considering predictions at one time that they could handle anywhere between 250,000 m³ – 500,000 m³. Unfortunately, what has occurred instead is a large reduction in volume utilization in BC.

“...I’ll bet that they are sawing close to 100 [cubic] metres a day, maybe, in their mill.”

“...we needed to have an equivalent of about 40 m³ a day to keep each mill going.”

“[Delta] was processing 200,000 m³ of logs a year. And mostly alder, but also birch and maple.”

“...when we worked on the alder strategy for the coast, we talked about supplying, building enough supply for one mill the size of Delta, or a couple of smaller ones, that was it, to get about 200,000 to 250,000 m³ of logs supplied a year.”

“...35,000 to 40,000 m³ [per year] will be deciduous. Of that [harvest volume], 90% plus is alder, the other 5% to 10% will be maple ... 30,000 m³ at least [will go to the USA for processing].”

“10 years ago, we had [harvested] 200,000 m³ a year and we were actively going and targeting alder stands.”

4.1.6 Climate Change

Climate change models and outlooks are predicting an increased growing area suitable for red alder (Cortini et al., 2012). This means that alder could become a much larger part of the volume inventory in coastal BC. This could force the management issue of the species. There are also concerns that alder might not respond as positively as some suspect to the changing climate (Cortini et al., 2012). Research is needed in this regard and extension of these results to licensees will be very important.

“...who even thought about climate change 50 years ago, even 15 years ago... So yeah, whenever anyone has ever asked me for my opinion on silvicultural advice given those long time frames, I only ever add one word: “diversify.” Because whatever you think is going to happen, it’s probably the opposite. So the only thing that is going to prepare you is that you diversify enough that a part of what you’re doing is going to be right, because a part of what you are doing is guaranteed to be wrong.”

“...we are predicting hotter, drier summers, less predictable rainfalls, and these are all things that alder needs...”

4.1.7 Government and Policy Issues

In many cases, hardwood volumes do not count against allowable annual-cut constraints. This helps to ensure that hardwood logs are not left in favour of softwood trees. In addition, stumpage rates are currently very low on red alder, which helps to make alder blocks viable. But both of these practices can be considered “bandaid” solutions to deal with a small portion of the total inventory harvested in BC. Until the early 2000s, it was also difficult for the government to accept stands reforested with red alder. That has changed under the new professional reliance paradigm of the Forest and Range Practices Act (FRPA), but the prevailing attitude is still to replant sites with coniferous trees regardless of whether or not it is the most appropriate for the site.

“...alder would have a partition cut, or alder would not count towards their AAC...”

“...I think the scale on the landscape at which it [the establishment of pure alder stands] is done should be sufficient to get around not creating monocultures, [be]’cause your blocks of alder won’t be large on a landscape level.”

“It is going to take some, if not legislation, then some serious effort by government to create opportunity and help nurture a value-added business to make it work...”

“...there was very significant stumpage advantages to harvesting alder...”

“...[it was] almost impossible at that time frame to get the Ministry of Forests to accept reforestation to alder.”

“...in some places, if you partitioned the deciduous harvest, you would increase the amount of deciduous that is harvested, very definitely.”

“...they just paid stumpage and, as you know, stumpage on deciduous is like 25 cents [per cubic metre]. So they were basically producing no revenue for the Crown...”

“...they really need to do a proper timber supply analysis of the Fraser TSA or wherever they want to base it out of...”

“...overlapping tenure and potential for conflict, you know I really think when you have a volume-based tenure, shared, a bunch of volume-based tenures all shared over the same fixed area, you are asking for trouble.”

4.2 Product Issues

4.2.1 Product Type and Properties

Alder was identified in the interviews as a species that could be utilized in a range of high-value appearance products. These products included cabinets, doors, mill works, furniture, woodenware, veneers, and musical instruments. A major attribute of alder that was discussed was its ability to take a stain and be marketed as a different wood species. This attribute offsets the fact that alder has a relatively plain grain pattern compared to other hardwoods, such as maple and cherry. Its workability and comparatively lower price point were also acknowledged as advantages over other hardwoods in the appearance product market. The wood-flooring market was described as being saturated with a variety of lower-cost product options. The low hardness rating of alder was also identified as a negative attribute for its use in a wood flooring application. The general consensus among interviewees was that it would be beneficial to develop high-quality logs on the land base to serve the appearance product market. It was noted that a high-quality log could be used in a low-grade application, but that low-grade logs could not be used in turn for high-value products.

“...hardwoods are used to a great extent in finishing products, cabinets, doors, mill works, mouldings... There is so much imported wood floor product that a person would be crazy to try and do anything substantial in local hardwoods for flooring.”

“...there is probably more alder out there that has been used, but represented as a different species than any other species...”

“...common furniture you will see in shops nowadays is red alder. Not always sold as alder, it’s maple finish, cherry finish, walnut finish, but it is all alder, it is just stained.”

“...specialty products, violins, musical instruments of one kind or another, specialized furniture, and wood turners and what not, and he [the tradeshow representative] gets all the creamy bits out of our maple, alder, and birch, and a bit of our high-grade fir [to take to these specialty wood tradeshow]...”

“I don’t think alder is good for flooring, it is too soft.”

“...I would rather see us develop a better log and focus on developing markets better for furniture because your pallet stock is a low-grade, low-price item...”

“...we have some unique species that are prized globally for their uniqueness and I am glad that red alder figures into that.”

“...I think what makes this species unique is its visual properties.”

However, interviewees also identified that it is usually only the top two grades of alder that produce profitable returns, whereas the remaining grades tend to be a break-even endeavour. In order to foster a viable supply chain, it is important to have markets established that can also utilize the low-grade product or waste and residue issues will be compounded. These lower-end markets are often the most difficult to secure and maintain over time.

4.2.2 Price

Red alder is sensitive to price fluctuations. It is often viewed as a moderate value item in the hardwood market. Therefore, it is important to ensure that the log price does not rise to the point where the end product is as expensive as oak, cherry, or mahogany. If price increases due to log

supply shortages, the market for alder products could quickly disappear or be substituted. This is why it is important to ensure a stable supply of alder to producers so that these producers can feed their end market at a consistent and competitive price.

Interviewees noted that where a business was operating in the supply chain established whether the price of alder logs was considered too high or too low. For a forest licensee, a logging company, or a log broker, a higher log price was seen as very beneficial to the viability of their alder business. Conversely, for lumber manufacturers and other wood-product producers (and subsequent end-users), a lower log price was seen as an attribute that made the product a viable option. A supply shortage of alder can drive up the log price and cause the resultant wood products to be too high a price and users will substitute it with other products with similar attributes. Over-supply can make alder stands uneconomical for forest licensees to harvest, but could result in profit for lumber manufacturers if they can secure a log supply under those market conditions. The current sentiment expressed by interviewees was that there is a lack of consistent supply of alder logs for the hardwood supply chain in coastal BC and the Pacific Northwest. Creating a stable supply of alder through a timber supply analysis was seen as beneficial by all supply chain actors that were interviewed.

“...careful where your price point is. If you get above \$1,700 to \$1,800 per thousand board foot for your product and you are pushing into that oak and beech sort of place, you might find that you start losing market share again.”

“...the Chinese market won’t buy any high-grade product to speak of, it’s all the low end of production that is price based and, at one time, they were using a container load of alder a week in that supply chain. That is quite a lot of low grade wood...”

“...log prices got too high. We couldn’t get them down because the Americans were paying a high price, so we just decided to extract ourselves from the log buying operations...”

“...by the time we were getting to 2006–2007 and the alder [log] price was up to \$70 to \$80 a cubic meter, we had divisions... that were actively seeking it [alder] and logging it...”

“...the most I have ever sold alder logs for was eight years ago, we sold a small boom of alder for \$200 a cubic metre, high-end alder... for plywood panels, high-end plywood panels...”

“...where you are in the supply chain dictates your answer on whether the price of logs is too high or too low...”

4.2.3 Competition and Product Substitution

There are few other tree species in BC that have the attributes of red alder, but as the geographic scope is extended, there are other species that compete with the type of products that red alder is used for. These competitors include hardwoods, such as maple and oak from eastern North America, which have a much more developed hardwood supply chain than in coastal BC. For this reason, it would likely be more effective to work on marketing local hardwoods in this region than trying to break into the markets east of the Rocky Mountains. Other competitors include tropical hardwoods and products from China and Asia. This includes bamboo and teak that are often desired by consumers.

“...back comes alder into the kitchen cabinet business again, and it’s big time for a few years and then people get tired of it and change to something else.”

“...you have all the eastern species to boot, and all the distributors here... they are all big stockers of eastern hardwoods...”

“...five years ago, I say alder was probably the third or second most common hardwood on the market in terms of furniture, behind oak and maple...”

Product substitution is also a significant threat to solid hardwood markets. Many types of hybrid and laminate products have entered the marketplace in the past few decades. A good example of this is found in hardwood flooring products; although there is a market for solid wood floors, it tends to be a niche market for high-end customers. Many flooring products are now just a thin layer of hardwood over a base comprised of medium-density fibreboard or particle board. These products can be manufactured overseas at a much lower labor cost (US ITC, 2008) and, consequently, will often be significantly cheaper to the consumer.

“... you don’t want to compete with things... that are considerably cheaper but have adequate enough attributes...”

“...you can have a paper laminate overlay, that looks so much like wood you can’t even tell. Pulp and paper side, long fibre lengths used to be everything, now with technologies of more modern paper-making, you can make do with pulps that have very short fibre lengths.”

4.2.4 Promotion and Innovation

Promotion plays a much more significant role in the hardwood supply chain compared to its softwood counterparts. There are many different types of end-use products for red alder compared to the commodity lumber and structural products derived from softwoods. Alder is also having to compete with global hardwood suppliers that may have lower costs associated with forest management, local taxation systems, and employee wages. The key is to promote the elements of red alder (and other local hardwoods) to the end-user. Check-off programs⁸ and wood processing associations can be used to pool collective resources to promote the general use of local hardwoods and raise consumer awareness about how their choice impacts the environment and the socio-economic well-being of their region. A good example of this is the recently-launched American Hardwoods Information Center website (HMA, 2012). It raises awareness about consumer choices regarding hardwood products.

⁸ “Check-off programs” are generic promotional techniques used to promote an industry as a whole. An example of a check-off program is the “got milk” promotion used by the California Milk Processor Board (CMPB).

“...all we wanted to do was promote the use of alder, and we did that as an industry association, and it involved Oregon, Washington, and BC, and for many years we have been the only Canadian member of that association...”

“...but for us to try and reach architects in the Vancouver area as an individual, it would be an awfully tough and awfully expensive job...”

“...As far as alder is concerned, it is kind of a dull product, it doesn’t have a lot of spark in the marketing chain at the present time. Hopefully it will come back.”

“...we are feeding the wrong demand, so we haven’t exploited the full level of demand that we could be exploiting.”

Product innovation is also important for the hardwood industry in BC. The types of products produced are often sensitive to consumer trends in finishing and appearance (Bumgardner et al., 2009). Cross-industry collaboration can help to identify opportunities for suppliers. Research and development institutes, such as FP Innovations, as well as associations such as BCWood and the Coastal Forest Products Association (CFPA), could work with manufacturers to help establish new products and markets to supply. This type of innovation requires clustering⁹ and collaborative efforts, but could result in new economic opportunities for the coastal BC industry.

4.2.5 Seasonality

Product seasonality can affect the red alder supply chain, especially in the woodenware and toy markets (representing 5% of global wood use), which see sales peak around Christmas time. This means that producers can be forced to put most of their production into an intensive period of a few months in order to have the components shipped in time for the other manufacturers to meet the orders for their end products. This timing can pose difficulties if red alder becomes available only at random times as a result of unstable timber flows from the land base. These difficulties can also be coupled with harvesting and seasonality constraints on the land base. Cross-industry

⁹ “Clusters” are geographic concentrations of inter-connected companies and institutions in a particular field (Porter, 1998), resulting in cooperation and information sharing between industry, academia, government, and public stakeholders.

relations could help to improve the scheduling concerns, increase alder-log availability, and improve supply chain efficiency.

“...it’s one of those products that is very seasonal, an item that you have all your production in by the end of summer in order to ship before the Christmas time [rush].”

4.3 Markets

4.3.1 Export and Development

Coastal hardwoods in British Columbia have seen a decline in the number of local producers involved in the primary breakdown or remanufacturing of local hardwood species in the past 10-15 years. As a result, many of the operations that harvest alder see a majority of the raw logs being shipped south into the Pacific Northwest of the USA for primary breakdown. From there, component parts are often sent to California or, more commonly, east to China for remanufacturing, before returning to the North American market.

“Weyerhaeuser has no mills in the [Fraser] valley, [or] in Canada, they are going to have to export all that lumber [for processing].”

“...35,000 to 40,000 m³ [per year] will be deciduous. Of that [harvest volume], 90% plus is alder, the other 5% to 10% will be maple ... 30,000 m³ at least [will go to the USA for processing].”

“... [The mill owner] will sell most of his product to China... [some will be sold to] Weyerhaeuser alder, some of it into the [United] States, probably [the] number one [customer] is China.”

“The 11 [shipping] containers [of alder] that we sold to China, out of Washington State, it just goes, and we handle the paper[work].”

Improving the current hardwood supply chain in BC should be a priority if we desire to have a diverse set of wood-product manufacturers in the province. To accomplish this, the market for coastal hardwood species must be developed. This will require an effort throughout the supply chain, from the forest licensees through to the manufacturers and marketers of the products. A hardwood strategy for red alder should include a realistic look at the timber supply on the land base (including comprehensive net downs and constraints of the timber-harvesting land base), the size of local manufacturing infrastructure that could be attained in the region, and a comprehensive plan to promote the use of our hardwood species locally and into our existing markets. A coordinated effort between supply chain actors will be required and should be encouraged by the provincial government.

“...if someone were to actually look at all the deciduous blocks, or polygons, out there and do a timber-supply analysis and actually come to a conclusion that there is no way to possibly ever meet a sustained yield with what is there, then I would be more open to taking conifer blocks and replanting them as deciduous.”

“In the harvestable land base, it [the harvest of alder] can’t be in riparian areas...”

4.3.2 Market Trends

Hardwood market tends to be less volatile than its softwood and commodity-based counterparts. The cycles seem to involve less variation in price, but on the other hand, market trends for finished products can change quickly. This means that operations have to be flexible and adaptable to new product requests and have access to a range of buyers they can deal with.

The 2008 global recession had a devastating effect on the forest industry in BC. The export of forest products from BC decreased by 24.8% between 2006 and 2009 (FP Innovations, 2010), which had a major impact on the viability of commodity-based lumber manufacturing. These impacts have also affected the hardwood and finishing product markets in the province. This crippling of the industry has reduced the number of hardwood supply chain actors to a small handful. Currently, only one producer is processing hardwood in coastal BC, and only in moderate volumes. Although the situation has been dire, it should also serve as a message to

diversify many aspects of the forest industry. A diverse product basket can serve to provide options to licensees on how to proceed with their harvests. The importance of expanding our presence into other non-traditional (i.e., non-North American) markets should be clear after feeling the impact of the current recession.

“...the market has more or less collapsed for alder... the situation at the present time is purely economics and has a lot to do with the US housing industry, it is in tatters...”

“...this recession has completely changed the US market...”

“...you see the supply chain weakening over the last few years, with people going away... I think the supply of alder logs could have been there, the weakness was [the] end-product market, particularly with the US going into a downturn.”

“...the two mills under our own control worked very successfully until this recession came along and, a year and a half or two years ago, we were seriously looking at it and it really was, from the logs to lumber part of our operation, logs were too high a price...”

“...mills in Washington and Oregon are hell bent to have that [alder lumber] business.”

“Every once and a while, they [a local mill] accumulate some local wood and run it through the chipper and put out a load of [pulp] chips, but the chips market is in such tatters too that its very marginal.”

4.4 Production Issues

4.4.1 Log Supply to Producers and Production Volumes

In the current atmosphere of timber harvesting in BC, a secure and stable supply of red alder is not always available to producers. Often, the red alder logs available for sale are incidental to softwood harvesting operations. The supply often varies and requires log buyers to scrutinize what is available; it takes a significant portion of resources to evaluate each alder boom.

Recently, with a reduction in existing red alder inventories, many producers have become “hand-to-mouth,” having only a few days of log inventory ahead of their manufacturing plants. The seasonality of timber harvesting also means that alder log availability fluctuates throughout the year.

“...We also bought land-delivered wood from the Fraser Valley, because that came from what we referred to as farmer wood, but in the last 10 or 12 years, it really, in a lot of cases, wasn’t farmer wood, it was small loggers and land developers...”

“...if they were in a stand that had mixed alder and cottonwood, all they wanted was the cottonwood, he [an employee of another business] would phone me up and ask me if I was interested in the alder, or the other species, being maple...”

“...if they had bad winters and the market was suitable, they wanted to keep their crews busy, so they dropped down to low-level logging and suddenly there would be a bunch of alder on the export list and it would come in surges according to season for a while...”

“...our mill was always hungry for wood, we never really built up big supplies behind us...”

“...he [a mill owner] could effectively double the production of his mill, he just can’t get enough [alder] timber supply to justify that [at this point in time]...”

Production volumes have fluctuated in the past 12 years in the red alder market. The most recent trend has been a reduction in the number of manufacturing operations working with coastal hardwoods. Although the falling and selling of raw logs increased through the 2000s, many local producers have been forced to either close down or rationalize their operations. The largest of these production lines, owned by Weyerhaeuser (Northwest) Hardwoods, was established and subsequently shutdown in Delta, BC. One priority could be to rebuild hardwood manufacturing capacity on the coast by first reopening the three medium-sized operations that exist. This might

require a concerted effort on the part of government and industry, but it may serve to increase the resiliency of our forest industry in the long term.

4.4.2 Wood Properties

FP Innovations, BCWood, and Weyerhaeuser (Northwest) Hardwoods have all produced good information detailing the specifications regarding the wood properties of red alder (BCWood, 2002.; FP Innovations, 2012.; Weyerhaeuser Hardwoods, 2011). Red alder is considered the “softest” hardwood in BC. This is a favourable attribute for creating a variety of wood products for appearance products, but is less desirable when strength and durability are desired. For example, industrial users (such as railroad companies and construction firms) often require blocking for temporary structural elements. In these cases, maple, hemlock, or fir (or even eastern hardwoods) are used instead of red alder because it is too soft. These industries provide good opportunities for some hardwood producers to get forest products used in industrial applications, but alder will not figure prominently in these markets.

In other cases, the workability of red alder is desired. One interviewee noted that mid-grade alder boards are often used in secondary-school shop classes. For wood workers beginning to learn the trade, red alder provides a workable species with which to create products and is much more forgiving than other hardwood species.

“...alder is not a really, really high-quality hardwood. You know it’s not an oak, not a cherry, not even a beech really, what it had it was fairly cheap and it looks good on the outside and it is easy to work with, so it had lots of favourable characters that made/makes it good for making furniture with. But it isn’t the type of furniture that is going to last two hundred years.”

4.4.3 Milling Operations

The type of milling operations described by the interviewees ranged from small and versatile operations sawing anywhere from 40 m³ to 100 m³ per day to larger, more industrial operations such as the one seen in the now defunct Delta mill. Operations in the mills in the United States included independent operators, as well as the network of Weyerhaeuser (Northwest) Hardwoods mills in the Pacific Northwest. A common issue among all of these mills was that they are having a difficult time building up supply ahead of their operations. In many cases, mills have been aggressively courting log suppliers. In BC, the one current mill operator is having to approach a licensee to get them to put hardwood blocks up for auction and is also having forest engineering companies actively go out to find deciduous units to feed the mill.

“I have spent the last six months trying to find deciduous [blocks], I did find tons, it was all locked up in this area that we are having conflict with, with another operator, because of political reasons”

“...they [a mill owner] have been hounding [a licensee] to go get deciduous volume so that they can sell it and they can buy it...”

In most cases, these mills are described as “hand-to-mouth” for fibre supply. In some instances, these operations have no more than a few days of log inventory sitting in their supply yards. Providing a strategy to provide a consistent supply of alder to these producers would be viewed as a major strategic improvement to the existing business environment.

“...Yes, they are running on one or two days of inventory. ...just absolutely ‘hand-to-mouth’... they [hardwood mills in the U.S.] are aggressively courting us for volume...”

Alder is usually processed in eight-foot logs, but there has been experimentation with 10-foot and even 16-foot lengths, depending on what a customer is looking for in the product. It was noted that producing high volumes of standard alder lumber was not as lucrative as it once was. Other manufacturing steps need to be added to get enough value out of the product to justify the cost of the inputs and operations. By supplying small niche markets with products that are difficult to acquire elsewhere, a producer can develop some positive economic returns on their

investments. Producing only a narrow line of products in large volumes was not viewed as a solution to the manufacturing challenges that currently face the coastal industry.

“...standard everyday alder lumber is a tough job now...”

Drying of red alder is an important element in the milling process. It requires some experience to dry the wood correctly and avoid discoloration (and a subsequent loss of quality). Using a combination of high pressure and steam was noted as an effective drying method.

After the drying process, defects in the resultant lumber become most apparent. The “checkerboard” effect from improper handling of the logs on the harvesting site becomes most prominent after the drying is completed. At this point in the manufacturing process, many resources have been allocated and the loss of quality and market value can cause significant economic losses to the operator. This shows how important it is to have high levels of quality control in the red alder supply chain and how mistakes at the harvest site can have large impacts on the financial well-being of the rest of the supply chain actors.

“...once you know how to do it [kiln dry alder], it is pretty straight forward. I think there have been lots of studies done of drying alder over the years, it is dried in all methods, and perhaps the best drying method is using low pressure with steam.”

“It [‘checker boarding’ of alder lumber] becomes most apparent after it has been [dry] kilned. So even when it goes through the mill you can’t see it, but when it pops out the other end with kilning... that is when it becomes most apparent.”

4.4.3.1 Value-Added Operations

Value addition in hardwoods is an integral element of viable production strategies. Incremental value addition to roundwood inputs serves the industry by providing a market where a premium can be charged on specific product requests. It takes considerable effort to establish customers for these types of products, something that is developed over time. If the specifications of the customer cannot be met on a consistent basis, they will look to other suppliers and products to fill their demand. The value-added business requires nimble producers that can adapt their

operations to specific requests. In some cases, producers will take alder lumber and regrade and resaw it to meet specific dimension requests for customers.

Hardwoods provide an opportunity to move some of BC's forest industry into more of a value-added orientation. There are some considerable barriers to developing the sector, and cooperation will be needed throughout the supply chain to overcome these barriers. If successful, the province could move towards developing a vibrant value-added industry that will bring significant economic benefits. It will also serve to diversify the product basket and portfolio of clients that the BC industry can serve.

“...we will value add to a lumber parcel, we will put it through the planer, sort it for width, and maybe straight line rip and we've supplied two containers into Italy recently that were all ripped to width alder, rather narrow widths...”

“...what are you going to do with SPF (spruce, pine, balsam fir) in a super value-adding way? ...here on the coast we are spoiled, we have red cedar, yellow cedar, sitka spruce, douglas fir, we have some species that are highly prized by value-added manufacturers, those are all softwoods, I think that it is a blessing that we have some hardwoods that are also prized, and red alder is also now on that list, broad-leaf maple has certainly been on that list... we have some unique species that are prized globally...”

“...[alder is] lending itself to value-added products so anything from furniture to cabinetry, particularly cabinetry, at the lower end millwork, moldings, that sort of thing.”

4.4.3.2 Employment, Equipment, and Investment

Both of the hardwood mills that are currently idle in the province had recently added new equipment to their existing operations. These were measures to try and improve their competitive positions. These capital investments in equipment help to improve the types of products that can be created and can also serve to reduce the amount of waste wood. Even with these investments, the number of employees working for the companies that own the idle mills has been reduced.

This is due to the significant economic recession that has hampered the hardwood industry's growth since 2008.

Many of the hardwood milling operations in the United States are currently up for sale, or not undergoing significant investments in capital and equipment. The reasons for these sales are varied, but without certainty in the supply of hardwood logs, and with questions surrounding the viability of markets in the long term, most investors would be wary to invest in significant mill improvements.

Hardwood mills have the capabilities of providing high-quality manufacturing jobs. The milling operations require a more specialized knowledge set compared to softwood commodity lumber mills, which are often highly automated and produce a narrow line of products. Hardwood operations have to be able to change their products as new product orders come online. The benefit is seen in adding value to wood for which a premium can be charged. This makes for a climate where more dollar value is derived per unit of roundwood, which is essential in shifting from a volume-based paradigm to a value-based one.

“...they have a big mill compared to anything that we have had. He's put an awful lot of money into it [in the form of equipment upgrades] in the last while, but it [the sawmill] is not running.”

“...at one time, we had 22 employees in our plant producing lumber in various forms, we have other aspects to our business too, we haven't just stayed with hardwoods.”

“...we spent a bunch of money upgrading our equipment in the plant, streamlining the green side of our operation and we reduced that from a seven or eight man operation...”

“...one high-quality mill producing, using Douglas-fir and cedar [or alder] for high-end products can employ 20 or 30 people and use hardly any wood, and everyone walks home with a reasonable paycheck at the end of the day.”

4.4.4 Species Diversity

While the main focus of this report was red alder, in the majority of cases, it was seen as part of a larger product basket that included other hardwood species on the BC coast. Maple, birch, poplar, and cottonwood were identified as other species that are important elements of the hardwood production chain. In other cases, the ability to handle softwoods, such as hemlock and Douglas fir, was also noted. These other species fit into the larger idea of diversification; being able to supply many different types of finished products to a wide array of markets. In the end, the focus should be on being involved in the market that supplies finished products, not just commodity or structural products. Being adaptable is a major element of being an effective business.

“...we have always had a connection in the softwood industry only, because we have mostly always been hardwood... but we’ve overlapped into some high-graded stuff of softwoods.”

“...in the last two or three years, we have specialized more in maple, because there is more, better opportunity to, how will I say it... to do some value-added work in it.”

“...Another part of our operation is building crane mats for the oil industry, but that is all hemlock, [Douglas] fir...”

“...We have always sold birch to fit the marketplace.”

“...when we were having trouble with supply of alder, we started messing around and experimenting with hemlock, so we started putting runs of hemlock through the mill...”

4.5 Supply Chain Issues

4.5.1 Actors and Integration:

There are many supply chain actors that are involved in the coastal hardwood industry. Forest licensees, woodlot owners, and land developers all have standing hardwood volumes. Professional foresters, forest engineers, forest operations managers, and forest technicians make important decisions on the land base that affect all other supply chain actors. There are silviculture specialists and planting and reforestation operations that implement silviculture prescriptions. Public and private institutions govern the practice of forestry in the province. Harvesting crews, fallers, truckers, and scalers deliver logs to primary breakdown milling operations that develop products for the remanufacturing and value added sectors. The products produced for the end-customer are dependent on business and sales relationships, market trends, and promotional activities. Associations, committees, and commissions are used to advocate market segments. Research institutes help to drive innovation in all aspects of the supply chain. With so many broad and dynamic aspects of the supply chain acting in concert, it is important to look for inefficiencies or weaknesses between actors. Creating a climate of cooperation and collaboration across the different aspects of the hardwood supply chain will help to identify such inefficiencies.

In many ways, each part of the supply chain informs the health and viability of the actors further along the custody chain. The size of standing alder inventories and their availability upon being constrained by land management objectives will invariably affect the work of forest operations divisions, wood producers, marketers, research and development agencies, as well as end-users, of the resultant products. In many cases, each actor has different and specialized knowledge. To effectively capture and capitalize on this knowledge, cross-industry collaboration needs to be encouraged. A coordinated effort to articulate what the hardwood industry needs to function as efficiently as possible should be undertaken at both the regional and provincial levels.

5.0 Discussion and Recommendations

Based on the review of existing literature and the interview results of this study, a series of recommendations for fostering the red alder industry in coastal British Columbia have been developed. Table 1 was created to synthesize the issues and results from Chapter Four and relate them to the recommendations presented later in this chapter. While not intended to be a comprehensive list of remedies, these recommendations will serve to set policy-makers and strategists on a trajectory towards developing a viable, healthy hardwood supply chain on the BC coast, with a particular focus on red alder.

Table 1: Issues, results, and related recommendations based on the literature review and interview data

Issue	Result	Recommendations
4.1 Timber Supply	4.1.1 Conifer Bias	5.1, 5.2, 5.3
	4.1.2 Forest Inventory	5.1, 5.2, 5.3, 5.9
	4.1.3 Harvesting & Transportation of Alder	5.2, 5.3, 5.6, 5.11
	4.1.4 Seasonality	5.2, 5.3, 5.11
	4.1.5 Economic Issues	5.1, 5.2, 5.4, 5.11
	4.1.6 Climate Change	5.1, 5.2, 5.5, 5.9
	4.1.7 Government and Policy Issues	5.1, 5.2, 5.3, 5.11
4.2 Product Issues	4.2.1 Product Type and Properties	5.4, 5.6
	4.2.2 Price	5.8, 5.10, 5.11
	4.2.3 Competition and Product Substitution	5.4, 5.6, 5.8
	4.2.4 Promotion and Innovation	5.3, 5.4, 5.5, 5.8, 5.10
	4.2.5 Seasonality	5.4, 5.6, 5.11
4.3 Markets	4.3.1 Export and Development	5.1, 5.3, 5.4, 5.5, 5.11
	4.3.2 Market Trends	5.5, 5.8
4.4 Production Issues	4.4.1 Log Supply to Producers and Production Volumes	5.4, 5.6, 5.11
	4.4.2 Wood Properties	5.8,
	4.4.3 Milling Operations	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.8, 5.10, 5.11
	4.4.4 Species Diversity	5.5, 5.6, 5.8, 5.10, 5.11
4.5 Supply Chain Issues	4.5.1 Actors and Integration:	5.2, 5.3, 5.4, 5.6, 5.11

A large and coordinated effort will be required to adequately develop the supply chain given the existing economic conditions. These conditions can also serve to allow for time to reflect on policies and past practices that have affected the current business climate. Strategic decisions need to be implemented at many levels to foster a vibrant hardwood supply chain. These

recommendations are intended to act as a starting point in addressing the many issues that face the current industry.

5.1 Address the Forest Inventory Issues

A major issue that emerged from the interviews was the uncertainty regarding access to existing red alder inventories and access to a consistent hardwood log supply on the BC coast. To address these issues, a thorough timber supply analysis focused on hardwood log supply should be conducted through the Ministry of Forests, Lands, and Natural Resource Operations. This would serve as the baseline for any future projections of hardwood log supply. It would also provide some certainty and quantification of the existing timber resources, which is valuable to every aspect of the hardwood supply chain that derives value from the raw material inputs.

5.2 Disseminate Information Regarding Hardwood Stand Management

Information regarding the establishment, harvesting, and transportation of red alder should be developed and disseminated to forest professionals, operations managers, entrepreneurs, and forest sector employees. This information could be in the form of an updated guidebook to hardwood management on the coast and could provide strategies for managing hardwood stands. This type of information helps to foster a climate where hardwood management options are as viable and reliable as their softwood counterparts.

5.3 Work in Concert with Professional Associations and Policy Institutions

To develop concise and correct information related to hardwood management and utilization on the coast, professionals, as well as public and private institutions, should be enlisted to contribute. These institutions may include universities and academia, as well as the resources of the Ministry of Forests, Lands, and Natural Resource Operations. Institutes, such as the Association of British Columbia Forest Professionals (ABCFP), could be commissioned to develop a stewardship or practice guideline regarding hardwood management. Other policy institutions could investigate any legislative impediments that need to be remedied to exploit the full benefit of the coastal hardwood resources. These types of activities and endeavours will

serve the industry by addressing the elements that result in the conifer bias that is still prevalent in the coastal forest industry of BC.

5.4 Develop Markets and Encourage Business-to-Business Relationships

The market for hardwood products is diverse, seasonal, and, in many respects, completely different from the market for softwood and commodity-based products. Creating a viable hardwood supply chain involves more than just an incremental addition to the existing manufacturing infrastructure in the province. The hardwood industry functions under a different, unique set of constraints and objectives. To develop and supply markets effectively, businesses within the supply chain should be enlisted to contribute to a vision for hardwood utilization in the province. In this way, inefficiencies in the existing supply chain can be identified and solutions proposed to improve the total competitive advantage of the coastal hardwood manufacturing sector.

To develop new markets, promotion and advocacy have to be undertaken on a regional scale. Associations of wood producers, coupled with other marketing organizations and experts, should be enlisted to contribute to these activities. Promoting the utilization of hardwoods and subsequent products is a time-consuming and potentially expensive endeavour and, if this burden can be shared among many actors, the effects could be realized at a lower cost than by individual marketing efforts alone. This will be even more important when trying to develop new business relationships in regions and countries we have had little business with in the past.

5.5 Diversify the Coastal Forest Industry

For decades, academics and policy makers have been touting the benefits of diversifying the forest industry in BC. In keeping with that trend, our research also found that the interviewees saw inherent value in developing diversity in both the forest inventory and in the manufacturing base of the province. Some of the many reasons that diversity builds resiliency, according to interviewees include:

- a.) Future markets are inherently unpredictable and at least some of the programs in effect today will face problems in the future. Diversity reduces the risk by preparing for unforeseen markets.
- b.) Hardwood products can have a higher incremental value addition; this creates jobs that require less volume input, but still generate positive economic returns. This could be valuable as forest cover becomes a global asset in adapting to and mitigating the effects of climate change.
- c.) Diverse species composition on the land base can improve forest health and resiliency to pest outbreaks, which can be difficult to predict and manage.
- d.) Species diversity brings positive wildlife habitat benefits, improves food web systems, and mitigates homogenizing landscapes and alterations to complex forest relationships.

5.6 Supply the Correct Customers, Encourage Nimble Producers

Red alder was not viewed by the interviewees as an industry in and of itself. It was often viewed as a piece of a larger product basket that includes maple, birch, cottonwood, poplar, and aspen, as well as softwoods, such as hemlock and Douglas-fir when demanded in the marketplace. Some operations could stock eastern hardwoods, as well as hardwoods from the tropics to meet the varied demands of their customers. The ability to be flexible and handle many types of product requests was seen as integral to the long-term viability and growth of a hardwood manufacturing sector. It is not necessary to consume large volumes of roundwood for the industry to be successful; being able to provide an array of products and adjust the manufacturing paradigms accordingly is what can make hardwood producers viable in the long term.

5.7 Assess Threats to Market Share

Any business must be aware of threats to its market share; these can include product substitution, a change in consumer tastes and product trends, new competitors, and new technologies (Per.

Comm. Interviewee, 2011). Fluctuating prices of both feed stock (roundwood) and end products can destabilize the market share. Higher log prices can result in higher end-product prices, which may cause existing customers to turn to lower-cost options (Per. Comm. Interviewee, 2011). Market share and product demand can be reduced by these price uncertainties. Providing a stable supply of hardwoods to the existing manufacturing industry will help to minimize drastic price fluctuations due to supply constraints and allow processors to focus more of their time on the marketing aspects of the supply chain.

5.8 Assess Climate Change Impacts

Climate change continues to be a real threat to the existing forest inventory in BC. There is much work being done in this field, with new data emerging constantly. Understanding how climate change will impact future stand composition, growth rates, and forest health is imperative to future supply predictions and the long-term viability of hardwood manufacturing operations. The most recent study on the impacts of climate change on red alder predicts an increase in the range and growth of red alder (Cortini et al., 2012). The results suggest that more alder could be grown in coastal BC as a pure crop or in mixed-wood plantations. The study notes that its model does not account for abiotic factors that can damage alder stands. These factors include frost damage, severe freezing events, and outflow winds. The model also predicts that alder growth improvements will only occur on moist sites as soil moisture deficits will be a limiting factor for alder growth on fresh and drier sites on the coast. Because of these knowledge gaps, it is suggested that caution be used if alder is to be planted and grown in new areas, and that stand-level considerations must also be utilized for the effective management of red alder as an adaptation strategy to mitigate the impacts of climate change.

5.9 Investigate Emerging Markets

New technologies and changes in national and international policies can create new markets for raw materials. Recent examples of this include the biofuel industry, which is rapidly developing technologies that can convert hardwoods into energy fuels (Hines, 2011). In some cases, the short rotation age of hardwoods, such as poplar and alder, make them a preferred option over species with longer rotation ages. The biofuel industry may also prefer trees to annual crops

because they represent a more stable supply source and longer-term agreements can be developed.

Another emerging market is the carbon credit market. This is currently a voluntary and relatively uncertain market, but if governments begin to adapt to climate change by enforcing carbon offsets, it could become a valuable component of the coastal forest industry.

The pulp and paper market also provides some emerging opportunities. “Paper board” is used for many containers, such as milk cartons, soup boxes, and juice containers (Finebar, 2001); it requires approximately 10% of the total pulp inputs to be hardwood fibre to create the product as the shorter fibre lengths make a smoother paper that is better suited for printing (Per. Comm. Interviewee, 2011). Alder can serve this need, and could be used as inputs in these types of specialty pulp and paper operations. As BC’s competitive advantage in the pulp and paper industry becomes eroded, these niche products could serve to bring higher-value returns to a weakening element of the supply chain.

5.10 Be Aware of New Technologies that Impact the Hardwood Market Share

Technology has been eroding the competitive advantage of Canadian forest products for the past few decades (Per. Comm. Interviewee, 2011). Advancements in the engineered wood-products industry from other parts of the world has resulted in an increase in the types of products that can serve the construction industry’s needs. Combining these technologies with fast-growing plantation forests near the equator and in the tropics can result in product substitution for our commodity wood products. The tight growth rings and long fibre lengths that were the backbone of the solid wood and pulp and paper operations in the province do not serve the industry as they once did (Per. Comm. Interviewee, 2011). It is important to take the pulse of the latest technologies associated with forest product utilization (BC, 2009). Clustering with research and innovation institutions, as well as academic institutions, can help the industry adapt to evolving technologies in the marketplace and remain competitive over the long term (Porter, 1998).

5.11 Create an Enabling Environment for Small Businesses

The reality of the hardwood industry in coastal BC is that there are currently only a few small businesses that are producing hardwood products. In the short term, given the global economic conditions, the likelihood of any large level of capital investment in developing another large hardwood mill (such as the one in Delta) is low. Therefore, the immediate future of the hardwood manufacturing industry in BC is largely in the hands of these small businesses. If they fall completely idle, sell off their assets, and close down their operations, nearly all of our coastal hardwoods will have to be exported as raw logs, and the incremental benefits will belong to other countries and businesses that undertake the processing of these exports.

In the short term, there should be a concerted effort to create an enabling environment for small businesses. Since they do not currently consume large volumes of hardwoods, they may be able to continue to operate while a red alder forest inventory analysis is conducted . They could also be partnered with smaller woodlot owners and land developers to gain economies of scale in volume inputs. This could be an effective strategy if the larger licensees are busy on the softwood side of the business and do not have the resources to allocate to delivering hardwoods to these producers.

In short, the government should provide incentives and an adequate hosting environment for these small businesses to collaborate and utilize the existing hardwood inventories to avoid losing the hardwood manufacturing sector all together.

6 Conclusion

In summary, the major issues that arose from semi-structured interviews on the supply chain for BC coastal red alder relate to:

- Current and future timber supply of coastal hardwoods;
- Hardwood product attributes and limitations;
- Hardwood markets and industry trends;
- Hardwood production processes and constraints; and
- Hardwood supply chain structure and current inefficiencies.

The timber supply of alder and other coastal hardwoods is uncertain; there is a serious need to have this resource adequately quantified in BC. BC hardwoods have unique product attributes as well as limitations to their industrial applications. Hardwood production processes, markets, and industry trends are different to those of conifers and these differences need to be accounted for when attempting to develop a viable hardwood supply chain in coastal BC. The current hardwood supply chain in coastal BC is weakening, and inefficiencies are present throughout the supply chain.

In many ways, the findings of this research parallel the findings of the extensive body of research and literature related to alder going back many decades. There have been many previous reports and recommendations by other authors that align with the recommendations here. The difficult task is finding the collective will and the combined and effective allocation of resources to make the coastal hardwood industry a viable and valuable component of the total GDP contribution to the province. It is all about transforming the vast body of knowledge that exists into a cohesive plan for a vibrant and competitive hardwood manufacturing industry. The key issue that is most under-developed and under-researched seems to revolve around how to secure the financing and create enabling business environments that are attractive to investors.

Many of the findings and recommendations of this study are interconnected at many levels throughout the coastal hardwood supply chain. No single recommendation or issue presented in this thesis is intended to be a stand-alone solution or description of the challenges that face the industry. Instead, the thesis is intended to be a synthesis of the opinions collected through a

semi-structured interview process and then combining these results with the existing information and literature regarding coastal hardwoods and alder specifically.

This study is not without its limitations. This study is a “snap-shot” in time of the hardwood industry in BC in 2011. Government policies, availability of input materials, markets and economies can change rapidly, so referencing this study without the proper temporal context can be erroneous. It also uses a qualitative research approach, meaning that the results cannot be quantified, extrapolated, and applied to the entire coastal hardwood industry. The fact that some of the requests for interviews were declined (or ignored) means that there are still elements and opinions within the supply chain that still remain to be investigated. Further research steps would include an attempt to engage these supply chain actors and stakeholders in the discussion regarding manufacturing diversification and developing a viable long term feed stock of hardwoods to producers. This could be accomplished through a public review and comment process added to the timber supply analysis for hardwoods that is recommended in this thesis. The willingness of the government to produce such an analysis (and provide an arena for public input) may convince reluctant stakeholders to contribute their opinions and/or to give an interview. An extension of this qualitative analysis could be conducted during the timber supply analysis process. Combining both qualitative and quantitative research approaches should serve to add new dimensions to a guiding document such as a timber supply analysis.

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APPENDIX I: Interview Script

Interview Script – Industry and Supply Chain Actors

May 2011

- 1.) Does red alder factor in as a portion of your revenue streams?
- 2.) Do you supply hardwood logs or products as a result of your operations?
- 3.) Are you aware of any hardwood specific mills in your region? If so, please describe.
- 4.) Does red alder contain any unique features that make it favourable / unfavourable for processing?
- 5.) Are there difficulties presented by alder in harvesting operations? If so, please describe.
- 6.) Is red alder mostly considered a bi-product of softwood harvest operations?
- 7.) What products could you envision being produced with red alder?
- 8.) Are there any issues in creating a viable red alder supply chain in this region? If so, please describe.

APPENDIX II: Letter of Intent and Consent Form

Faculty of Forestry
2424 Main Mall
Vancouver, BC, Canada
Tel: (604) 822 – 2727

Date:

To: (Insert client)
Address

My name is Dan Nadir and I am a graduate student at the University of British Columbia. I am interested in carrying out a study to evaluate opportunities along the red alder (*Alnus rubra*, Bong.) supply chain. I want to include the perspectives of multiple communities and businesses in the coastal B.C. forest industry. The data collected will be useful in identifying possible mechanisms to improve the understanding and utilization of red alder in coastal British Columbia.

As you are a member of (insert community/business) and are involved with the Forestry industry we believe that you can provide us with very valuable information for the purpose of this study. We would like to know if you would be interesting in participating in this research and allow us to interview you for one to two hours. We will cover topics related to issues pertaining to the red alder supply chain, its most common limiting factors and the aspects that have influenced its successful utilization.

We hope that you are willing to participate in this study, which aims to encourage the development of a viable supply chain for red alder in the coastal forests of British Columbia.

Please do not hesitate to contact us if you have any questions or concerns.

Thank you for your consideration.

Dan Nadir
Faculty of Forestry
University of British Columbia
Phone:
Email: Daniel.Nadir@gmail.com

Consent Form – Industry

Co-Investigators:

Dr. Robert Kozak,
Professor
Dept. of Wood Science,
Faculty of Forestry, UBC
Office phone:

Dan Nadir, Graduate Student
Dept. of Forest Resources Mngt.
Faculty of Forestry, UBC
Phone:

This study is part of Dan Nadir's research thesis required for his Masters Degree of Science (MSc) and will be a public document when it is considered complete.

Purpose:

The main purpose of this study is to assess and describe opportunities and barriers to entry in the red alder supply chain in coastal British Columbia. A secondary objective is to determine if there is any available First Nation traditional knowledge related to red alder that might improve the understanding and management of this valuable resource. You have been invited to participate in this study because we believe you can provide us with interesting perspectives and viewpoints about this topic.

Study Procedures:

Interviews will help us to collect information regarding the red alder supply chain and traditional knowledge. This interview can last from one to two hours depending on the amount of information you are willing to share with us. Hand written notes will be taken during this dialogue and it will be taped with a digital voice recorder.

To complement our data, we will appreciate if you can provide us documents or reports related to any of the topics discussed during the interview. If this information is not in the public domain, we understand that you can't make it available to us.

If you have any specific questions about these methods, please do not hesitate to ask us anytime.

Potential Risks:

This research is not expected to cause any harm to you or your institution.

Potential Benefits:

Your business and/or community might be able to use the information gathered in the supply chain analysis to recognize potential new markets and utilization opportunities for red alder.

Confidentiality:

Your confidentiality will be protected so your name will not be revealed in any part of the research, especially when the results are distributed. Data records from the interviews will be kept in locked cabinets as soon as possible; they will be entered into a computer with password protection. Once this is done any name or identification that can be found in the registers or in field notes will be erased.

The principal investigator and the co-investigators will be the only ones who have access to the information provided in the interviews and to any field notes produced.

Remuneration / Compensation:

There will be no remuneration for your voluntary participation.

Contact for information about the study:

If you need any other information about this specific study you can contact the co-investigator, Dr. Robert Kozak, by phone (604-822-2402) or email (rob.kozak@ubc.ca).

You can also contact either of the co-investigators, Ron Trosper (Ronald.trosper@ubc.ca) or Dan Nadir (daniel.nadir@gmail.com) for questions related to this study.

Contact for concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 1-604-822-8598 or by email to RSIL@ors.ubc.ca

Consent:

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time you wish.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

Signature

Date (dd/mm/yyyy)

Printed Name of the subject signing above

APPENDIX III: Coding Results

	Data	A	B	C	D	E	F
Themes	Issues						
Log Supply		8	1	4	1	8	
	Conifer bias	2	4	2	1	1	
	Inventory		4	4		3	
	Existing			3		2	
	Establishment		1	3	1	1	
	Layout	2			1	7	
	Silviculture		3	5	1		
	Harvesting	1	1	2	1	1	
	falling		2			1	
	yarding		1	1			
	bucking			1			
	loading			1			
	trucking						
	Handling			1			
	Transportation		1	6			
	Roads	2	1			2	
	Seasonality	1	2	3		2	
	Geographical region		1	2	1	1	
	Constraints		1	1		2	
	Economics			3	1		
	value vs volume		2	1	1	1	
	stand maintenance						
	Log Grade Quality		1				
	Rotation age	1	3				
	Volume			2		1	
	Climate Change		1				
	Government		1				
	Policy		3	3	1	6	
	Tenure	2	5		1	5	
Product		13	7	3	4	1	
	Design	1					1
	Type		1		1	1	1
	Price	1	3	3	1		1
	Substitution	2	1		1		1
	Competition	3	1		1	1	
	Innovation				4		
	Marketing	6					1
	Promotion	2			1		1
	Properties		1	1	1		1
	Seasonality	1					
Markets		9	4	5	2		
	Export	2		3	2	1	1
	Development			1	4	1	1
	Recession	2	1	1			
	Trends	3					
	Cycles	1	1				
	US Housing Crisis	1					
	Global Competition			1	1		
Production		11	4	4			
	Log supply	1	4	2			
	Volume	4	3	2		1	
	Milling	3	1				1
	Primary breakdown						
	Value added						1
	Remanufacturing						1
	drying			1			
	wood properties	1					1
	Employment	1	1				
	Investment	1					
	Equipment	2					
	Product diversity						1
	Species diversity	8	3		2		
	Lumber Grades	7	2				
Supply Chain				1		1	
	Integration	3	1		2	1	
	Actors	10	4	7	2	4	1
	Size						
	History						
	R & D				4		

Note: The numbers in these columns represent the number of times during an interview an issue was identified and discussed by an interviewee.