# Timber Products Output and Timber Harvests in Alaska:

# An Addendum

## Authors

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## Abstract

Updated projections of demand for Alaska timber were published July 2006. Their application in land management planning for the Tongass National Forest has resulted in numerous questions and requests for clarification. This note discusses a broad range of these questions from the context of why we do projections; the model we used; the assumptions that determine the levels of timber harvest; our use of scenario planning; comments about how producers in Alaska compete with other North American producers; and the potential that some significant changes in southeast Alaska markets have changed the demand projections.

Keywords: National forest (Alaska), derived demand, forest sector models, timber harvests, softwood lumber.

## Introduction

Updated projections of demand for Alaska timber were released for review in December 2005 and published in July 2006 (Brackley et al. 2006b). These projections (hereafter called the 2006 Demand Study) were developed for use in land management planning for the U.S. Department of Agriculture, Forest Service, Tongass National Forest (Alaska Region [Region 10]). Since the fall of 2006 there have been numerous questions and requests for clarification of different aspects of the projections and descriptions of their underlying assumptions. Compounding the interpretation of the projections have been some significant changes in markets for forest products from southeast Alaska. These include a new domestic shipment policy (approved by Region 10 in March 2007) allowing up to 50 percent of the total timber harvest, including higher grades of Sitka spruce and western hemlock logs with a scaling diameter of less than 15 inches and any grade number 3 and 4 Sitka spruce or hemlock sawlogs from federal lands to be shipped from Alaska to U.S. West coast locations in log form; a restart of the veneer mill in Ketchikan; as of spring 2007, continued strong growth for softwood lumber in the U.S. domestic market; and a continued evolution of the economies of the Western Pacific Rim nations.

These questions span a broad range from the context of why we do projections of the demand for national forest timber, the model used to develop the projections, the assumptions that determine the levels of timber harvest being projected in each scenario, and comments about how producers in Alaska compete with other North American producers. This paper includes responses to the following questions:

1) Why we described the “existing model and approach obsolete” (Brackley et al. 2006b: 28).

2) How we interpreted the domestic market in making projections of timber harvest in southeast Alaska.

3) Clarification on the importance of product differentiation in making harvest projections.

4) How the forest products industry in southeast Alaska adjusted to changes in both the southeast and to changes in competing regions (Canada and the Pacific Northwest).

5) Responses to key points raised by The Wilderness Society in its review of the demand study. The Wilderness Society’s comments include the following concerns:

    a. A lack of causal factors that affect demand for southeast Alaska wood products in domestic markets.

    b. An assumption that the forecast of demand in Pacific Rim would determine demand in domestic markets.

    c. An observation that Japanese data is not a good predictor of other Pacific Rim markets (other markets use different products and quality).

    d. There is no parameter to represent the potential influence of changes in domestic markets included in the analysis—they model domestic demand as a derivative of Alaska exports to the Pacific Rim.

    e. The extent of China’s role as a major importer of North American wood products.

f. The need to consider a scenario built around a decrease in the demand for national forest timber resulting from southeast Alaska losing domestic markets. Clarification of the intent for scenarios three and four was additionally requested.

g. A statement that other studies (e.g., Stevens and Brooks 2003) suggest southeast Alaska producers operate at a cost disadvantage relative to other North American producers.

h. A lack of justification for the increase in Alaska stumpage prices shown in table 7 of the 2006 Demand Study.

i. Clarification of the definition of the Pacific Rim as used in Brackley et al. (2006a).

6) Clarification on the evolution of the industry in the second half of the 20th century, including the raw material that supports the industry and changes in the products (grades and value) produced by the industry.

7) Clarification about the links between the Brooks and Haynes Demand Model (Brooks and Haynes 1990, 1994, 1997) and the 2005 RPA Timber Assessment Update (Haynes et al. 2007).

8) Why we used scenario planning and the intent of the four scenarios.

9) Requests for clarification about the relation between the demand projections which are for trends in demand and annual sales and harvest volumes.

The purpose of this research note is to address these various questions and concerns, and to describe the context of the 2006 Demand Study. Also included is an update relative to events in China and an assessment the impact of events that have taken place since the date of the original release and publication of the 2006 Demand Study. We start by providing some background about how the Forest Service approaches economic assumptions used in planning, a brief history of past demand forecasts for southeast Alaska, and a description of the forest products industry in southeast Alaska. We then review the model structure used to make the demand projections. Next we discuss the use of scenario planning and the intent of the four scenarios used in the 2006 Demand Study. We close with a discussion of the implications on the projections of the events in 2006 and 2007.

## Background

It is important to understand the context in which the 2006 demand projections were made, including the three preceding demand projections. First, the federal government has a history dating back to 1876 of making long-term demand projections to guide policy making and planning processes. The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (amended by the National Forest Management Act of 1976) formalized these analyses by directing the Secretary of Agriculture to prepare a renewable resource assessment every 10 years. The purpose of the assessment is to analyze the timber situation and provide indications of the future cost and availability of timber products to meet the Nation's demands. The analysis also identifies developing resource situations, emerging policy issues, and opportunities that may stimulate both private and public investments. Colloquially, these are called the RPA Timber Assessments. The highlights of the most recent RPA Timber Assessment (Haynes et al. 2007) are summarized in the appendix. The first RPA Timber Assessment, published in 1982, introduced more rigorous economic modeling methods than previous analyses of the timber situations conducted by the Forest Service.[1]

Since the early 1980s, forest planning (as required by the National Forest Management Act) has evolved using assumptions derived from the RPA process. These primarily have been stumpage price projections and an understanding of the markets for national forest timber; including the derived demand for national forest timber (see Haynes et al. 1981 for a discussion).

Planning for Alaska National Forests has been no different. In the 1980s we started working on understanding the timber situation in Alaska and the role played by national forest timber (Haynes and Brooks 1990). Part of that work was the development of the demand model (described in Brooks and Haynes 1990) that is used today. Much of the attention at that time dealt with the expanding export market to Pacific Rim[2] countries and with the extent that logs from native lands and corporations would either be exported or locally processed and then exported or shipped to domestic markets. The simultaneous peak in 1988-89 of the U.S. and Japanese markets, the injunctions (in 1991) on federal sales and subsequent harvest reductions in the Pacific Northwest raised expectations among producers in Alaska for a larger share of the markets—both domestic and export served by producers in the Pacific Northwest. These expectations, along with the interest resulting from the Tongass Timber Reform Act of 1990 (TTRA 1990) led to a revised set of demand projections (Brooks and Haynes 1994). These projections provided a view of the future that anticipated the impact of one pulp mill closing and changing views about the relation between log and lumber exports from Alaska.[3] The third set of demand projections was completed right before the 1997 Tongass Record of Decision (ROD) was signed—when concerns were raised about the adequacy of the 1994 projections. The 1997 demand study included three scenarios (low, medium, and high) and assumed that the primary markets were the same Pacific Rim countries as assumed in the earlier demand studies. The study was completed just before Asian markets collapsed in the summer of 1997.

During this same time the RPA Timber Assessments (published in 1995, 2003, and 2007) chronicled the market adjustments following the listing of the spotted owl and the federal harvest adjustments as part of the habitat conservation strategy; the shift of the industry from the West to the South; the increase in Canadian softwood lumber exports to the United States; the loss of U.S. export markets; and the emergence of the South's fourth forest as the major U.S. timber region.

The four demand studies done in 1990, 1994, 1997 and 2006 and summarized in table 1 reflect changing economic conditions both in southeast Alaska and in forest products markets around the Pacific Rim. All four studies used the same model and were done in support of land management planning activities on the Tongass National Forest. The differences in the projections reflect differences in the underlying assumptions especially about the types and amounts of products produced in southeast Alaska. While the details of the various projections are described in the various reports; the differences in the projections reflect the general uncertainty that is inherent in economic forecasting where short term changes can out weigh longer term changes.

## The Evolution of the Forest Products Industry in Southeast Alaska

Beginning with Russian settlement, there has been some form of local timber processing in southeast Alaska to support local consumption. It reached 8 to 9 million feet of harvested material in the late 1800s as mining expanded, increasing the demand for mining timbers and lumber for local construction. Concerns about conservation led to the creation of the Alexander Archipelago Forest Reserve by presidential proclamation in 1902 (Rakestraw 1981) and the proclamation creating the Tongass National Forest was signed September 7, 1907. Reported sales in 1909 and 1910 averaged 13 million board feet (MMBF) of logs per year (see fig. 1).

Annual volumes of timber harvested following World War I and prior to World War II varied from 14 to 57 MMBF. This rose during World War II to more than 90 MMBF in southeast Alaska to support the war effort. About 45 percent of this war year volume was shipped to Seattle for use in airplane construction. The remaining amount was sawn and used in Alaska building programs.

After the war, raw material was required to rebuild Japan. This coincided with Forest Service efforts to contribute to the development of well-paying, year-round jobs in southeast Alaska. The first long-term contract for timber was issued in 1948 (preliminary) and 1951 (final) to the American Viscose Corporation, the largest producer of rayon in the United States (Rakestraw 1981). The initial contract was designed to supply a mill at Wards Cove in Ketchikan. The second contract, with a Japanese firm (Toshitsugu Matsui), was signed in 1953 to support a mill in Sitka. The harvest to support these mills increased from 70 MMBF in 1954 to 405 MMBF in 1965. Figure 1 shows this increase as well as the peak in Forest Service harvest in 1973 and the peak in total harvests from all lands in the late 1980s. Figure 1also shows the shift in harvest from the Forest Service to private (Native corporations) timberlands, and the decline in both

public and private harvests starting in the mid-1990s. Current Forest Service harvest levels are 10 percent of what they were in the mid-1960s.

As pulp mills became operational, an integrated industry evolved, which included sawmills and pulp mills. The development of sawmills was encouraged by Forest Service restrictions on the export of round logs. The policies were designed to increase local manufacturing. These sawmills typically produced cants and baby squares[4] for export to Japan. Both lumber and log exports from Alaska and the other three Pacific coast states are shown in figure 2. Alaskan producers accounted for a major share of lumber exports until land transfer as a part of ANILCA created a private land base (the Native corporations and Native village corporations) whose owners could sell logs to the highest bidder, whether domestic or foreign. Until the early 1990s, the highest prices for stumpage were in the log export markets and Alaskan private land owners took advantage of these higher prices. The emergence of log exports as one of the forest products changed the competitiveness among Alaskan forest products since trading companies could purchase high quality logs for manufacturing primarily in Japan. These reduced markets for cants and posts produced in southeast Alaska lead to the demise of large scale softwood lumber manufacturing.

Until 1990, the production from Alaska mills was exported to Japan and domestic shipments were relatively minor. The general history of lumber shipments from southeast Alaska to domestic North American markets is presented in figure 3. This information was estimated using the accounting relations in the Demand model that describe material flows. Other than some observations of past flows, there is no consistent historically reported annual data series for shipments from southeast Alaska to the lower 48 states.

In the early 1990s housing construction slowed in Japan and increases in the price of U.S. lumber reduced U.S. lumber and log exports (see Daniels [2005] for a detailed discussion of the changes in the log export market). Both changes in the demand for dissolving pulp and new mills opening elsewhere changed the competitiveness of the two Alaskan pulp mills and lead to their closures. The Asian economic collapse (that began on July 2, 1997, when Thailand floated its currency) further reduced the demand for softwood lumber in Pacific Rim markets. These, along with changes in Forest Service sales policies, introduced greater volatility in the Alaska timber market as producers responded to changing market opportunities. During the 1990s, the magnitude of the change in shipments to domestic markets for 2 or 3 year periods increased and decreased in excess of 80 to 100 MMBF (see fig. 3), demonstrating the extent of volatility in lumber markets during periods of great transition. These volumes represent amounts that are two to three times greater than the total annual production in any year since 2000.

Since the early 1990s there has been a structural change in the production and shipment patterns among the Pacific Northwest, Canada, Alaska, and Japan. These shifts reflects the steady increase in softwood lumber consumption in the United States, the loss of export markets, increases in lumber imports from Canada and no real change in U.S. softwood lumber production (see table 2). These trends are also expected to continue in the near future. The level of aggregation in table 2 reflects the way softwood lumber is treated in the RPA Timber Assessment as a composite of all softwood species and grades.

Much of the growth in U.S. softwood lumber consumption since the early 1990s was a result of a prolonged increase in residential construction. This resulted in increased demand for dimensioned lumber[5] and lumber used for millwork.[6] Simultaneously there were reductions in exports and lowering of demand for cants and baby squares. These shifts in the grades of lumber are reflected both in production data (see Warren 2006, table 13, Haynes and Fight

2004, table 7) and for Alaskan producers in the Capacity studies.[7] In addition the increased U.S. consumption increased imports from Canada, led to a resurgence of softwood lumber production in the Pacific Northwest,[8] and, as the Capacity studies show, greater shipments of Alaskan production to Seattle for domestic consumption and for export to Pacific Rim markets. At the same time the markets for high quality material have increased in the United States where softwood lumber used in millwork applications have remained about 13 percent of all softwood lumber used in residential construction but the market share of Alaskan producers has increased.[9] Given these various markets shifts, the annual log usage by Alaska sawmills during 2002 through 2006 has ranged from 30 to approximately 40 MMBF (Brackley et al. 2006a; Parrent 2006, 2007) and lumber exports from Alaska has average 1.45 MMBF (lumber scale) per year.[10]

## The Raw Material That Supports the Southeast Alaska industry

Southeast Alaska is one of the last areas in North America (including Canada) that supports and harvests stands of large, old growth timber of white wood species (hemlock and Sitka spruce). The old growth forest is a source of large logs that have relatively high percentages of clear material, i.e., material that is clear and relatively free of knots and being old growth has a high number of growth rings per inch of diameter growth. Clear material, high ring counts, and large log sizes all allow production of high value large pieces of lumber (widths of 10-12 inches). There are high value products associated with all of the species that are native to the region (western red cedar, Alaska yellow-cedar, Sitka spruce, and western hemlock). The cedars are naturally resistance to decay and are especially suitable for use in applications such as siding, decking, and other high value building products. In addition, Alaska yellow-cedar is similar to Japanese cedar and accepted there for finished and exposed applications in residential construction (Eastin et al. 2005).

The availability of old growth provides southeast Alaska mills with an advantage when competing with mills in the Pacific Northwest. There old growth material on private timberlands was mostly harvested by the mid-1970s (Haynes 1986) and the reduction of federal harvests reduced the supply of large logs in the early 1990s. As Spelter (2002) observed, "a striking trend in coastal Washington data is the decline of the share of old growth. By 1996, it had nearly disappeared." This is also the situation in Oregon (Haynes 1986, Spelter 2002).

Numerous studies make reference to the yields of quality of material from Alaska old growth, including Green et al. (2000); Fahey (1983); Woodfin and Snellgrove (1976); and, Lane et al. (1972). The 1972 and 1976 studies were concerned with the recovery of material from old growth logs. The Woodfin and Snellgrove (1976) report indicated that 98 percent of the logs in the study (a total of 1,261 mill length logs) had a scaling diameter[11] of 10 or more inches. Seventy-five percent of the logs had a scaling diameter in excess of 15 inches. This is typical of old growth material still available in Alaska and highlights a basic difference between raw material available to Alaska mills and those in Washington and Oregon. Spelter (2002) reports that prior to the conversion to young growth (1970 to 1984) average scaling diameters for the annual log harvest in Washington and Oregon ranged from 15.2 to 17.8 inches. He also reported that the average scaling diameter of logs harvested in 1998 was 9.9 inches. Table 35 in the RPA Timber Assessment update (Haynes et al. 2007) indicates that the average diameter at breast height (dbh) of softwood trees harvested from the Pacific coast region in 2002 was 15.8 inches. The average dbh is predicted to decrease to 14.6 inches by 2020.

## The Competitiveness of Southeast Alaska Producers

The Stevens and Brooks (2003) study suggested that southeast Alaska producers were at a competitive (costs) disadvantage relative to producers in Canada and U.S. regions when producing for the domestic market. However they focused on Alaska competing in integrated commodity markets, which are dominated by dimension lumber used in residential construction

(i.e., 2 by 4, 2 by 6, 2 by 8, etc.). This view in light of the Capacity studies is now outdated since it does not recognize the extent to which southeast Alaska producers have transitioned to compete in the high quality domestic markets since 2000.

Further evidence of the costs disadvantage in southeast Alaska is stumpage prices for Forest Service sales (reported in Warren 1986, 1996, 2007). These prices typically reflect what bidders are able to pay for stumpage in anticipation of their logging and manufacturing costs and expected returns for the products that can be manufactured from the stumpage. In that sense the lower observed stumpage prices in southeast Alaska (which between 1975 and 2005 average 23 percent of those in the Pacific Northwest) demonstrates that costs (logging, manufacturing, and transportation) in Alaska are roughly $149 dollars per thousand board feet higher than in the Pacific Northwest. These higher costs limit the ability of Alaskan producers to compete in the lower value commodity markets. But the current production levels and shipments patterns in southeast Alaska demonstrate how the industry has transitioned to operate in current market opportunities where they focus on higher value markets.

In terms of cost competitiveness, Canada is the largest exporter to the United States, providing mostly dimension grades (usually sold as spruce, pine, and fir [SPF]) of softwood lumber used in construction. Canada is also a large exporter to Pacific Rim countries. It has been aggressive in promoting platform frame housing construction techniques,[12] shipping commodity grades of lumber to Japan for use in platform frame construction, and shipping posts and beams used in traditional housing. But Canadian producers along the coast in British Columbia (and in the closest proximity to Alaska producers) have faced a diminishing supply of the old growth material favored by Japan and other consumers of such material (Snetsinger 2007). British Columbia coastal lumber production has decreased in the last 15 years (STATS CAN 2007). Since 2000, it has decreased 30 percent as the Canadian softwood lumber industry has shifted

to the interior provinces where producers concentrate on SPF lumber for dimension markets in the United States.

Still the available shipment data (Brackley et al. 2006a; Parrent 2006, 2007) suggests that Alaskan producers in spite of substantial cost disadvantages can find niche markets where they can compete with Canadian and Pacific Northwest producers in end uses that require high quality softwood lumber. Admittedly these are a small proportion of both domestic and export markets but even a small proportion is a large absolute number to the relatively small Alaskan softwood lumber industry.

## Products Produced by the Industry (Grades and Value)

Until the early 1990s, southeast Alaska sawmills produced cants and baby squares for the export market. However, by the late 1990s markets had shifted to include specialty products for global markets. As part of the monitoring put in place following the 1997 ROD, the Juneau Economic Development Commission (JEDC) in 2000 began conducting periodic surveys to determine the capacity of southeast Alaska mills to produce solid wood products. These capacity reports have been published by the U.S. Forest Service's Pacific Northwest Research Station (Brackley et al. 2006a; Kilborn et al. 2004). The surveys have collected additional information relative to the products produced from the mills. Figure 4 (developed from information for Alaska described by Parrent 2006, 2007), shows the percentage of produced products in terms of lumber grades (dimension vs. shop) and forms, such as cants or heavy framing. Figure 4 indicates that in the past 2 years, 30 to 33 percent of production has been shop grades of lumber. Forty-seven to 48 percent has been dimension lumber. Heavy framing, including cants, comprise 19-22 percent of production. The array of these products toward larger dimension sizes and/or clears for use as shop lumber reflects the size and old growth

nature of the available logs. Some cants and heavy framing material include high value material that is exported and often resawn by the importing nation. In other situations the cants are used for relatively low value products like railroad ties. There is limited information relative to the value of cants and heavy timbers from southeast Alaska. Figure 5 shows related data for hem-fir lumber produced in the Pacific Northwest. Comparing figures 4 and 5 suggests that for the past 2 decades, select and shop grade (see footnotes 4, 5, and 6–lumber products where the primary consideration in use are application where appearance as opposed to strength is important) lumber production has decreased to almost zero in the contiguous Pacific coast states while it is 30 percent in Alaska. The reason for this shift in hem-fir production (from the early 1970s) is the falling log sizes in west coast regions, especially in the 1970-80s (Haynes et al. 2007: table 35). The increased availability of smaller logs reduced the opportunities to produce larger sizes of dimension, heavy timbers, and/or clears for use as shop lumber.

While not apparent in figure 5 the loss of lumber export markets (82 percent from 1994-2004, recall fig. 2) from the Pacific Northwest has led to a merger of export and domestic grades. That is, there is no longer enough volume of lumber exports (the available raw material in Washington and Oregon just does not supply or yield the material) to support unique grades. At the same time increasing globalization of forest products (in both production and consumption) has led to direct competition between domestic and export users of select and common lumber grades.

A second consideration is that the shop and factory grades of lumber that go to domestic markets are cut form the same portions of the log as the export products. The options of what products the producer can chose are mutually exclusive. In both cases, the lumber is a type of specialty or luxury goods where there is a limited supply available to the global market. The decision of which market to produce for often relies on various financial considerations that

include product prices, exchange rates, transportation costs, and costs associated with switching the production equipment from export to domestic specifications.

This increasing demand for the reduced supply of high quality lumber has kept prices high for lumber used for millwork applications. Figure 6 shows prices by various combinations of sizes for dimension lumber and a composite of shop/moulding grades. While it is difficult to calculate a weighted average price for the production from Alaska mills, figure 6 indicates that the higher proportions of shop lumber, larger sizes of dimension lumber, heavy timbers, and cants (shown in fig. 4) should give Alaska producers an opportunity to supply products of relatively higher value to both domestic and export markets.[13]

These shifts have important implications for future markets for producers in southeast Alaska. That is, at the levels of current and expected production the producers can sell into robust markets for the high grades of softwood lumber. The size of these markets is fueled by the expected growth in the U.S. domestic market and changes in Pacific Rim markets that will increase the demand for cants, shop and select, and some common grades of softwood lumber.

## Recent Research About the Species in Southeast Alaska

During the period from 2000 to 2005, a coalition of organizations funded a project that established new grading rules and design values (strength values) specific to lumber produced from Alaska species (WWPA 2005). These rules recognize that Alaska yellow-cedar is much stronger than previously reported (Bannester et al. 2007) and results in higher strength and design values than previously available. These new grading rules also recognize lumber produced from Alaskan hemlock will have mechanical stress ratings (MSR) that are comparable to the stronger grades of Douglas fir. The creation of these WWPA grade stamps brands products made from Alaska and gives producers the ability to market material as a unique

species (Alaska spruce, Alaska hemlock and Alaska yellow cedar) as opposed to groups of species (see WWPA 2005; Hem-Fir, S-F-P, Hem-Larch). The development of unique grade stamps for Alaska species will enable producers to compete in higher value markets.

Large logs have always been the primary source of raw materials for sawmills in southeast Alaska. In the past two decades interest has grown in how to increase utilization of small material (grade 3 and 4 sawlogs) for lumber production. A study by Green et al. (2000) investigated the properties of small logs and defective material that, during the pulp mill days, were chipped and processed into pulp. For hemlock and spruce, they found that it was possible to produce high quality dimension lumber from low-grade and small logs. These results agreed with a study conducted by Fahey in 1983. The Green (2000) study also reported new information relative to recoveries of mechanically stress graded (MSR) material. The MSR process uses a machine to non-destructive test each piece of lumber to assign and stamp it with its actual strength value. This material is especially in demand for production of engineered wood components in truss and laminated beam manufacture. There is a relative shortage of this material in the Pacific Northwest where the bulk of production is now from second-growth material. MSR-graded material must have a dense ring structure of 5 rings or more per inch (WWPA 2005). This limits production of high-strength material in coastal Washington and Oregon mills that are processing fast-grown young-growth. Figure 7 presents average annual price information that allows comparison of materials graded by traditional visual grades and MSR methods. As a rule of thumb, the prices for this material are 25 percent higher than material sold by the traditional visual grades.

While research has indicated that there is a potential to produce higher value material from the smaller and low-grade logs harvested from southeast Alaska (Green et al. 2000) the industry has been unable to attract the investment required to build mills to efficiently process the

smaller material. Attracting investment requires a guaranteed supply of raw material, labor, close proximity to markets, and surplus supplies of power. Given the risk associated with these requirements in southeast Alaska, an alternative strategy may be to transport small diameter material to the lower 48 states where investment risks are lower and mills have been designed to process smaller logs. In March 2007 the Alaska (Region 10) Regional Forester approved a policy that allows the limited export of smaller and lower value logs to the highly automated mills in Washington and Oregon (Bschor 2007). The specifics of the new limited domestic export policy are covered in more detail in the section titled: “Events since December 2005” presented later in this addendum.

## A Comparison of Sawmills in Southeast Alaska and the Pacific Northwest

There are many similarities and differences between sawmills in Alaska and the Pacific Northwest. Both regions have a mix of mills of various sizes that have the capacity to produce from 0.5 to 30 MMBF annually. The mills have much in common and they tend to produce specialty products. The small and medium mills in southeast Alaska are designed to handle large old growth logs common to the area. Some of the Pacific Northwest mills still retain the capability to process larger logs both old growth and second growth. But the Pacific Northwest also has some of world’s larger mills that process 200-300 MMBF annually. These have adapted to the smaller log mixes that are available from private timberlands. These mills are highly automated and computerized to efficiently produce high volumes of dimension lumber. Figures 4 and 5 illustrate the contrasting mix of lumber grades that result form raw material between the two regions.

## The Brooks and Haynes Alaska Timber Demand Model

The 2006 Demand Study (Brackley et al. 2006b) was the fourth timber demand report to use the Brooks and Haynes model. Over the years various parameters in the model have been continuously updated as data are reported. The updating process also requires that conversion factors be updated to reflect changes in raw material available to mills in southeast Alaska, revisions to accommodate the products produced by mills in southeast Alaska, and updated conversion factors to reflect the technical characteristics of the industry.

Major sources of information have always been the RPA Timber Assessments Updates (Haynes et al. 2007) that provides information on U.S. consumption, production, trade and prices. The source of export price and quantity information include: Japan Wood Products Information Service (JAWIC. 2006); Warren (2006), the U.S. Department of Commerce; United Nations sources (such as FAO 1997), and industry trade and newsletters such as Random Lengths (2006).

Once the model is updated for use, the challenge is the preparation of the demand scenarios. These are developed based upon our collective views and interpretation what might happen given the current situation and trends. It is a challenging exercise and requires attention to detail to ensure consistency among the assumptions underlying each scenario.

**Model Description**

The Brooks and Haynes model and the updated version used by Brackley et al. (2006b) is an early form of a forest sector model (see Haynes 1993 for details about forest sector models). This is a type of model used to examine the set of activities related to the use, forest growth and harvest, the manufacture of products, shipment of products to markets and consumption. Specifically the Brooks and Haynes model attempts to explain for southeast Alaska the consumption and production of all forest products as well as the roundwood equivalent needed to produce these products. Within the typology of forest sector models, the Brooks and Haynes model is a variant of the gap model format in that it explicitly considers only physical quantities and does not directly consider prices and costs. This model is a commonly accepted form of a forest sector model and was used in the RPA assessments through 1980 (Adams and Haynes 2007, Haynes 1993). It satisfies economic principles in that production equals consumption (with adjustments for trade). It also satisfies material accounting principles in that the raw material requirements (derived demand—the pile of logs required to manufacture the defined products) considers all products and their conversion into the equivalent wood fiber content.[14] It is referred to as a gap model because such models have often been applied to production and consumption problems where the model defines the gap between physical estimates of supply and demand. Once the gap is defined, the related policy questions concern how to design programs to eliminate the physical gap and create a balanced relationship between supply and demand.

The model used by Brackley et al. (2006b) mimics the more elaborate framework used in the RPA Timber Assessments[15] for the contiguous 48 states and also uses the available data for the southeast Alaska wood products markets. The model is a simulation model that uses historic data to determine past ratios that define market shares and alternative production opportunities. By integrating a number of assumptions relative to future ratios (market shares,

changing conversion factors, etc.) into the model, we can determine future outcomes (in this case, demand scenarios). The model does not include empirical relations that filter and determine results, but rather simple mathematical relations that describe the conversion of product levels into the roundwood (log) equivalent. The model starts with current estimates of lumber demands faced by Alaska producers. These demands come from consumers in Japan, the US and other Pacific Rim countries. Future projections of those demands are based on growth rates derived from various sources and are consistent with the intent of the scenario being examined.

The RPA timber Assessments (Haynes et al. 2007) provide the background for the many assumptions needed in the demand model. The size of the U.S. market described in table 2 and figure 8[16] suggests that Alaska softwood lumber producers have access to a large domestic market assuming they can compete with other producers. That is, the relatively small amount of southeast Alaska production should be able to find markets in domestic or export markets for clear (shop and factory grades) and other high quality lumber (large sizes of dimension lumber 2 by 10, 2 by 12, and heavy timbers). These markets have the higher prices needed to cover the higher Alaskan costs. Since these high value markets are not modeled directly in the RPA Timber Assessment, we use exports to Japan as a proxy for describing the demand for high value products produced in southeast Alaska. In the demand model, the demand facing Alaskan producers is than made up of two parts: one part that is assumed to go to Japan and another part that goes to U.S. domestic markets. The use of Japanese demand is a reasonable proxy because it is a traditional market for high quality material from both Alaska and the Pacific Northwest and the type of material now being exported has become more of a global product used in roughly similar applications.

Several comments criticized the use of this model to forecast demand for Tongass timber. Comments focused on an observation on page 28 of the Brackley et al. (2006b) report, where

the authors said, ". . . world markets are rapidly changing, making the existing model and approach obsolete." Upon reflection, the use of the word "obsolete" does not really describe the true nature of the problem. In reality, the existing model is a robust system that remains a valid approach to model demand for Tongass timber because of the limited data on lumber shipments and values and production costs. The challenge is to ensure that the data put into the model does not become outdated. As one comment observed, one of the challenges in forecasting future demand is that markets are dynamic and structural conditions change over time. To add transparency to a future version of the model, data and explicit links to the RPA models could be added. These revisions would make domestic U.S. demand one of the explicit demand determinants for the Alaska market. Such a disaggregation of demand determinants would not change the current projections nor would they change the need to disaggregate the implications for different grades of lumber.

There is already one explicit linkage to the domestic market in the Demand Study. That is, the stumpage price projections are directly linked to the price series used and projected in the RPA Timber Assessments. This linkage relies on the economic concept of market arbitrage,[17] stumpage prices in Alaska are estimated as a function of prices in the Pacific Northwest (westside). That way, projections of future prices for national forest timber in southeast Alaska are a direct function of those projected for other U.S. regions and reflect the interaction of producers and consumers in the contiguous 48 states.[18]

The relative size of Alaskan production and U.S. domestic markets is shown in figure 8. The annual consumption of softwood lumber in the U.S. (domestic market) in 2002 was 56 billion board feet. The production of lumber in Alaska was approximately 40 MMBF. This suggests that the domestic market is sufficiently large enough to consume the high quality material that producers in southeast Alaska are capable of producing under current price and cost conditions.

Concerns were expressed about the assumptions for the Alaska share of the domestic market. Given the proportion of Alaska production and U.S. consumption, Alaska producers should be able to compete in these specialty markets given the unique nature of the Alaska products. Based on these factors, we assumed that, “Export products will be considered synonymous with high-value products. The products may be exported or shipped to domestic markets. Producers will select markets based on price” (Brackley et al. 2006b:14). We also assumed that, “Alaska producers have unlimited access to domestic markets, both in Alaska and the continental 48 states.” Figure 8 illustrates the validity of these assumptions because the volumes of Alaskan softwood lumber production are small relative to total U.S. softwood lumber consumption.

Some reviewers commented that extrapolating the historical data would lead to a future of declining demand for timber. This led them to question how we were able to project futures with rising demands. The lack of historical relations and necessary data is what led Brooks and Haynes (1990) to develop a model[19] that used an expert opinion approach rather than an equation based predictive approach to forecasting. This approach is based on a set of relations between trends in product markets and logs delivered for processing. Key in this model is product conversions developed from past data. The actual projections are based on assumed changes in products shipped from southeast Alaska, converted into roundwood equivalents using current conversion factors. The model structure and assumptions are validated by making adjustments so that current conditions are replicated. The projections are considered to be conditional projections that reflect the underlying assumptions about the future.

The updated Brooks and Haynes model as applied by Brackley and others (2006) is an useful approach that makes the best use of available data, can replicate current production and harvest data, and provides a framework for conditional projections of future demand for southeast Alaska timber.

### Long-Term Demand for Timber Vs. Annual Timber Sale Program

The demand projections prepared by Brooks and Haynes (1990, 1994, 1997), and Brackley et al. (2006b) are characterized as long-term projections for time periods of 20-25 years into the future. These reflect the trends in demand for national forest timber. They are not intended to be interpreted as forecasts of annual timber sale volumes. Those are provided as output from what has become known as the Morse (2000) procedures. These procedures, used by Region 10, provide a link between projections of market demand and the annual national forest timber sale program. In reality the Morse procedures are best viewed as an inventory adjustment system (see any Operation Management Text such as: Stevenson 1999) that describes the annual sales programs as a function of both the long-term demand trend and goals the forest has for maintaining the uncut volume under contract. It is the portfolio of sales that contains the uncut volume under contract that mills draw timber for processing.

## China As a Market

Several comments by critics focused on statements that China might play a large role in Pacific Rim trade. They argued that China might not consume the types of products produced in southeast Alaska and that Chinese log trade from North America has declined.

Since the preparation of the original report (Brackley et al. 2006a) we have continued to review information relative to softwood log and lumber imports to China and Japan. The recent softwood log and lumber imports to Japan and China have been estimated by combining the Japan information in the demand model (JAWIC 2006) with China data from a variety of reports (IWPG 2007, Lankin 2005, Northway and Bull 2007, Taylor and Gao 2006, and Weiming et al. 2007). As shown in figure 9, the updated demand for log imports would be almost 85 percent

greater than previously recorded volumes. The increase in softwood lumber imports (fig. 10) to Japan and China is greater than any previously reported level. In comparison to these values (figs. 9 and 10) our projected increase for softwood logs and lumber are conservative in that they assume that the demand in Japan and China will return over the next 25 years to pre 1997 levels for Japan alone.

During the preparation of the 2006 update to the timber demand study (Brackley et al. 2006b) the authors constantly discussed and were concerned with the impact of an emerging China on the global forest products industry. There are many aspects that must be considered, but the situation may be best summarized by quoting recent statement from the publication, “China and the Gobal Market for Forest Products: Transforming Trade to Benefit Forests and Livelihoods” (White et al. 2006):

> “China’s spectacular economic growth over the last decade is having a dramatic impact throughout the world. It has become a leading nation in terms of its demand for forest products, and its influence is being felt as far afield as Cameroon and Cambodia, Indonesia and the United States. Burgeoning domestic consumption, in a nation with very limited per capita forest resources, has fueled the rapid rise in China’s imports of forest products. Growing demand in US, Europe and elsewhere for low-cost wood products manufactured in China has also contributed to the ever-increasing demand for foreign timber. China is rapidly become the wood workshop of the world, capturing almost a third of the global trade in furniture of the last eight years.”

The same publication (White et al. 2006) reports that 68.2 percent of the logs that support the China’s forest products industry are from Russia. China’s major sources of sawn lumber are Russia (17.7 percent) and the United States (14.3 percent). At the present time China’s imports from Russia are primarily softwood logs and lumber. The United States supplies hardwood

lumber used in products manufactured in China and consumed globally.

China prefers to purchase material in log form and creating local manufacturing opportunities (Kozak and Canby 2006) and creating wood chips, shavings, sawdust and hog fuel. The latter products are considered as an important source of energy to support manufacturing. Change is coming, however, as the Russian government is also interested in obtaining the social and economic benefits of domestic production and they have proposed a tariff on log exports to make them prohibitively expensive (Helsingin Sanomat 2007, Roberts et al. 2007). These reductions in the availability of Russian logs may have potential benefits to lumber producers in Alaska as Chinese producers make adjustments.

In the next 5 years we tend to agree that the emergence of China will have a minor impact on demand for softwood products produced in southeast Alaska. Future projections, however, need to reflect a combination of factors that exist in both foreign and domestic locations. These include among other things: The relative value of the U.S. and Canadian currency; the supply of softwood in both the United States and Canada (note; that upon completion of the pine beetle salvage in Western Canada supplies of softwood lumber are expected to be reduced; and, energy costs and the level of use of renewable sources for energy will increase.

In our view one of the most significant unfolding events of the 21$^{st}$ century is the emergence of China and other under developed nations of Asia. Our projections are for a period 25 years and we are confident that there will be continuing strong demand from Japan for the traditional non commodity specialty products they have historically purchased from southeast Alaska. In the longer term there will be direct impact (direct purchases of log and lumber products) or indirect impact (opportunities resulting from a general scarcity of softwood products, especially high value specialty products that can only be produced from larger old growth log, as a result of

global demand) that will provide markets for any level of production the forest products industry of southeast Alaska may attain. The critical factor to the southeast industry is supply of raw material and not demand for products.

In conclusion we reiterate a statement made in the original report. China and Russia are currently negotiating entry into the U.N. World Trade Organization (WTO). Once they achieve membership their trade information (imports and exports) will be reconciled with the data reported by receiving and sending countries by the WTO. This new information will improve future treatment of the combined consumption patterns in Japan and China but until then figures 9 and 10 show the best available current information.

## Scenarios That Project the Future

The 1997 and 2006 demand studies adopted the scenario planning approach that has been used in RPA Timber Assessments since 1985. By varying background assumptions and recasting the projection, we can learn more about the sensitivity of outcomes to underlying conditions and build some qualitative notions of the key uncertainties in the projection. This approach is consistent with planning methods used in business and government communities where the intent is to help organizations cope with unexpected future events (Schwartz 1991, 2003). Here we have assumed that there will be an increase in global demand for forest products (Haynes et al. 2007; UNECE 2006). This demand will be both for traditional solid and fiber products. In addition, the residual products and unused biomass from harvested trees will be used directly for energy or as a raw material for production of energy products. The implication is that total demand for products from Alaska producers are the sum of domestic and export demand (this assumption is in agreement with the RPA projections and FAO [1997] global projections).

The current Alaska industry is one that is transitioning to the markets that have emerged following structural shifts around the Pacific Rim and in the United States. It is this current behavior of Alaska producers that is important because it provides the platform for projections. The four scenarios in the 2006 Demand Study describe how southeast Alaska producers might respond to different sets of future events, but always in the context of the RPA and FAO projections. In all of the scenarios, we assume no structural shifts in the world's economic and political environment. We also assume continued efforts by government and non-government organizations to support sustainable development.[20]

In our analysis, scenario 1 assumes the continuation of the current trend (i.e., the no action scenario required under the National Environmental Policy Act). All of the other scenarios assume change. The major determinants of future demand will be factors such as technological change; increased use of renewable resources that are carbon neutral with a minimal impact on climatic change; increased use of low-value trees (utility logs) and small trees for fiber and energy products; evolving economies and a desire for governments to improve their citizen's standard of living; a need to replace nonrenewable energy sources; and a scarcity of resources. To create the three scenarios that project expanded demand, we identified gaps between demand and supply, and projected growth in products that use Tongass timber. Based on our experience, we also believe that research and technology will create products or processes that don't currently exist in southeast Alaska or any region.

## The Focal Issue

The focal issue of the three expanded demand scenarios takes into account the superior nature of Tongass forest products in a world increasingly concerned with environmentally-friendly products (see Meil et al. [2007] for an expanded discussion), carbon, and climate change. In a resource-poor world there is a need and demand for solid wood products, fiber products, and sources material that can be used directly in energy applications or as feedstock to create

energy products. The scenarios embody our belief that high-quality forest products will continue to be exported from the region to both domestic and export markets, and that there are opportunities to increase use of biomass products—either for engineered wood products or that technology will be developed to replace expensive imported fuels within the region.

## Decrease In Demand

Several comments focused on why we did not consider a scenario of decreased demand. We did not because we consider the low scenario as representing present conditions. That is, a set of conditions representing a future where the markets have adjusted for both the collapse of the Asian markets and the structural shifts in the U.S. market, resulting from reductions in federal timber flows. In addition, several events have occurred since the release of the original report that demonstrates the demand for forest products is increasing. One event has been the ability of southeast lumber producers to find markets for their chips at pulp mills in British Columbia as lumber production has slowed at sawmills in western Canada reducing the availability of chips. Another event is an increasing demand for low-grade fiber as a feedstock for energy applications and products such as wood pellets (Perlack et al. 2005). Third, the ongoing congressional efforts to consider legislation on climate change, high energy costs (oil is in the vicinity of $90-$95 a barrel as we write), a need to reduce carbon emissions, and conversion to sources of renewable energy all suggest increased demand for wood. Most of these have the potential to create new markets for residual products produced from sawmills and also change the competitive positions of the various producing regions in North America. Finally, U.S. demand for softwood products is expected to increase at just below 1 percent per year mirroring the expected growth in population (from the RPA Timber Assessment, Haynes et al. 2007).

Given the range of these events, we judge that the probability of a future decrease in demand for lumber to the Pacific Rim is almost zero; the probability of no change in demand small; and, the probability of an increase in demand extremely high. If demand to the export markets does decrease or remain constant, Alaska producers will ship products to the domestic market as consumption—especially in residential construction (including new, repair, and alteration)—is expected to increase.

## Events Since December 2005

Since 2005 there have been new policies and events that may have an impact on the demand for Tongass timber. We have been asked to consider these policies and events, and how they relate to our projections.

### Region 10 Limited Log Shipment Policy

On March 14, 2007, the Alaska Regional Forester (Region 10) (Bschor 2007) signed a new policy that allows certain material to be shipped out of southeast Alaska in log form. Under the terms of the new policy, ". . .unprocessed Sitka spruce and western hemlock sawlogs that are: a) smaller than 15 inches in diameter at the small end of a 40 foot log, or b) grade 3 or grade 4 logs of any diameter. . ." may be shipped to the lower 48 states. Only 50 percent or less of the total sawlog contract may be exported. Red cedar and Alaska yellow cedar will be included in the allowable amount, unless an exception is granted in advance. An analysis conducted by the Director of Forest Management and recommendations (Castillo 2007) were cited as the basis for the new policy.

There is no specific detailed data that describes the species composition and range of diameters that mills are currently harvesting and estimates of the specific impact of the policy. It is intuitive, however, that given the possibility of shipping the smaller material to the lower 48 states the average diameter of material processed by mills in the southeast could increase. There may also be a slight change in species composition as preferences shift.

In terms of the demand projections, the limited log shipment policy may not result in an increase the demand for Forest Service timber at the rate of 1 additional unit of harvest for 1 unit of log export. The outcome depends on both the utilization patterns[21] before and after the policy change. If the logs that are being shipped to the contiguous 48 states were previously left in the woods (because of being too small or breakage) or removed and sent directly to the chipper there would be no change in demand. But these new market opportunities may increase removals from the forest as local mills replace smaller material that can now be shipped to other states and increase demand for larger material for unique Alaskan products. The extent to which this happens will be revealed over the next several years as the policy is implemented.

The Region 10 shipment policy represents a shift from scenario 1. The direction of the shift is both toward scenarios 2 and 3. If the segregation and shipment of stated small logs result in an increase in diameter of logs processed by local mills, the effect will be similar to demand shift from scenario 1 to scenario 3. The important distinction that should be recognized between a total shift from scenarios 1 to 3 is that utility logs[22] may still be left in the woods due to a limited fiber market. A shift from scenarios 1 to 2 incorporates technological change (improvements in mills to handle smaller logs) and marketing to stimulate sales of superior products. Regardless, the net result will be in an increase in the demand for Tongass timber to maintain a constant supply of the larger logs to producing mills, given that mills can now get a higher return by mixing the returns from harvesting national forest timber sales for both shipment to the

contiguous 48 states and processing the larger and high quality logs for domestic and export markets

### Restarting of the Ketchikan Veneer Mill

Late in the summer of 2007, the Ketchikan veneer mill was restarted using timber imported from British Columbia. Imported raw material has no immediate impact on the derived demand for Tongass timber. Since the start-up, the mill has procured Tongass timber from a logging contractor that has purchased log material from several Southeast Alaska timber sales. This purchase of Tongass log material is an expression of increased demand for Tongass timber. If the veneer mill start-up is successful, the next version of the model will need to add conversion assumptions for veneer production. The start-up of the veneer mill tends to validate some of our assumptions that increasing demand will result from the industry becoming more integrated.

## Conclusions

Alaska is a vibrant but high cost producer of high quality softwood lumber for global markets. The events of the past two years suggest changes are necessary to our conclusion in the last demand study where we stated that “in the face of the various challenges implicit in scenarios 2 through 4, the outcome resulting from the limited lumber scenario (scenario 1) assumes greater likelihood of occurrence” (Brackley et al. 2006b: 27). Given the Region 10 shipment policy, the restarting of the veneer mill, and the success of Alaska producers in niche or specially markets, our current appraisal is that demand for national forest timber in Alaska is on a trajectory more similar to the scenario 2 (expanded lumber production). The down side of this development is, however, that part of the harvest is moving to mills outside southeast Alaska that have the technology to produce high volumes from small material. In our projections we assumed that the new technology would move to southeast Alaska. Regardless, the changes have the potential to create higher returns to the mills in southeast Alaska. Challenges still remain with the utilization

of utility logs due to a limited fiber market. Until such markets evolve, it is difficult to see the evolution of an integrated industry characteristic of scenarios 3 and 4.

## Metric Equivalents

| When you know: | Multiply by: | To find: |
|---|---|---|
| Board feet, log scale | 0.00453 | Cubic meters, logs |
| Board feet, lumber tally | .00236 | Cubic meters, lumber |
| Tons, short | 0.9072 | Dry metric tons |

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Figure 6. Prices for selected grades and sizes of hem-fir dimension lumber and composite price for shop and moulding. Source: Random Lengths Publications 2006.

Figure 7. Comparison of 2 by 4 and 2 by 4 values based on visual and MSR grades. Source: Random Lengths Publications 2006.

Figure 8. Total domestic consumption of softwood in the U.S. and production from southeast Alaska. Source: Brackley et al. 2006a, Haynes et al. 2007.

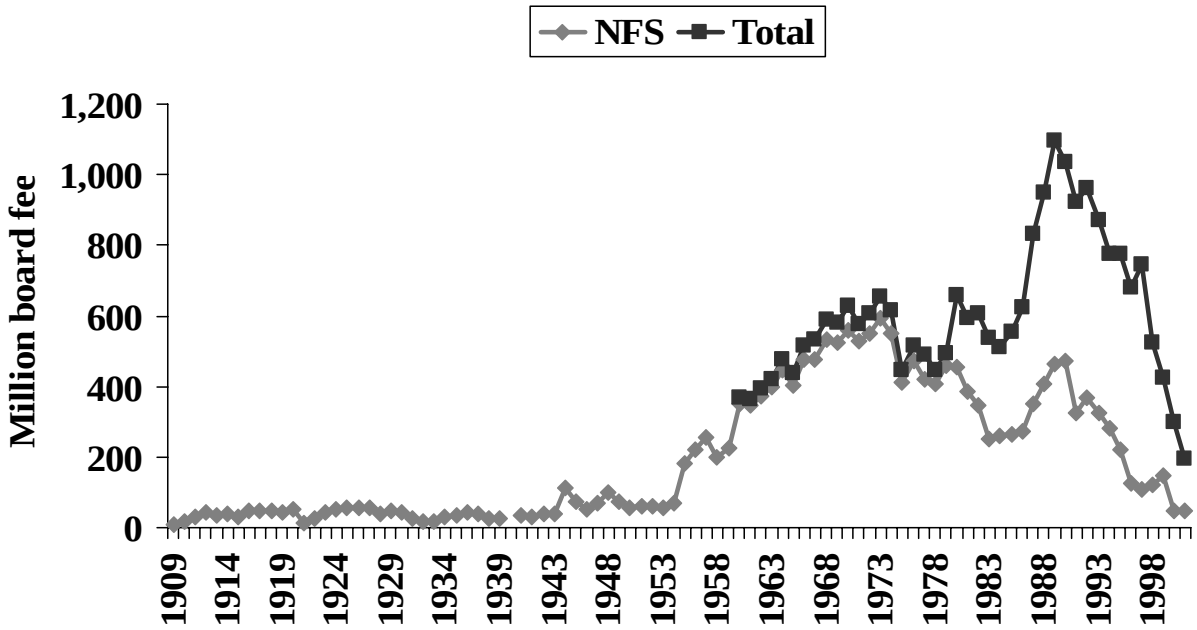
Figure 9. Softwood log imports to Japan and China. Source: Brackley et al. 2006a, IWPG 2007, Taylor and Gao 2006.

Figure 10. Softwood lumber imports to Japan and China since 1999. Source: Source: Brackley et al. 2006a, IWPG 2007, Taylor and Gao 2006.

Figure 11. Total U.S. roundwood consumption, harvest and trade. SRWC = short rotation woody crops from agricultural lands. Source: Haynes et al. 2007, table 8.

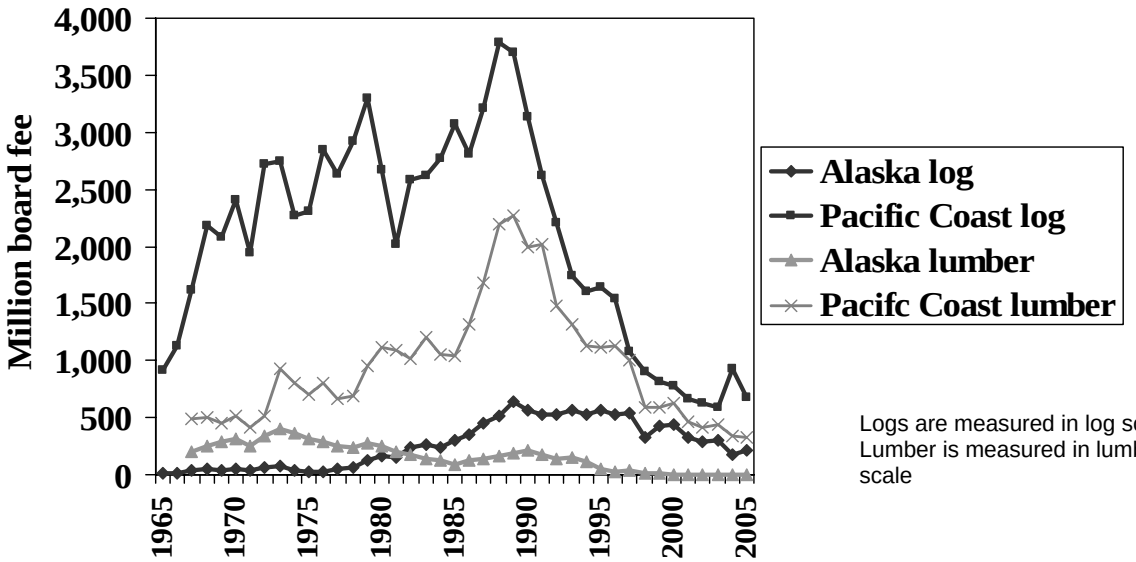
Figure 12. U.S. growing stock inventories all species by owner group. Source: Haynes et al. 2007, table 12.

Figure 1.




NFS 1909-1939 CY, 1940-1959 FY, 1960-2006 CY

Figure 2.


Million board fee
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1965
1970
1975
1980
1985
1990
1995
2000
2005
Alaska log
Pacific Coast log
Alaska lumber
Pacifc Coast lumber
Logs are measured in log scale
Lumber is measured in lumber scale

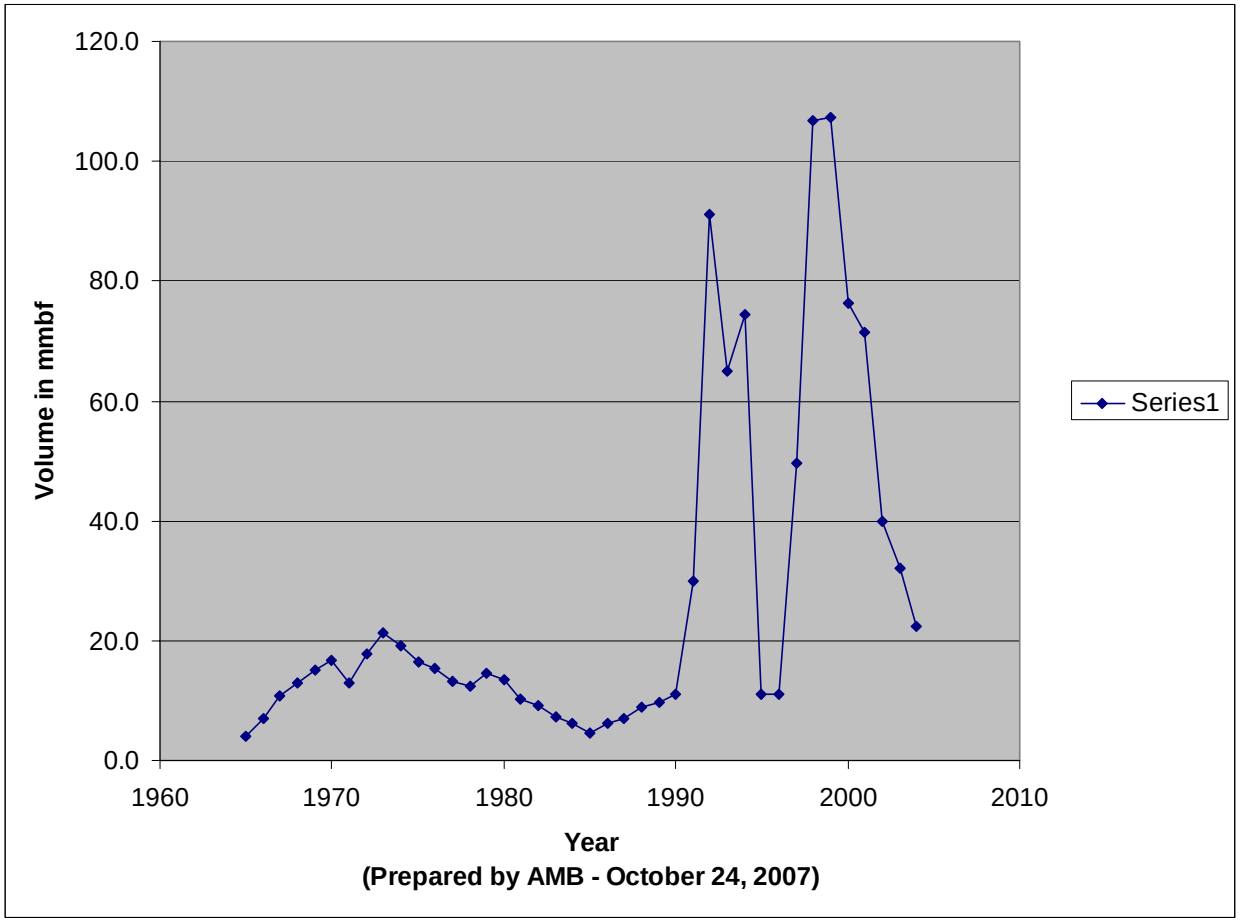

120.0
100.0
80.0
60.0
40.0
20.0
0.0
Volume in mmbf
1960
1970
1980
1990
2000
2010
Year
(Prepared by AMB - October 24, 2007)
Series1

Figure 3.

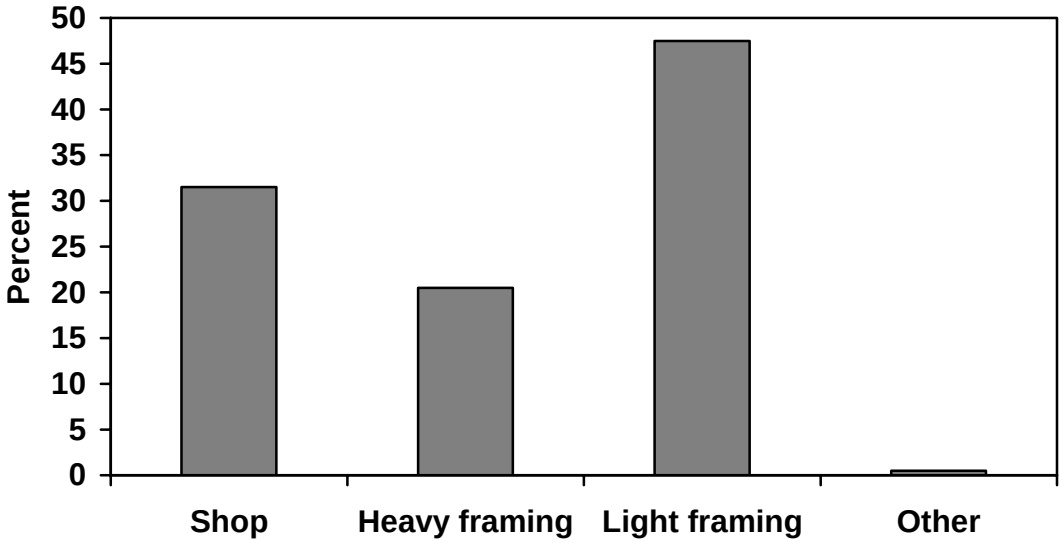

50
45
40
35
30
25
20
15
10
5
0
Percent
Shop
Heavy framing
Light framing
Other

Figure 4.

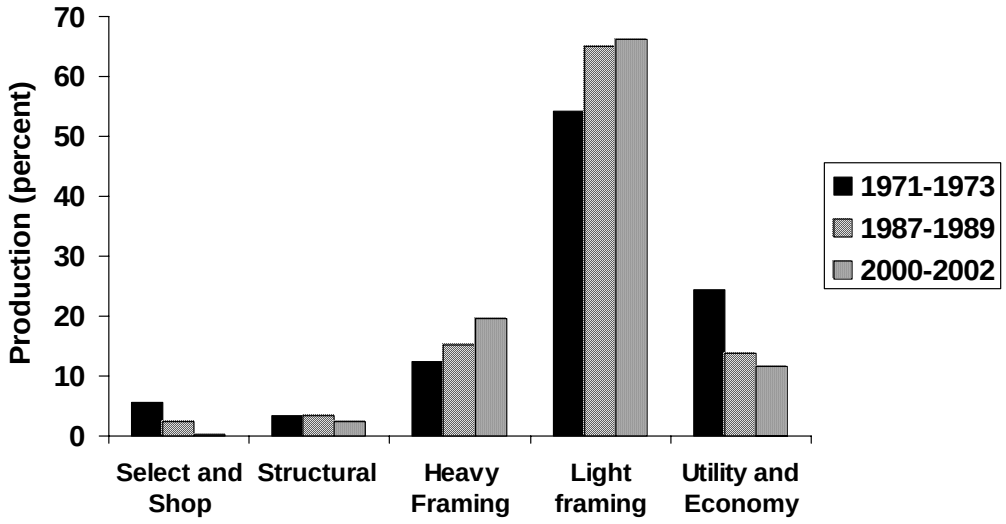

Production (percent)
70
60
50
40
30
20
10
0
Select and Shop
Structural
Heavy Framing
Light framing
Utility and Economy
1971-1973
1987-1989
2000-2002

Figure 5.

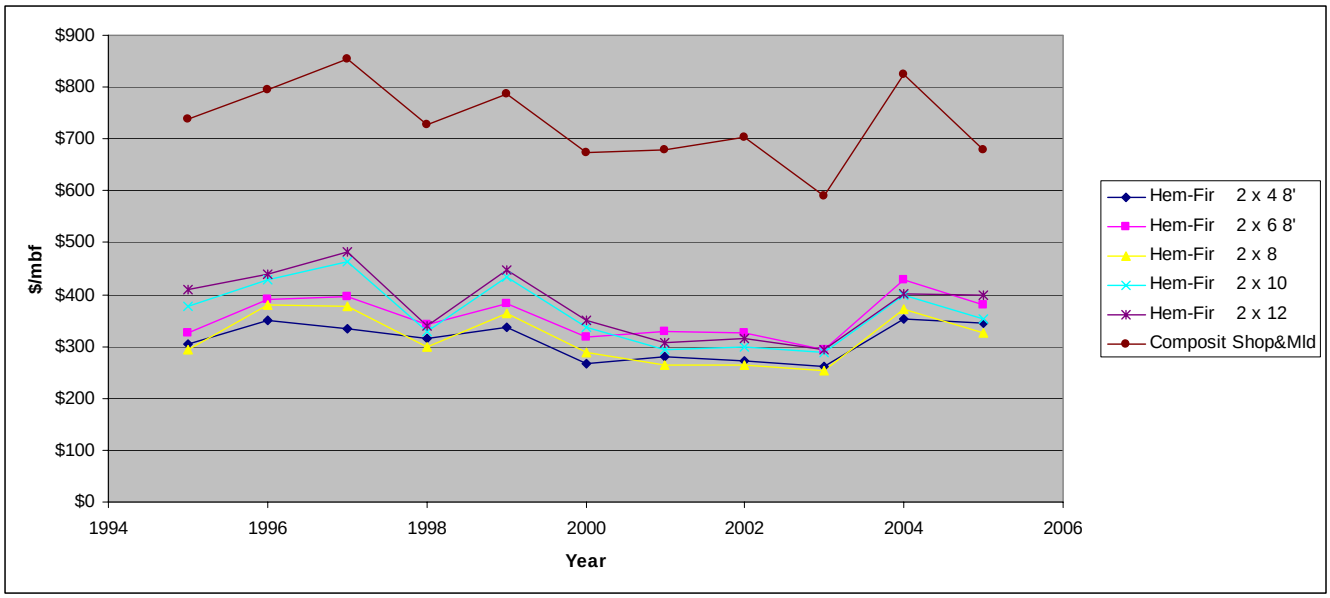

$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
$/mbf
1994
1996
1998
2000
2002
2004
2006
Year
Hem-Fir 2 x 4 8'
Hem-Fir 2 x 6 8'
Hem-Fir 2 x 8
Hem-Fir 2 x 10
Hem-Fir 2 x 12
Composit Shop&Mld

Figure 6.

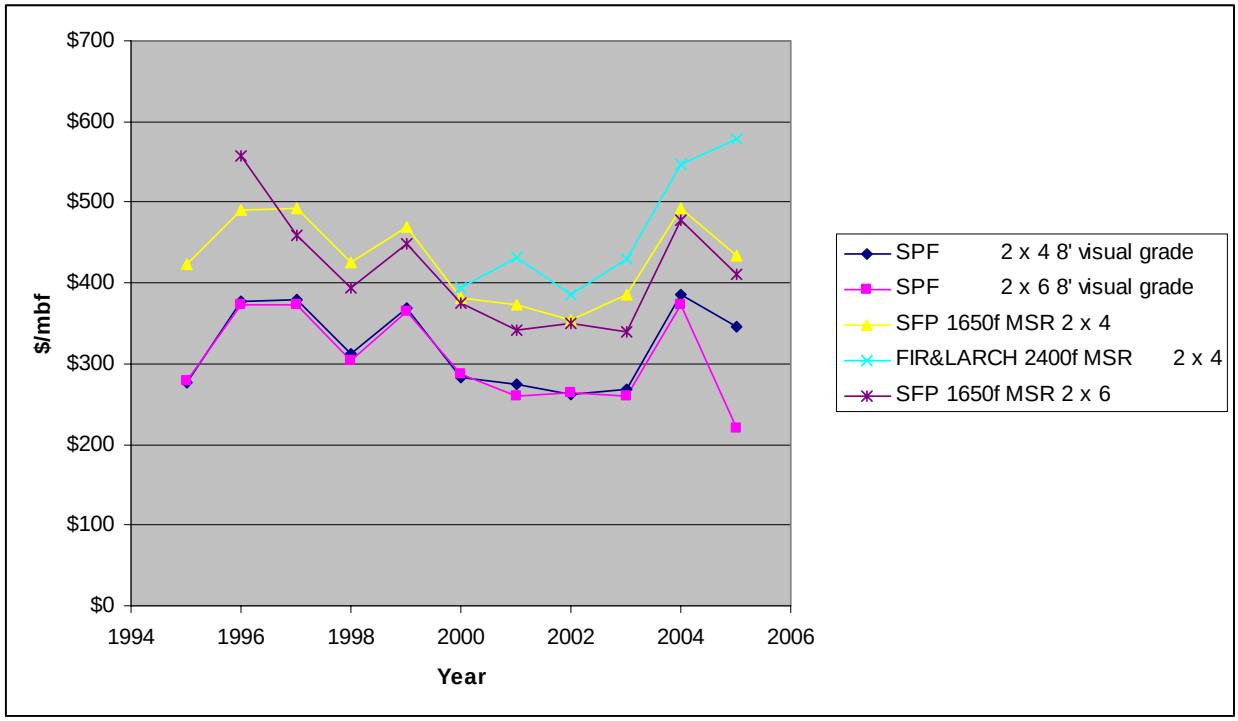

$700
$600
$500
$400
$300
$200
$100
$0
$/mbf
1994
1996
1998
2000
2002
2004
2006
Year
SPF 2 x 4 8' visual grade
SPF 2 x 6 8' visual grade
SFP 1650f MSR 2 x 4
FIR&LARCH 2400f MSR 2 x 4
SFP 1650f MSR 2 x 6

Figure 7.

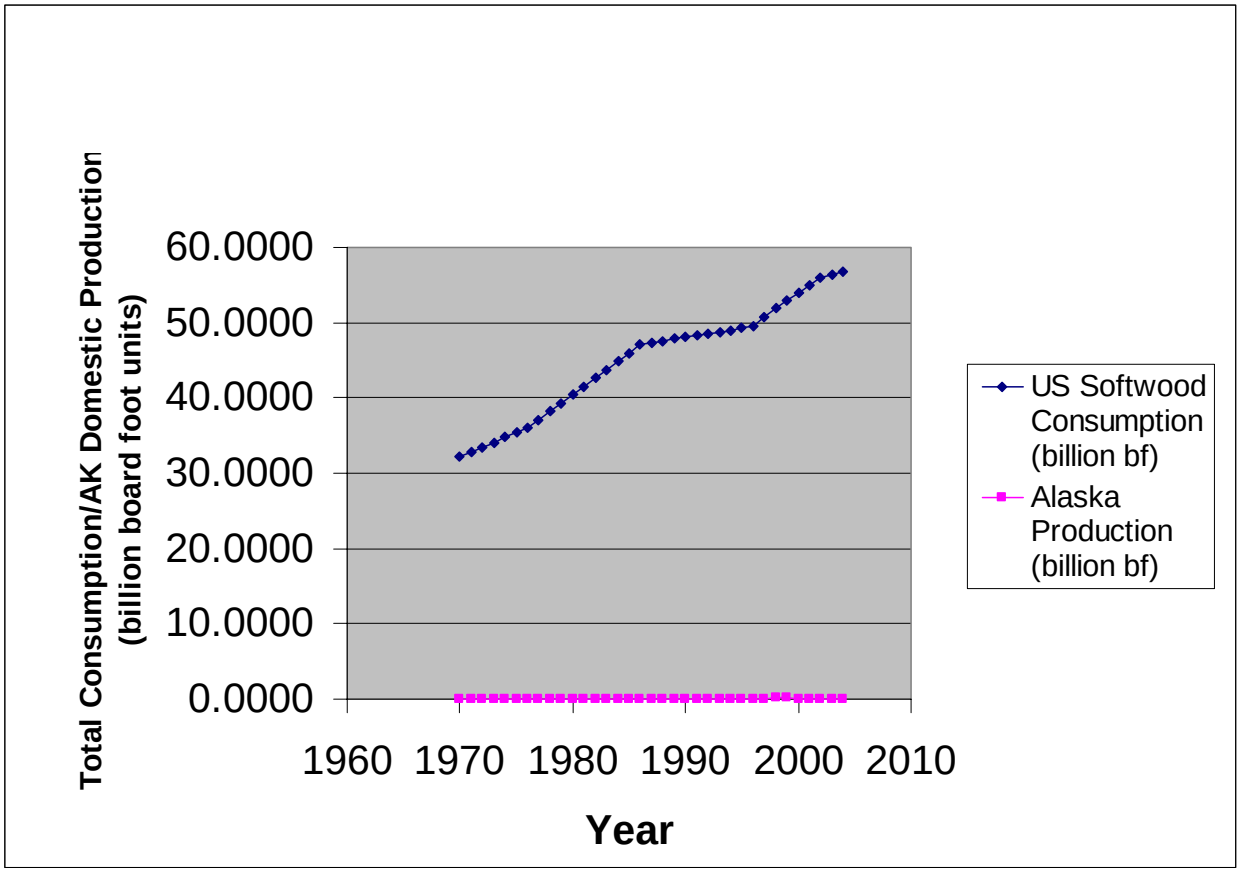

Total Consumption/AK Domestic Production (billion board foot units)
60.0000
50.0000
40.0000
30.0000
20.0000
10.0000
0.0000
1960
1970
1980
1990
2000
2010
Year
US Softwood Consumption (billion bf)
Alaska Production (billion bf)

Figure 8.

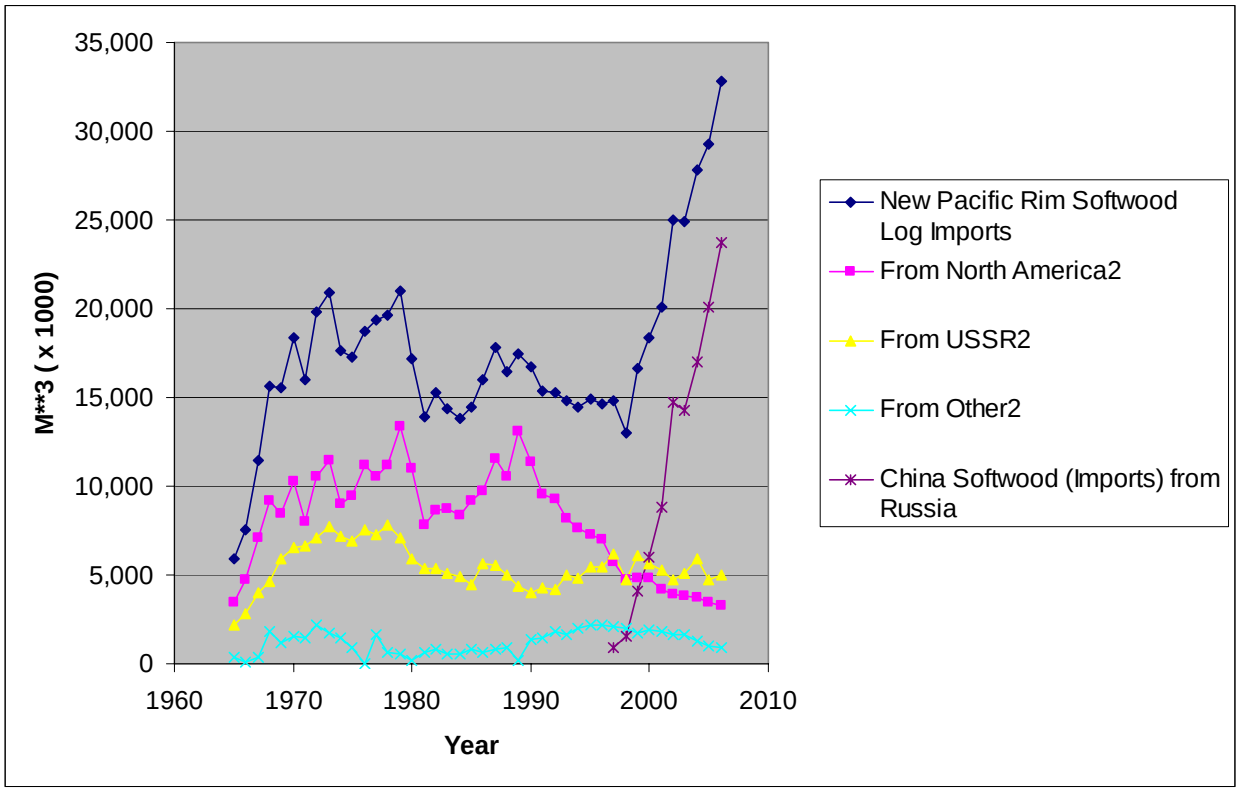

35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
M**3 ( x 1000)
1960
1970
1980
1990
2000
2010
Year
New Pacific Rim Softwood Log Imports
From North America2
From USSR2
From Other2
China Softwood (Imports) from Russia

Figure 9.

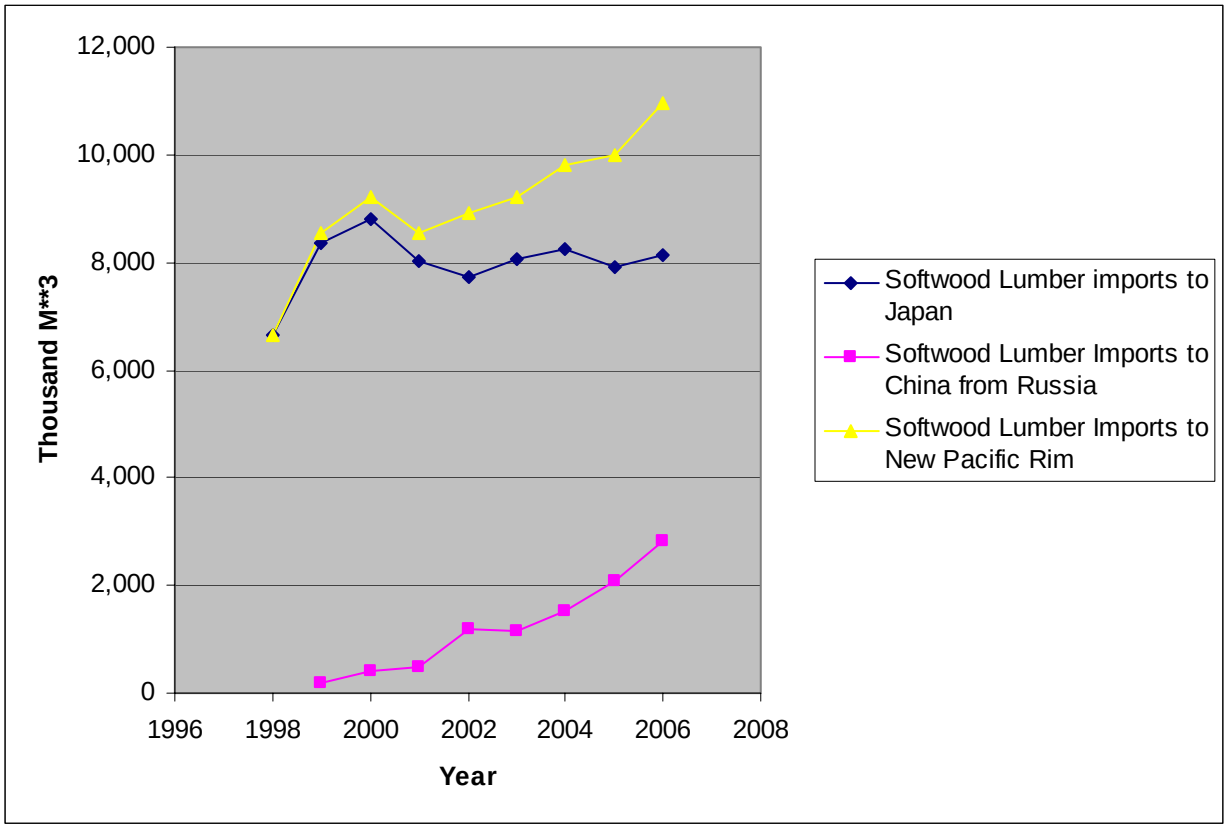

12,000
10,000
8,000
6,000
4,000
2,000
0
Thousand M**3
1996
1998
2000
2002
2004
2006
2008
Year
Softwood Lumber imports to Japan
Softwood Lumber Imports to China from Russia
Softwood Lumber Imports to New Pacific Rim

Figure 10.

**Table 1—Timber demand projections from the four demand studies**

| | Brooks and Haynes | | | Brackley et al. |
|---|---|---|---|---|
| **Years** | **1990[b]** | **1994[c]** | **1997[d]** | **2006[e]** |
| 1983-1997[a] | 281.0 | 281.0 | 281.0 | 281.0 |
| 1988-1992 | 414.0 | 414.0 | 414.0 | 414.0 |
| 1993-1997 | **404.0** | **300.0** | **192.0** | 200.2 |
| 1988-2002 | **403.0** | **315.0** | **113.0** | 93.3 |
| 2003-2007 | **397.0** | **332.0** | **152.0** | **33.7** |
| 2008-2012 | **401.0** | **335.0** | **174.0** | **52.0** |
| 2013-2017 | | | | **75.4** |
| 2018-2022 | | | | **108.1** |
| 2022-2025 | | | | **142.9** |

[a] Years are the periods over which the 5-year averages are calculated.
Data that were not historical at the time of the projection are in bold.
[b] The base projection assumed two pulp mills would continue operating and 50-year contracts continue in force.
[c] Base projection assumed that one pulp mill would remain operating.
[d] Assumes the medium demand scenario.
[e] Assumes the expanded lumber scenario.

**Table 2--U.S. softwood lumber consumption, imports, exports, and production**

| Year | Lumber consumption | Imports | | Exports | Production | |
|---|---|---|---|---|---|---|
| | | Total | Canada | | U.S. | PNWW |
| | | *Billion board feet, lumber scale* | | | | |
| 1986 | 47.1 | 13.8 | 13.7 | 1.9 | 35.3 | 9.3 |
| 1998 | 52.0 | 18.5 | 18.0 | 1.1 | 34.7 | 9.1 |
| 2002 | 56.0 | 21.0 | 18.2 | .8 | 35.8 | 9.2 |
| 2010 | 59.0 | 26.3 | 20.0 | 1.0 | 33.7 | 10.7 |

Source: Haynes and others 2007, Table 25. Data for Canadian imports and Pacific Northwest, Westside (PNWW) production from unpublished RPA summaries.

# Appendix

**Highlights of the 2005 RPA Timber Assessment Update**

The 2005 update base projection envisions a 38 percent expansion in total U.S. forest products consumption to 27.4 billion cubic feet per year by 2050 (fig. 11). Per capita consumption will remain roughly constant. Imports will continue to rise but will supply a smaller portion of the growth in consumption, and domestic sources—a correspondingly larger share over the next 50 years than was the case during the previous 5 decades. At the same time, real product price growth will fall below long-term historical rates for all products.[23]

**Product output and trade**

- Domestic product output will shift toward pulp and paper products, with a declining share for lumber and a steady share for composites.
- The share of imports in U.S. timber consumption will rise from 25 percent to more than 27 percent over the next decade, then decline to 23 percent by 2050 as domestic production expands.
- U.S. softwood lumber production will expand 20 percent by 2050 relative to recent levels with increases primarily in the Pacific Northwest and South. Pulp and paper production will increase primarily in the South.
- Canada's share of U.S. lumber consumption will decline from more than 34 percent in recent years to 27 percent by 2020, in the face of restrictions on domestic harvest and strong competition from off-shore imports.
- Offshore softwood lumber imports (from Europe and the southern hemisphere) will capture nearly 15 percent of U.S. consumption by 2020.
- OSB will largely displace softwood plywood in all markets; hardwood lumber output will show little growth.

**Timberland area and forest management types**

- U.S. timberland area will decline 3 percent by 2050 due primarily to conversion to developed uses.
- Land held by the firms integrated to processing will continue to decline through sales to institutional investors (TIMOs and REITs).
- The area of planted pine in the South will continue to expand as U.S. timber production is concentrated on fewer acres. By 2050, 54 percent of U.S. softwood harvest will come from 9 percent of the U.S. timberland base.
- Hardwood types will continue to dominate the forest land base in the South (60 percent) and throughout the eastern United States (67 percent).

**Timber harvest and inventories**.

- U.S. softwood growing stock removals rise 30 percent over the projection, driven by expansion of pulpwood consumption (for OSB and wood pulp).
- Hardwood removals rise 33 percent by 2025 then stabilize for the remainder of the projection, again due to expansion of pulpwood use.
- Aggregate U.S. forest inventory rises 31 percent for all owners; cut is less than growth over the next 5 decades (fig. 12).
- For virtually all regions and private owner groups, softwood inventories rise by 2050 despite increasing removals.
- Private hardwood inventories rise sharply by 2050, with continued expansion in the North offsetting modest reductions in the South.

**Prices**

- Solid wood products prices will rise at rates less than ½ percent per year, well below

historical experience.

- Prices of paper and paperboard are expected to decline in real terms.
- Sawtimber stumpage prices in the South and Interior West decline slowly after 2010, while those in the Pacific Northwest westside and North rise at about 0.2 percent 0.6 percent per year.

**Figure 11. Total U.S. roundwood consumption, harvest and trade. SRWC = short rotation woody crops from agricultural lands.**

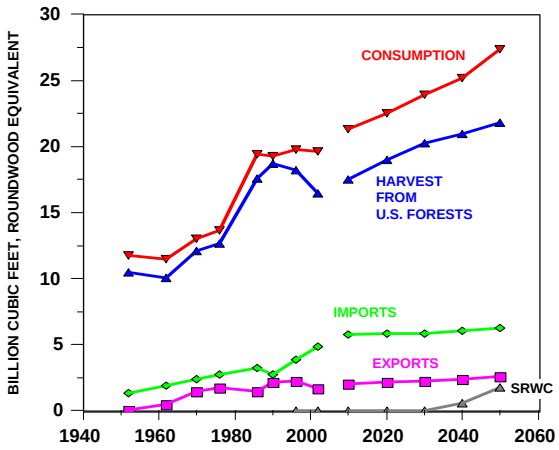
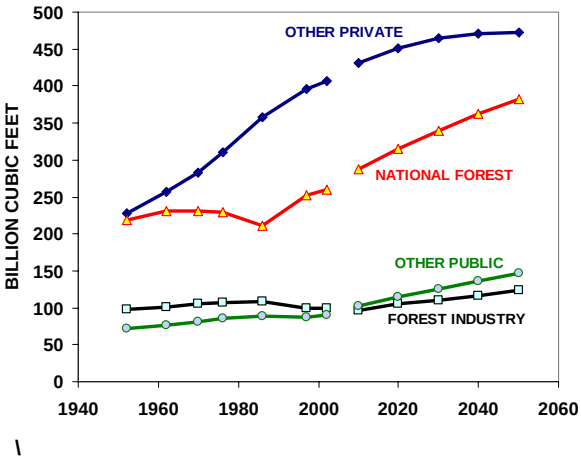


**Figure 12. U.S. growing stock inventories all species by owner group.**

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[1] See Chapter 10 of Adams and Haynes 2007 for a history of the post-World War II assessments, and a discussion of the evolution of methods, models, model validation, results, and policy analyses.

[2] The demand studies traditionally considered the Pacific Rim as the major producing areas of the three contiguous Pacific coast states, British Columbia, Alaska, Russian Far East, and the major consuming regions of Japan, Korea, Taiwan, and China (Haynes and Brooks 1990).

[3] In the 1990 and 1994 demand studies, there was much discussion about the extent log exports would displace lumber exports from Alaska. By the 1994 study, it was becoming apparent that declines in log exports would not result in increases in lumber exports (Brooks and Haynes 1994: 10).

[4] Cants [sometimes also referred to as heavy timbers] are a type of lumber made from a log by removing two or more sides in sawing. Often cants are remanufactured into specialty products in the importing nation. Baby squares are full-sawn 4 by 4s used in post and beam construction in Japan.

[5] Dimension lumber is used in structural applications where strength is an important consideration. Studs used in walls, joists used in floor, and rafters used in roof systems are examples of dimension lumber. Appearance is a minor consideration in dimension lumber because it is often not visible in the finished building (see WWPA 2005).

[6] Millwork (shop, factory and moulding grades) are terms to define lumber products that are used in applications where appearance, as opposed to strength, is the most important consideration. Shop and factory grades of lumber are remanufactured into door and window casing, doors, cabinets, fascia, and trim (see WWPA 2005).

[7] The capacity studies are an annual or semi annual survey of southeast Alaskan mill owners to obtain information about species, volumes, products, markets for southeast Alaska sawmill industry. The capacity studies (new since the 1997 Brooks and Haynes study) reveal that the proportion going to the domestic market both for final consumption and transshipment to export markets have been higher than previously assumed.

[8] The increased lumber production in the Pacific Northwest resulted from formerly exported logs being shifted to the domestic markets and to reductions in plywood production that freed up logs for lumber production.

[9] This is computed from unpublished data showing lumber demand by the various end use applications considered in the 2005 RPA Timber Assessment.

[10] Logs are measured in log scale usually using the Scriber log scale. Lumber is tallied after being sawn based on actual board footage produced. Both are in board feet but have different solid wood content. For example the log scaling rule is assumed to be 5 board feet, scriber scale per cubic foot of wood while at the same time lumber recovery measured in studies might range from 7 to 10 board feet (lumber scale) from a cubic foot of wood. This difference that arises because of the measurement rules or conventions that have been adopted is call overrun. It is often used as an indicator of a mill's relative processing efficiency.

[11] Scaling diameter is the inside bark diameter at the small end of a log.

[12] Platform frame construction is a North American framing technique used in residential construction.

[13] For example, southeast Alaska mill owners report it is not uncommon for foreign buyers to periodically travel to Alaska to visit mill sites. During these visits, the buyers inspect and purchase high-grade logs for conversion into specialty products. The logs are sawn to the purchaser's specifications, which often

include large squares and other sizes that contribute to the “other” category in figure 4. Some of this volume may be reported as cants if it is cut in conventional sizes (such 6 by 6, 8 by 8, etc.).

[14] This is done using a set of conversion factors that equate wood in its different product forms to actual wood fiber content. These conversation factors also convert from various product scales like board feet, lumber scale to cubic feet, which is used in the United States as the standard, common measurement unit.

[15] Since 1980, the RPA timber assessment (USDA FS 1982) has used a market equilibrium approach where changing prices balanced supply and demand relations. That is, increases or decreases in prices led to changes in the quantities supplied or demanded until both were equal (the quantity supplied equaled the quantity demanded).

[16] There is not official source of information for shipment of lumber from Alaska to domestic markets. Exports to foreign markets are based on export declaration forms submitted to the U.S. Department of Commerce as reported by Warren (for two most recent publications see Warren 2006, 2007). Total production from the mills is estimated from several sources. Given estimates of total production and exports, domestic production is determined by the subtracting exports from total production.

[17] Market arbitrage is used to understand parity among prices in spatially distinct markets where there is the opportunity for open exchange (trade). Market arbitrage is a powerful force that keeps prices of different species, grades, and locations within some fixed proportion to each other. Abstracting from transportation and transactions costs, for example, prices of one species and grade will not exceed prices for other species of a similar grade in the long run because of possibilities of substitution.

[18] Stevens and Brooks (2003) using cointegration tests found support for assuming an integrated market for western hemlock and Sitka spruce logs in Alaska, British Columbia, and the U.S. Pacific Northwest.

[19] The term model is used here to mean an abstraction of a complex process where the lack of data makes, in the case of markets for Alaskan products, determining relations difficult. Depending on the extent of data, models can range from simple to highly complex. All can be used for conditional forecasts or understanding how systems work.

[20] Defined here in the international context as attempting to increase economic prosperity that is socially just and environmentally sound.

[21] Utilization factors are specified in timber sale documents and contracts. The specified items may include: the species of trees to be harvested; the minimum diameter breast high (dbh) of trees that must be processed into products and removed from the harvest block; the minimum top diameter (inside bark) that may be left in the woods; the maximum ratio of net scale in relation to gross scale that determines if the log is usable or cull (cull logs may be left on the ground in the woods).

[22] Utility logs are logs that contain a net scale of less than 33 1/3 percent of the gross scale but are suitable for the productions of firm usable chips to an amount not less than 50 percent of the gross scale, provided the log meets a minimum diameter of 6 inches and a minimum length of 12 feet (USDA FS R10 2004). Under many current timber sales contracts this material can be left in the woods. If it is removed from the woods there is no additional change in timber charged to the allowable sale quantity (ASQ).

[23] The base projection assumes continuation of a weak U.S. dollar relative to other world currencies.