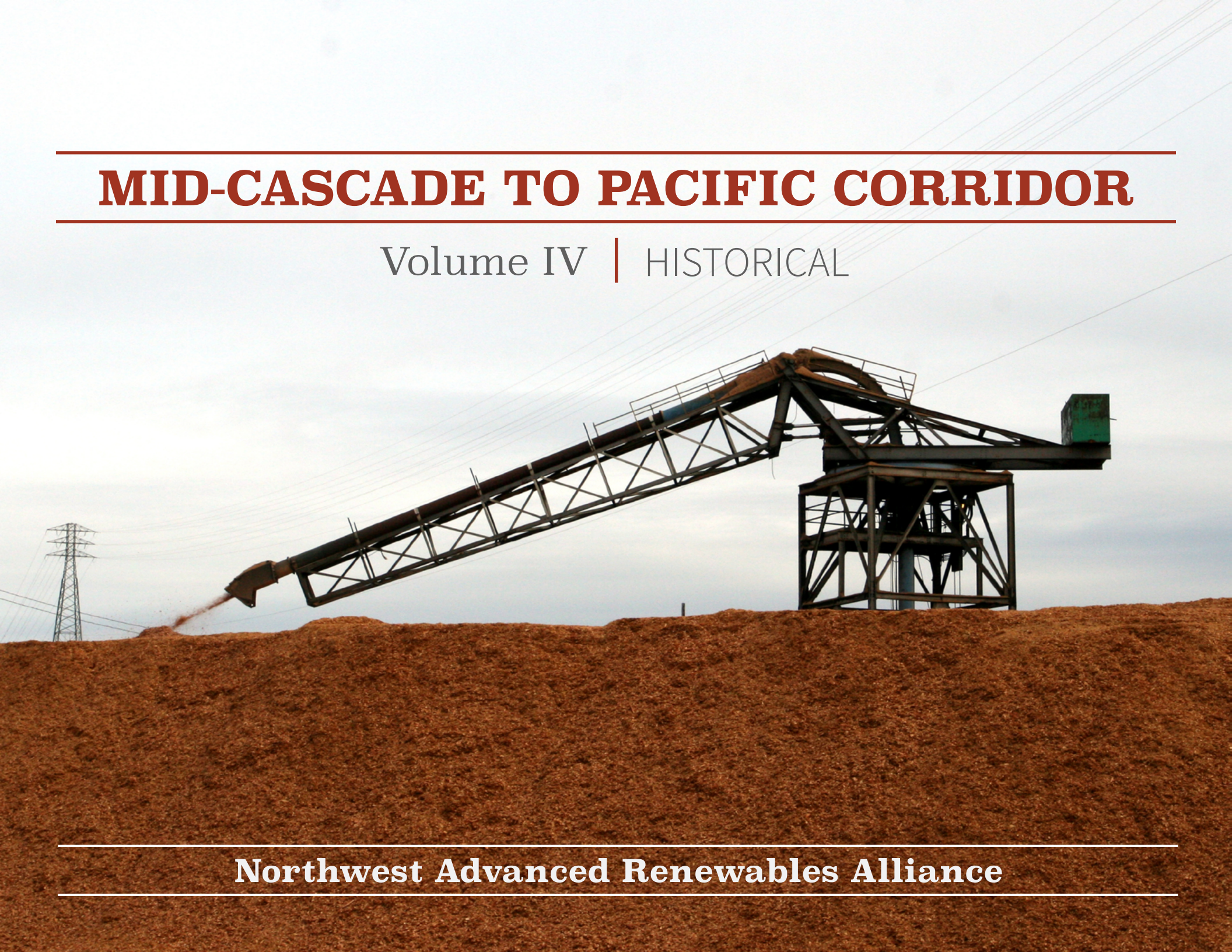
# MID-CASCADE TO PACIFIC CORRIDOR

## Volume IV | HISTORICAL



**Northwest Advanced Renewables Alliance**

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# ABBREVIATIONS

| | |
|---|---|
| AFRI | Agriculture and Food Research Initiative program |
| AHB | Advanced Hardwood Biofuels Northwest |
| BDT | Bone Dry Tons |
| Brownfield | Abandoned or underutilized site with real or perceived contamination |
| CAPS | Coordinated Agricultural Projects |
| CAAM | Community Asset Assessment Model |
| C&D | Construction and Demolition Debris |
| CIA | Community Impact Analysis |
| CY | Cubic Yard |
| Greyfield | Vacant or underutilized site with no contamination |
| IDX | Integrated Design Experience |
| IO | Input-Output Analysis |
| LCA | Life Cycle Assessment |
| MRF | Material Recycling Facility |
| MSW | Municipal Solid Waste |
| N&E | New and emerging |
| NARA | Northwest Advanced Renewables Alliance |
| NIFA | USDA National Institute of Food and Agriculture |
| OSU | Oregon State University |
| RFA | Resource Flow Analysis |
| RWW | Recycled Wood Waste |
| SLA | Site Location Analysis |
| TEA | Techno-Economic Analysis |
| UI | University of Idaho |
| USFS | United States Forest Service |
| MC2P | Mid-Cascades to Pacific Corridor |
| WSU | Washington State University |

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# Mid-Cascade to Pacific Corridor

# 4.1.0 MID-CASCADE TO PACIFIC PROJECT

## 4.1.1 MC2P PROJECT OVERVIEW

To study the MC2P supply chain, the Integrated Design Experience (IDX) group, part of the NARA Education team, divided its tasks into three stages outlined in Figure 4.1.1. In the first stage, assets integral to developing a regional supply chain were identified. The second stage of activity identified case study sites where specific activities along the supply chain could occur, such as preprocessing of forest residues into wood chips or converting chips into isobutanol. In the third stage, conceptual master plans and building designs for solids depots, liquids depots and integrated bio-refineries were developed. These findings are presented in Volumes 2 & 3 (MC2P Analysis & Design).

To view a video presentation given by Michael Wolcott, NARA Project Co-Director, and Tammi Laninga, NARA Education Team Co-PI that describes findings for the MC2P, visit http://goo.gl/CqbgX9

The MC2P Corridor (MC2P) encompasses the western half of Oregon and Washington (Figure 4.1.1).

The geographic scope for the MC2P is based on the biomass to biofuels supply chain. In establishing these boundaries, we considered the location of the feedstocks (forest residual), the existing forest industries, the petroleum refining and distribution capacity (e.g., the Yellowstone pipeline), and location of markets west of the Cascade Mountains where the biofuels will be consumed (e.g., SEATAC International Airport and Air Force Bases). The MC2P has significant assets, making it a compelling region for studying a regional biomass to biofuels supply chain.

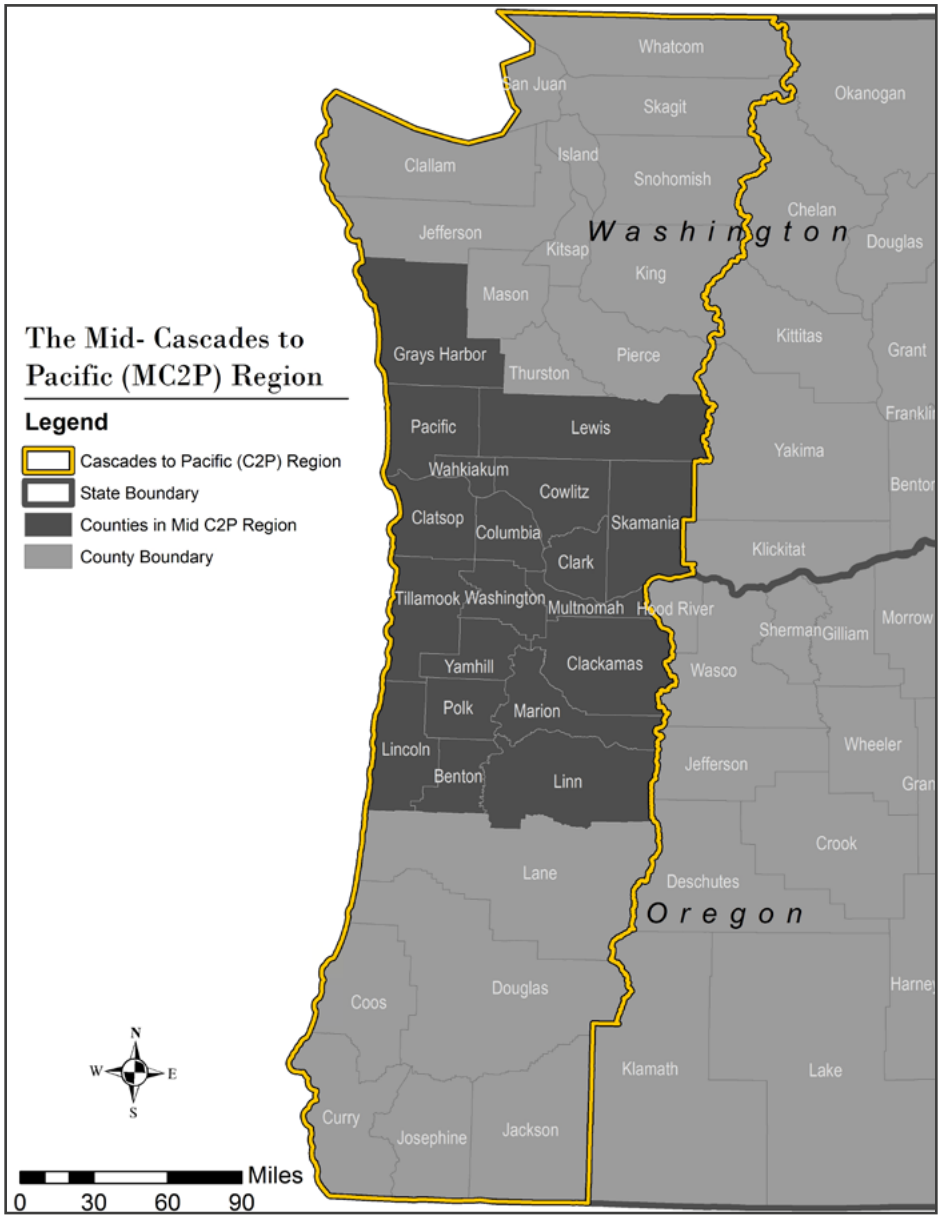

Figure 4.1.1. MC2P corridor map

# 4.2.0 PNW HISTORIC TIMBER INDUSTRY

## 4.2.1 INTRODUCTION

Timber usage in Oregon and Washington is as old as the civilizations that have lived there. Whether it was the native inhabitants of the region, the homesteaders that came later, or buyers around the world, people have always demanded wood. Loggers and sawmills arrived in the early 1800s, and production kept rising for the next century and a half. The arrival of the railroads and settlers ushered in this historic rise, while technology, war, product diversification, and housing booms kept it going. As time went on, attitudes shifted from unlimitedness to conservation, and environmental concerns gained ground. Milling and logging operations shifted from individual operations to consolidated corporations, and jobs were eventually shed. Changing economic conditions of the late 20th century marked a turning point for the industry, and the early 1970s would remain the peak years for timber in the Pacific Northwest. Environmental regulations, highlighted by the Spotted Owl protection of the early 1990s, would further reduce harvests, and the recession that hit the United States in 2008 would signify a new post-Great Depression low for the industry. As the nation recovers, a new focus on energy security presents an opportunity for the Pacific Northwest to capitalize on its historic identity as a forest region, and move toward a new life in biofuels.

## 4.2.2 PRE-RAILROAD YEARS

Like the history of the United States as a whole, the story of the Pacific Northwest forests begins with Native American Indians. Present in the region for over ten thousand years, Indians were active forest managers.[1] They harvested wood from the forests for a number of reasons, including heat, boats, homes, art, medicine, and tools.[2] The Indian way of life in the Pacific Northwest was altered towards the mid-19th century, as treaties intended to protect traditional homelands were never ratified, reservations were created, and homesteading began for white settlers.[3]

The value of the Pacific Northwest for non-Indians was becoming clear towards the turn of the 19th century. Lewis and Clark reached the Columbia River by 1806 and prior to that, the region was noted in the 1780s by British navigator and fur trader John Meares as having desirable timber for ship production.[4] Value was seen not only in timber, but in the region's beaver and sea otter pelts, which were traded to China by the British during this time.[5]

The mid-1800s, saw an influx of white settlers into the traditional Indian lands of the Pacific Northwest. During the decade of 1842-1852, the Oregon Trail (Figure 4.4.1)

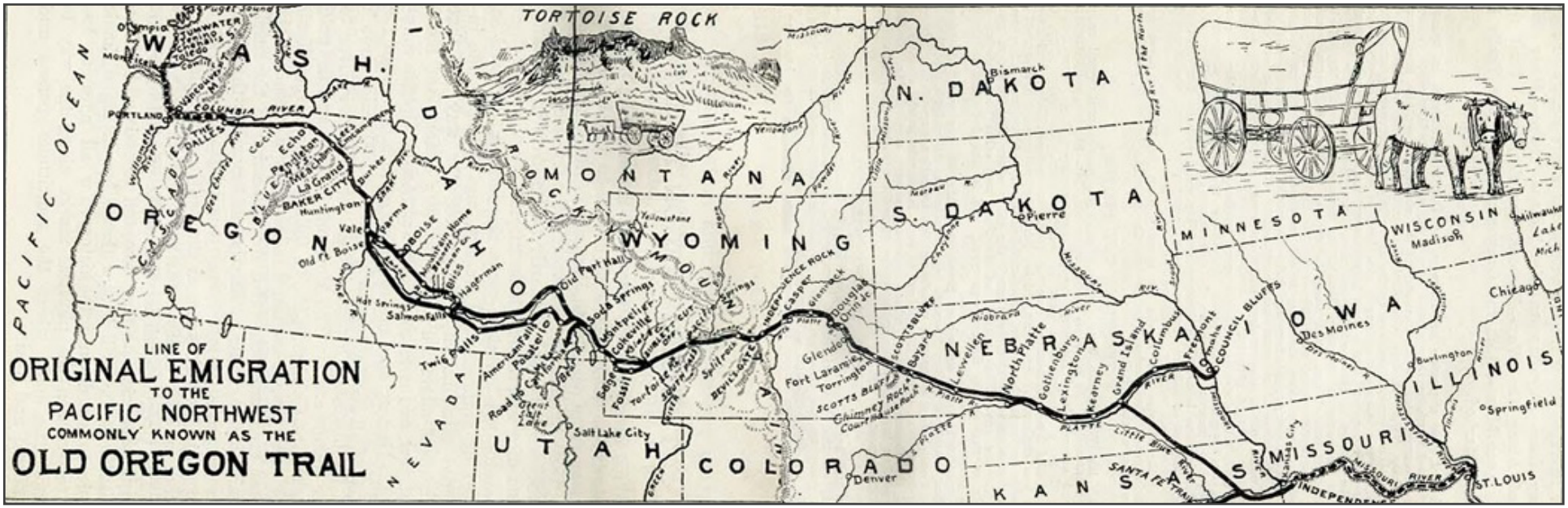


Figure 4.2.1. Oregon Trail Map. Ezra Meeker, 1907

brought nearly 18,000 people to Oregon. By comparison, there were only around 200 non-Indian individuals in Oregon in 1840.[6] Gold discoveries in the western territories of the United States in the 1840s and 1850s, especially the California gold rush, caused settlers to seek out the area, and this wave of newcomers lead to the Homestead Act of 1862.[7] Naturally, the rise in population and establishment of towns created a demand for wood to be used in the construction of homes, businesses, and fencing.[8]

Sawmills were used to meet the demand for wood products, with the earliest one being established at Fort Vancouver by the Hudson Bay Company in 1825.[9] While population increases created a domestic demand, early sawmills also satisfied an international timber demand from other Pacific regions, such as China, Australia, and what is now Hawaii.[10] The number of Oregon mills increased through the 1840s, with establishments in Oregon City and Astoria, and by 1850 there were numerous mills in the Willamette Valley.[11] By 1870, Oregon had a total of 173 sawmills to meet demand.[12] Oregon more than doubled its production in the decade between 1849 and 1859 (17 million board feet to 41 million board feet). This number jumped to 75 million board feet another decade later, and more than doubled to 177 million board feet by 1879, representing a 941% increase in only 30 years.[13] This was before official harvest numbers were recorded for the area that would become the state of Washington.

This era also shows wood to be the original biofuel. As noted, native people burned it for warmth, and sawmills by the 1850s were using it for power. Mills were no longer powered by water wheels, but rather by steam generated from the burning of wood in boilers. Putting its importance into perspective, in 1850 wood was responsible for 91% of the nation's energy.[14]

As mining, logging, and settlement increased, the framework for railroads began to take shape. The first small railroad in the Columbia River Basin was completed in 1851, and by 1854, Congress chartered the Northern Pacific Railroad, which would further-connect the east to the west.[15] The arrival of the railroad was the start of an explosion of timber harvesting.

## 4.2.3 THE RAILROAD, BOOM TIMES, AND CONSERVATION BEFORE THE GREAT DEPRESSION

The late-19th and early-20th centuries in the Pacific Northwest are highlighted by one aspect above all others - the arrival of major railroad operations. Following its start in the previous decade, rail construction continued around the Columbia River in the 1860s, connecting steamboat cargo to destinations eastward.[16]

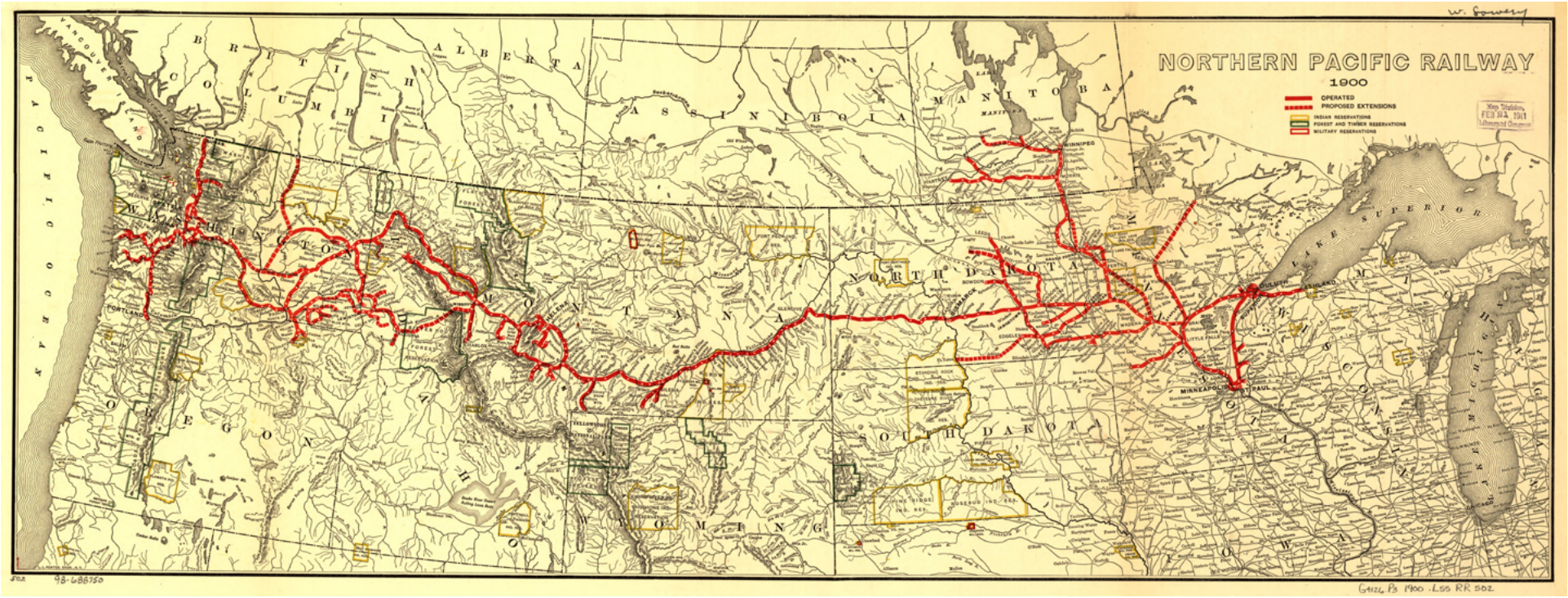


Figure 4.2.2. Northern Pacific Railroad map circa 1900

However, the major milestone came in 1864, when President Lincoln signed the Northern Pacific Railroad land grant, which was intended to connect the Great Lakes area to the Pacific by granting public lands to railroad companies. The intention of the land grants, which were given in an alternatively-sectioned checkerboard pattern, was to aid in the financing and construction of rail lines.[17] By 1867, Congress had given out over 130 million checkerboarded acres.[18] Construction continued through the following decades. By 1875, rail lines connected the Columbia and Walla Walla rivers, and by 1881 the Northern Pacific had reached the Washington towns of Pasco and Spokane (Figure 4.1.3). By 1884, railroad companies had made connections between Wyoming and Oregon, which were followed by various lines connecting the Pacific Northwest to San Francisco, Vancouver, and Chicago.[19]

The arrival of railroads also ushered in a population boom for the area. Specifically, in the three decades between 1880 and 1910, Idaho, Washington, and Oregon's regional population exploded from around 280,000 people to 2,000,000 people.[20]

Along with, and often because of, this population boom was the continued rise of the timber industry. Washington's forests offered plentiful jobs with high wages, and were the source of over 60% of the manufacturing jobs in the state by 1910.[21] This was representative of the region as a whole. This industry was responsible for 55% of all Pacific Northwest salaries by 1914.[22]

Oregon's timber production was up to 735 million board feet in 1899, continued rising to 1.26 billion by 1905, and was up to 2.09 billion by 1910. This harvest total was 122 times higher than 1849's.[23] Washington, now officially a state and recording harvests, overshadowed even these numbers. Washington's levels for those same highlighted years were 1.86, 3.92, and 4.1 billion board feet, respectively.[24]

By this time, Washington had become the number one timber-producing state in the nation, surpassing the former leader Oregon.[25]

Increased harvests naturally led to increased milling, and the mills were dependent on the railroad to ship their products to larger lines and to market. For this reason, mills were usually built right on the rail line.[26] 1885 saw the first Pacific Northwest paper mill arrive in Camas, Washington,[27] and in the following years large lumber mills could be found around the region, including Grays Harbor in Washington, and Baker City, La Grande, Sumpter, and Enterprise in Oregon.[28] By 1910, the largest sawmill in the world was located in Washington, in Port Blakely.[29] Towns were very eager to attract new mills and capitalize on this growing industry. To do so, incentives including free land were offered in hopes of luring a new company from the east.[30] By 1929, there were over 600 lumber mills in Oregon alone, along with five paper mills.[31]

This era was dominated by large timber barons. Railroad companies, as previously noted, were major landowners because of federal land grants, but two of the dominant individual names were Frederick Weyerhaeuser and Edward Hines. Weyerhaeuser had purchased millions of acres of railroad land grant forests in the Pacific Northwest as well as the Midwest, and his largest purchase happened in 1899, when his company acquired 900,000 acres in Washington.[32] The power of both Weyerhaeuser and the railroads is illustrated by the fact that in 1913, he and the Southern Pacific Railroad combined to own over 22% of western Oregon's standing timber.[33] By 1928, Edward Hines of Illinois was part of the largest-ever purchase of publicly-owned forest, securing an estimated 890 million board feet-worth of timber in Harney County, Oregon.[34]

Figure 4.2.3. 20th Century logging truck

A booming timber industry was further-aided by advances in technology and infrastructure during this time. Steam-powered logging machines, also known as steam donkeys, began to replace man and animal power by the 1900s,[35] and technology was further advanced as gasoline-powered trucks (Figure 4.1.4) came onto the scene by the 1910s, when the railroads of America took on increased usage for war preparation. This technology continued to improve into the 1920s, creating more efficient, safe, and powerful trucks that could handle larger loads and tougher conditions. Operation of logging trucks was made even easier when Caterpillar road graders allowed for roads to be constructed without wood planks. Improvements in trucking technology also allowed the small-time independent logger to gain ground in the industry, against the big time timber barons of the day.[36]

Forest roads increased in numbers due to federal action during these years. In 1916, Congress passed the Federal Aid Road Act, which among other things created forest roads in national forests to better-extract natural resources.[37] A year later, the US Army authorized the Spruce Production Division, which was tasked with building roads in western Washington in order to extract Sitka Spruce for the purpose of airplane construction during World War I.[38] The Federal Highway Act of 1921 continued the development of forest infrastructure with two types of roads. Forest Development Roads were defined as being related to the management of national forests, and Forest Highways were defined as having the additional role of serving communities in and near national forests.[39]

Wood continued to have multiple uses throughout this era. The railroads, which allowed for the growth of the industry, also depended on the same timber they were extracting. The Ponderosa Pine and Western Larch were seen as excellent wood for the construction of railroad ties.[40] Wood usage by the railroad did not end at railroad ties, but was used for everything from bridges and stations to fuel.[41] As noted, airplane construction created additional demand for timber during World War I, but this use continued even after the war, as the Boeing Corporation became a major economic contributor to the state of Washington in the years to come.[42] Wood continued its role as a biofuel for mills as well, as sawdust and wood scraps were used in the steam boilers that powered the machinery.[43]

An important aspect of this era is the relationship between resource usage and conservation. A mindset of timber inexhaustibility transitioned into concerns for conserving and protecting the resources of the United States. Edmond S. Meany, a Washington historian, said in 1893, "The natural resources of the state are vast and inexhaustible."[44] However, this concept was clearly false because the reason some timber companies were arriving in the Pacific Northwest was because supplies had already been exhausted in the Midwest.[45] Congress was aware of this fact, and acted by passing the Forest Reserve Act in 1891, and the Forest Management Act in 1897. These acts served to set aside public forests in order to safeguard against depletion, and the 1897 act was responsible for the creation of the US Forest Service. Additional federal legislation included the Weeks Act of 1911, which expanded public forest land, and the Clarke-McNary Act of 1924, which aided private landowners in forest management.[46]

The concept of conservation during this time frame was championed by Theodore Roosevelt, who became President in 1901. With an attitude that parts of the country should be appreciated for their natural beauty, Roosevelt was responsible for the establishment of 51 federal bird reservations, 4 national game preserves, 150 national forests, and 5 national parks. His stance on responsible conservation efforts can be summed up by his statement that "We have become great because of the lavish use of our resources. But the time has come to inquire seriously what will happen when our forests are gone, when the coal, the iron, the oil, and the gas are exhausted, when the soils have still further impoverished and washed into the streams, polluting the rivers, denuding the fields and obstructing navigation."[47]

## 4.2.4 THE GREAT DEPRESSION THROUGH WORLD WAR II AND THE POST-WAR BOOM

As with the United States as a whole, the Great Depression hit the Pacific Northwest timber industry hard. From 1929 to 1932, Oregon's timber production dropped 67.8%, from 4.53 billion to 1.46 billion board feet,[48] and Washington's production dropped 69.1% from 7.3 billion to 2.26 billion board feet.[49] It would take nearly a decade, and the onset of World War II, for production to reach pre-Depression levels. War efforts demanded new diversified wood products like pulp and veneer, which were produced in towns such as Aberdeen, Washington.[50] In Bellingham, Washington, the Puget Sound Pulp and Paper company worked during the war to produce wood-based ethanol, which was then used for rubber, medicine, and fuel additives.[51] By 1944, with the added war demand, timber harvests were able to jump back up to 7.27 billion board feet in Oregon,[52] and 4.52 billion board feet in Washington.[53] As the numbers imply, this marks a turning point in regional shares of timber harvesting, as Oregon overtook Washington as the clear leader. In 1947, Oregon had 1,573 lumber mills,[54] and the largest plywood mill in the world a decade later.[55]

Infrastructure and technology continued to improve in the years following the Great Depression. Trucks were still going strong, and gaining ground compared to railroads. By the 1930s trucks were hauling just as much timber as rails,[56] on over 1,300 miles of forest highways in the state of Oregon.[57] This trend continued as the years progressed. Trucks were not only cheaper than railroads, but could fit into isolated and hard to reach spots made accessible by the new timber roads.[58] By the 1960s, trucks were the dominant mode of timber transportation, and the railroad lines that made the turn of the century boom possible were mostly out of use.[59] Additionally, new tractors, chainsaws, and road-building equipment all contributed to the evolution of the industry during this time.[60] A new era of postwar technology had made steam donkeys and railroads a thing of the past.

World War II had served as a jumpstart for the timber industry, and the housing boom that followed kept it going. The combination of war savings being spent and GI Bill loans being used led to an increase in home construction, and timber was needed to meet the demand.[61] In addition to house frames, there was a demand for other housing-related items, such as veneer, window and door materials, plywood, and molding.[62] While Washington timber harvests rose during the post-war years, it was Oregon that saw the biggest increase. From 1950 to 1955, timber harvests in the state jumped 23% from 7.89 billion to 9.72 billion board feet, which to this day rivals the 1970s as an all-time high for Oregon. By 1961, Oregon supplied around one fourth of hardwood and softwood, and half of the plywood, within the United States.[63] This was also an era of change for milling operations in the Pacific Northwest. Large timber corporations such as Weyerhaeuser and Georgia Pacific began to take advantage of economies of scale and further-dominate the industry,

just as was the case during the railroad era.[64] Small operators were losing their share of the market.

Native Americans, after experiencing a century of settlement and often-unfavorable government policy, faced another setback in the 1950s. During this era, it was the policy of the federal government to terminate the trust status that had been put in place between tribes and the United States, in order to promote the assimilation of Indians into American society. In doing so, tribal lands were split and sold off, and many collectively-held forest resources were lost.[65]

## 4.2.5 CHANGING MARKETS AND ENVIRONMENTALISM FROM THE 1960S THROUGH THE 1980S

Another shock to the timber industry occurred during this time period, when the Baby Boomers began to enter the housing market. Timber data reflects this, as Oregon and Washington both saw significant harvest increases. From 1970 to 1972, Oregon increased production by 22%, from 7.98 billion to 9.74 billion board feet.[66] Washington reached 7.8 billion board feet a year later, which represented a 21% increase from 1970 levels. This time period (Figure 4.2.4) would represent the all-time

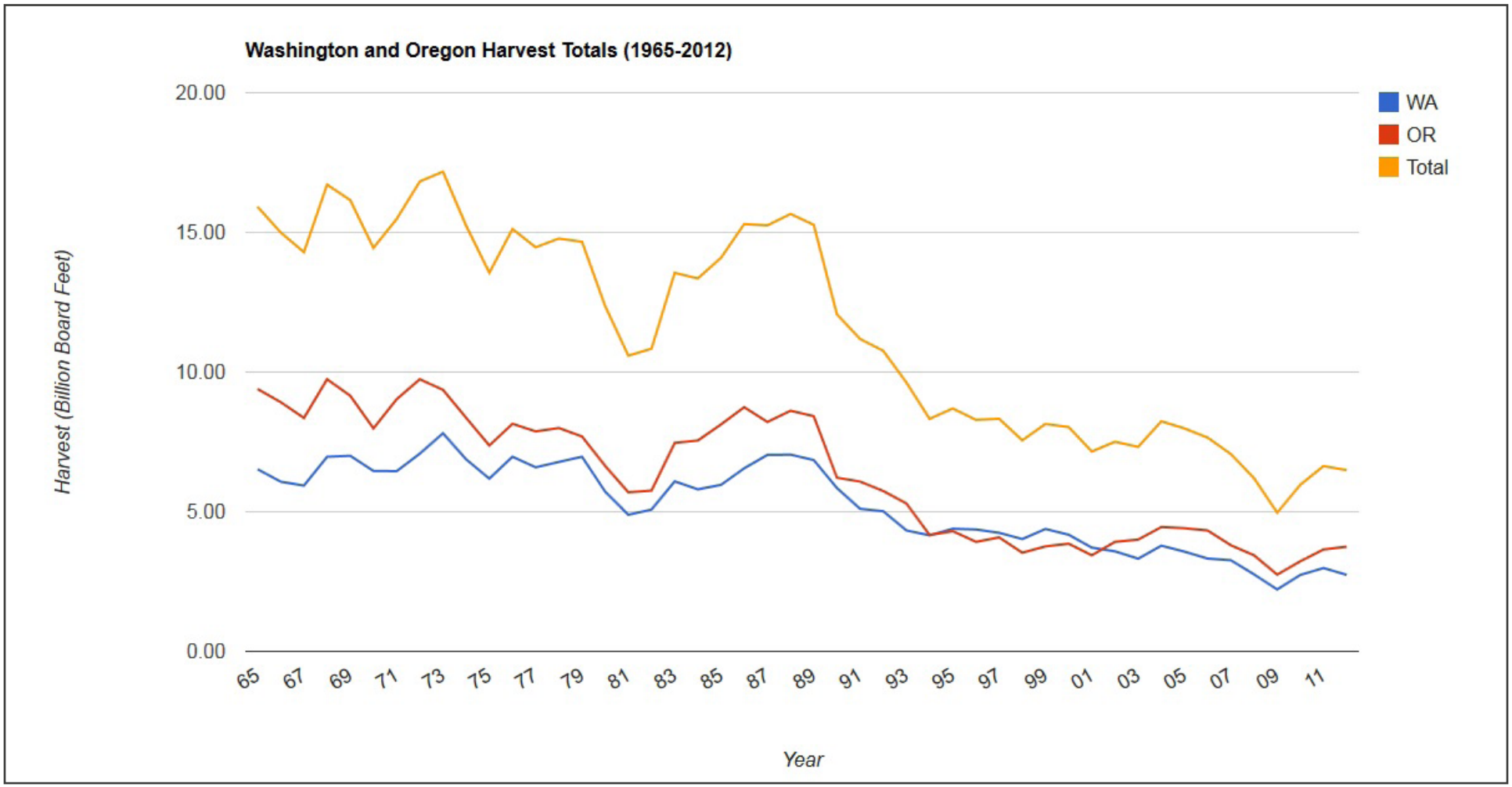


Figure 4.2.4. Washington and Oregon combined harvest totals for 1956-2012

high point for timber harvesting in the region, an achievement that remains today.[67] Not coincidentally, the period from 1971 to 1973 remains a high point for new private housing starts (Figure 4.2.5), representing levels that would not be approached again until 2005.[68]

As the 1970s progressed, the timber industry experienced multiple changes. One such change was increased competition from Canada (Figure 4.2.6). By this decade, Canada was meeting up to 20% of the demand from the United States for softwood lumber.[69]

Another development during this era was the increase of timber exportation from the Pacific Northwest to Asian nations, with the majority going to Japan (Figure 4.2.7). Most of the available timber in Japan and Korea was cut during World War II, thus requiring importation in the following decades. Additionally, Japan experienced rapid economic growth and housing demand from the 1960s to the 1990s.[70]

The early 1980s, however, brought an economic recession to the United States. As is the case during most recessions, residential investment, and thus the timber industry, took a hit.[71] Oregon's timber harvests fell from 8 billion board feet in 1978 to 5.76 billion in 1982, a 28% decline that wouldn't be regained until 1985.[72] Mirror-

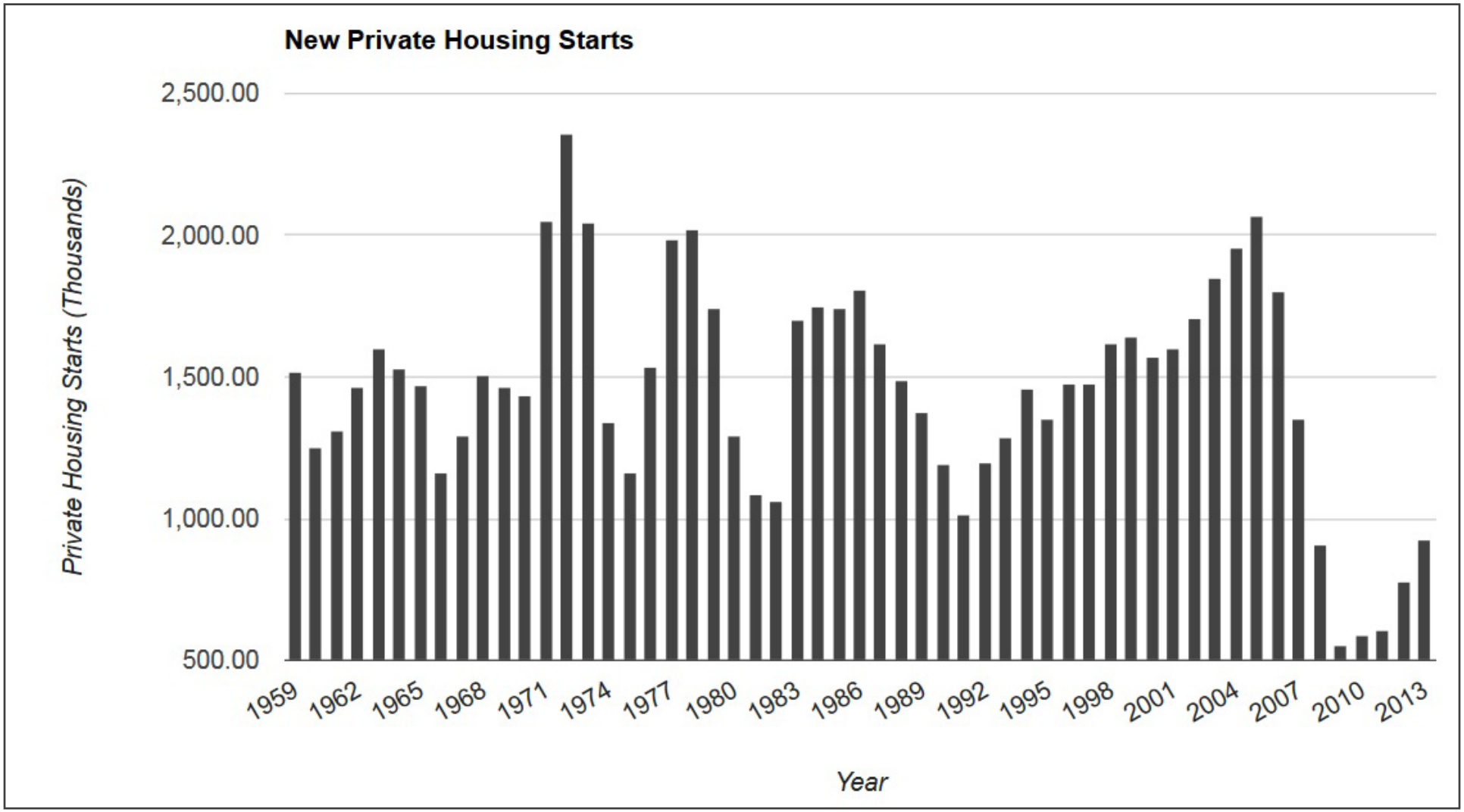


Figure 4.2.5. New private housing starts for 1959-2013

ing these recession effects, Washington's 1979 harvest of 6.97 billion board feet fell 30% to 4.89 billion in 1981, which wouldn't be regained until 1987.[73] The trend of large corporations dominating the industry accelerated in the 1980s as well. Due to changing economic conditions and technology, small mills continued to lose their share of the timber market, as large mills were better-equipped to run efficiently (Figure 4.2.8). Small mills suffered the most closures, and employment in the industry dropped from the 1980s onward.[74]

This era, particularly the 1970s portion, is also highlighted by the volume of environmental legislation that was passed. Legislative efforts began in 1964 when the Wilderness Act designated specific federal wilderness areas, and continued in 1969 with National Environmental Policy Act, which focused on environmental quality and procedural requirements.[75] In 1971, Oregon passed the Forest Practices Act, which addressed issues related to harvesting, reforestation, chemical use, and critical species, among other things. Washington passed similar legislation in 1974.[76] Congress passed the Endangered Species Act in 1973, and the Forest and Rangeland Renewable Resources Planning Act in 1974. This planning act, amended in 1976, aimed to balance environmental quality with long-range resource management.[77] While the 1980s did not provide many new laws regarding the environment, legislation was passed to aid forest highways. The 1982 Surface Transportation and Assis-

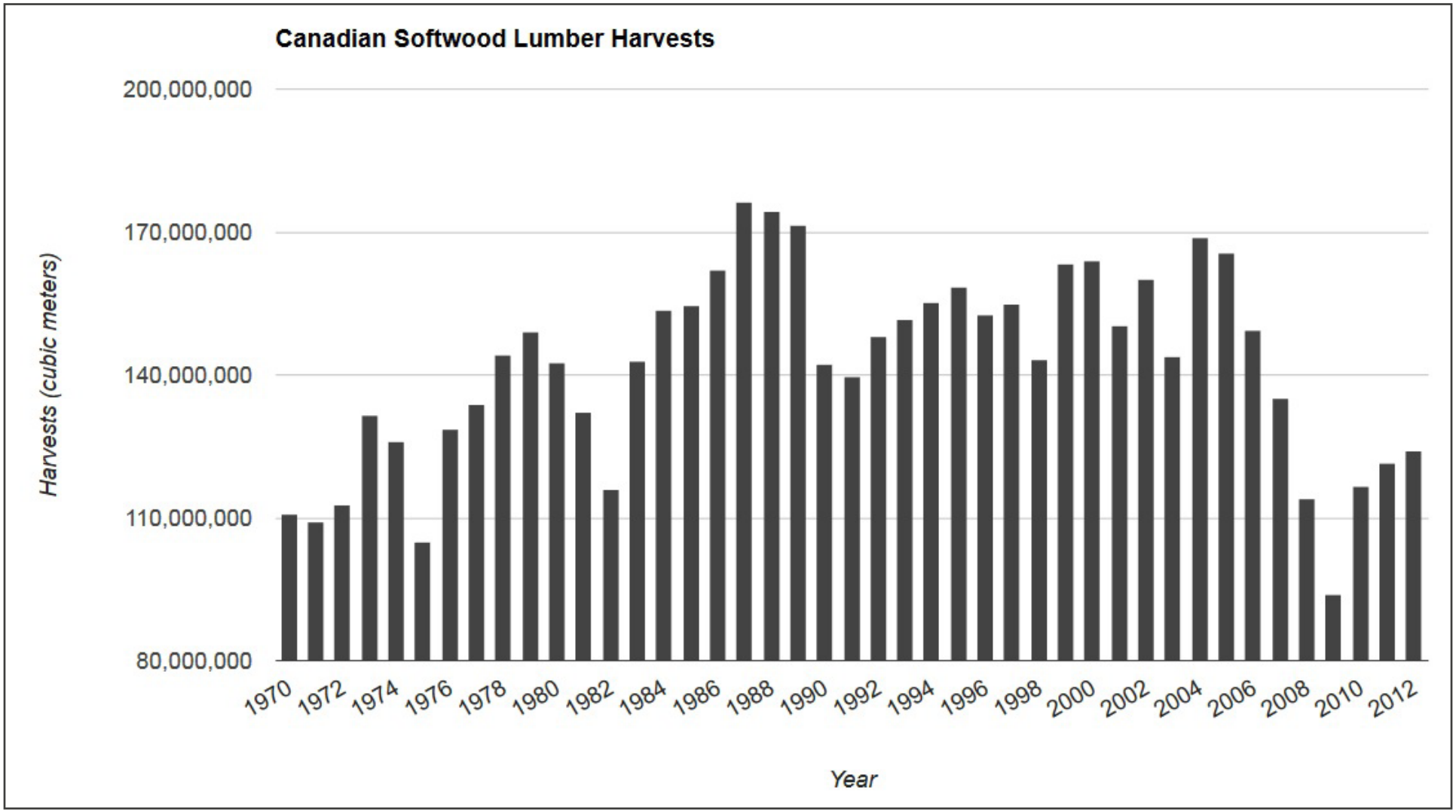


Figure 4.2.6. Canadian softwood lumber harvests for 1970-2012

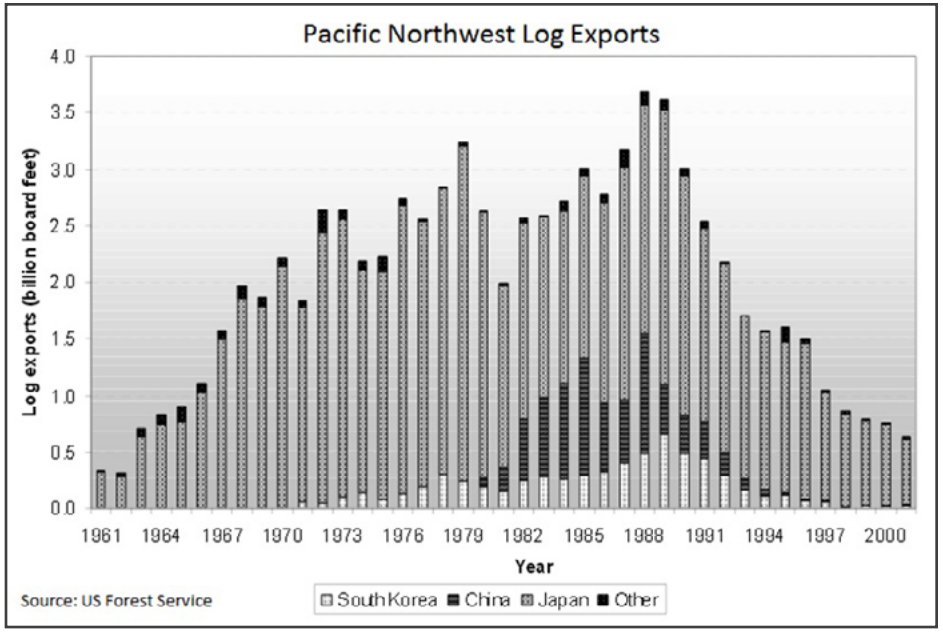


Figure 4.2.7. Pacific Northwest log exports for 1961-2000

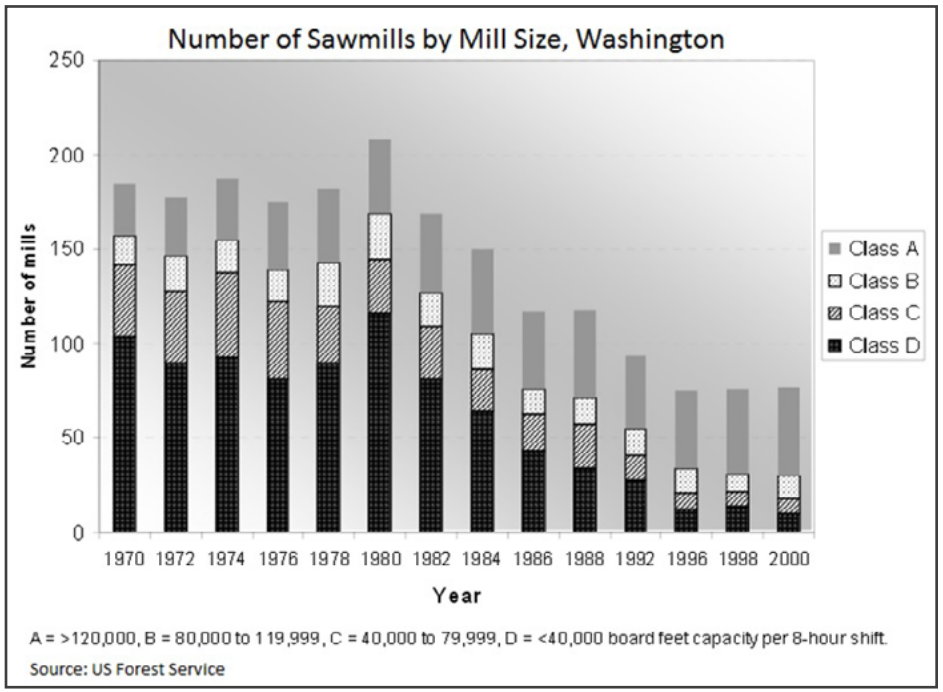


Figure 4.2.8. Number of sawmills by size in Washington for 1970-2012

tance Act and the 1987 Surface Transportation and Uniform Relocation Assistance Act served to increase the amount of funding available for forest highways. The first act increased annual funding from $33 million to $50 million, and the second act further-increased funding to $55 million.[78]

The 1973 energy crisis provided new government support for biofuels as well, as a means to achieve greater energy independence. The 1976 Resource Conservation and Recovery Act, through various requirements, sought to create a demand for biofuels,[79] and the Public Utility Regulatory Policies Act of 1978 further-promoted renewable resources.[80] Two years later, the 1980 Crude Oil Windfall Profit Tax Act provided tax credits to producers and sellers of biofuels.[81]

## 4.2.6 SPOTTED OWL, CHANGING ECONOMICS, AND BIOMASS SUPPORT FROM THE 1990S TO TODAY

The start of the current era is centered around a landmark court ruling, and the controversy that followed. In 1989, the Northern Spotted Owl was listed by the US Fish and Wildlife Service as a threatened species in Washington, Oregon, and Northern California. Then in the February 1991 decision in Northern Spotted Owl v. Lujan, it was ruled that the Endangered Species Act requires the US Fish and Wildlife Service to designate critical habitat for the Spotted Owl.[82] After old-growth forests were designated as critical habitat for the owl, Federal District Judge William Dwyer ruled that new timber sales would be banned from federal forests in the three states listed. Affected forests totalled around 10 million acres, taking up to 3 billion board feet worth of timber off the market. Naturally, harvests from national forests dropped significantly, amounting to an 87% reduction from 1988 to 1996.[83] Worsening the situation for mills, the speculation over the coming reduction in supply led to price increases, which in turn hurt demand.[84] Today, 10% of old-growth forests remain uncut.[85] The restrictions on federal forest harvesting led to both a reduction of timber cuts, and a change in the private sector's share compared to the public's (Figure 4.2.9).

Adding to the effects of the Spotted Owl ruling were a series of economic trends in the following decades. One such trend was the fall of exports to Asia, which had reached highs in the late 1980s (Figure 4.2.7). Economic collapse across the Pacific in 1997 led to a shrinking demand from Japan, and China had begun to import its softwood from Russian sources.[86] Compounding these problems for timber in the Pacific Northwest was a rise in production in the southern United States (Figure 4.2.10), as well as the previously-noted Canadian competition. The South surpassed the Pacific Northwest in 1999 as the national leader in lumber exports.[87] Meanwhile, the continued consolidation and improved efficiency of large corporations, coupled with emerging competition from global suppliers, amounted to decreased employment and profitability for the pulp and paper industry of the Pacific Northwest.[88]

Already dealing with the effects of these factors, the Pacific Northwest was dealt another blow by the 2008 recession, which eliminated the most jobs and was the longest recession since the end of World War II.[89] New private housing unit starts in 2009 were down to 25% of what they were only four years earlier.[90] In Oregon, 2005 harvest levels of 4.41 billion board feet dropped 38% to 2.75 billion in 2009 (Figure 4.2.11).[91] To view 2009 in a larger historical context, these levels represent only 28% of the harvests achieved in 1972.[92]

Washington was exactly the same. 2009 timber harvests in the state totalled 2.22 billion board feet. This represented a 38% drop from 2005 levels, and amounted to only 28% of 1973 levels.[93] Job numbers reflect the effect of the recession as well. As of 2009, Oregon and Washington employment in wood products was roughly half of what it was in the late 1980s (Figure 4.2.12).[94]

Native Americans of the Pacific Northwest have been making strides as forest managers in recent decades. In addition to maintaining tribal forests (Figure 4.2.13), natives have been pursuing degrees in areas such as forestry, ecology, and land management.[95] Known for management practices that combine economic, cultural, and environmental values, tribes are providing revenue and jobs for reservations with their participation in the timber industry. In Washington, Yakama Forest Products has sawmills in White Swan, and the Confederated Colville Tribes have a sawmill and plywood facility in Omak.[96] 2004 saw the passage of the Tribal Forest Protection Act, which aims to protect Indian interests in and around forest land, and the creation of the Office of Tribal Relations, which aims to strengthen federal collaboration with tribal governments.[97] In 2011, the Coquille Tribe of Oregon received the honor of Forest Stewardship Council certification, which signifies excellent environmental, social, and economic standards. This certification has also been granted to the Oregon Confederated Tribes of Warm Springs.[98]

The years after Spotted Owl brought additional legislation aimed at protecting wildlife. The Clinton administration created the 1994 Northwest Forest Plan which, among other things, sought to protect the health of forests, waterways, and wildlife, produce a sustainable and environmentally-responsible resource yield, and protect the old-growth ecosystem that is home to the Spotted Owl.[99] Similarly, the 1995 Habitat Conservation Plan for the Elliott State Forest of Oregon was designed to protect sensitive species during operations such as logging.[100] In 1999, Washington passed the Forests and Fish Law, which imposed stricter regulations on private landowners in order to protect sensitive fish habitats. With these added regulations, losses to private landowners in Washington are estimated to be in the billions of dollars.[101]

Support for the usage of biofuels has gained support in recent years as well. As noted throughout the entire time line of Pacific Northwest forests, woody biomass can be used to create heat, power, fuels, and other chemicals. In addition to coming from scrap mill wood, biomass can be obtained when loggers leave behind unmarketable branches, stumps, and lower-quality trees on site, and can also be obtained from forest-thinning efforts. As conventional oil reserves decline and prices

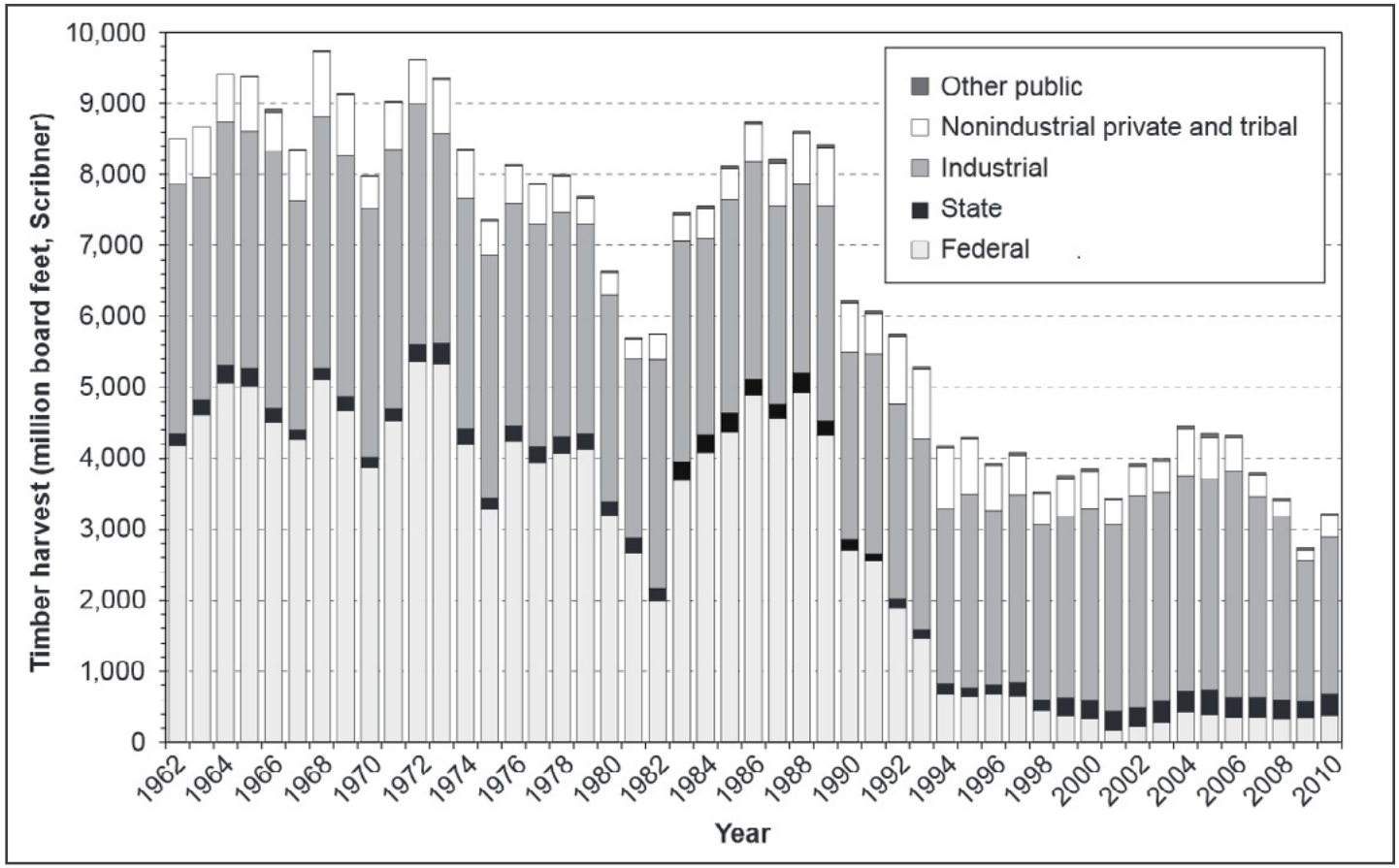


Figure 4.2.9. Harvest shares for 1962-2010

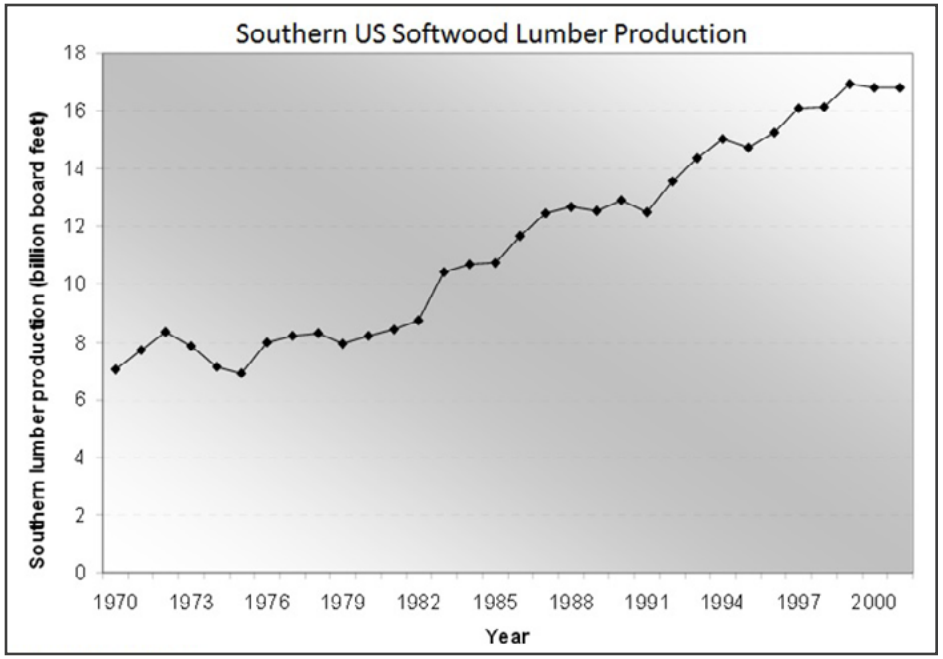


Figure 4.2.10. Southern US softwood lumber production for 1970-2000

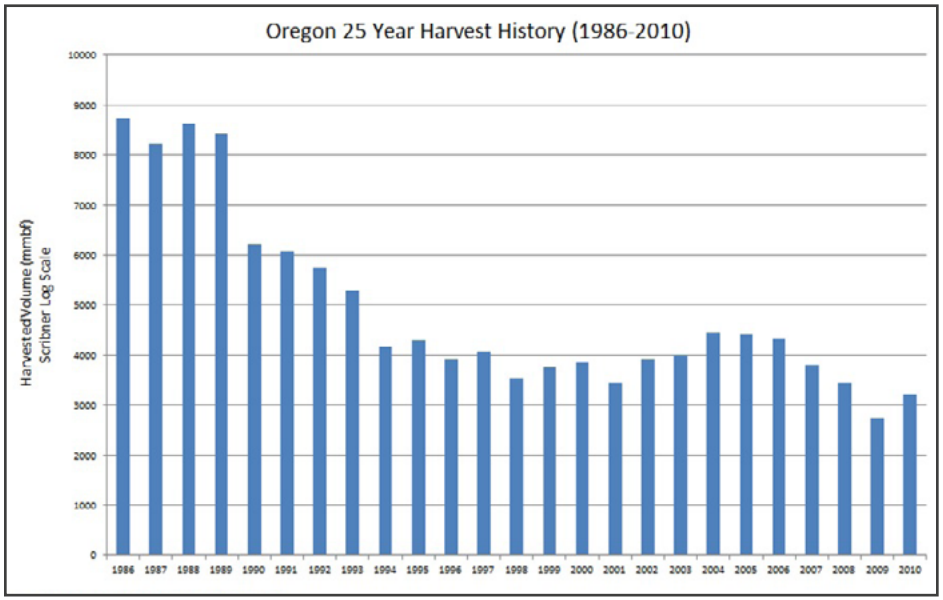


Figure 4.2.11. Oregon 25 year harvest totals for 1986-2010

rise, woody biomass becomes a way to diversify the energy supply of the United States.[102] A considerable amount of governmental action has taken place regarding the promotion of biofuels, especially since 2000. Beginning in 1992, the National Energy Policy Act contains provisions that encourage renewables, and both the 1999 Executive Order 13134 and the 2000 Biomass Research and Development Act specifically promoted the research and use of biofuels.[103] 2001 saw the creation of the Office of Energy Efficiency and Renewable Energy, which provided continued support for the development of alternative energy, including biofuels.[104] Between 2002 and 2005, the Farm Security and Rural Investment Act, Transportation Equity Act, Consolidated Appropriations Act, and National Energy Policy Act all provided various levels of support for biofuels.[105] In both the 2006 and 2007 State of the Union Addresses from President Bush, woody biomass was mentioned as an alternative fuel source, and the 2007 Energy Independence and Security Act set mandatory renewable fuel standards for the future.[106]

In addition to its role as an option for national energy security, woody biomass plays a part in forest fire management. Past fire practices, in efforts to comply with various environmental and management regulations, have left forests overstocked with flammable organic material. At the same time, more people are living on the boundaries of forest land, and thinning is a way to reduce this fire danger.[107] Major fires around the turn of the century, such as the 2002 Syskiyou Fire in Oregon, brought attention to the fact that national forests were dangerously overstocked.[108]

The 2000 National Fire Plan is a partnership between the National Association of Conservation Districts, the US Forest Service, and the Department of the Interior, and involves the utilization of woody biomass as a forest thinning strategy and source of biofuel. The 2003 Healthy Forest Restoration Act further-promoted biomass collection for forest thinning.[109] Wood usage such as this appears to be win-win. Fire hazards are reduced and a source of alternative fuel is produced.

Timber harvesting in Oregon and Washington has begun an upward trend since its low point of the 2008 recession, but levels are still as low as they were when the nation was climbing out of the Great Depression in the 1930s. After bottoming out in 2009, Oregon's harvest levels have rebounded by 36% to reach 3.75 billion board feet in 2012.[110] Washington has been able to recover 23% since 2009, getting back up to 2.74 billion board feet in 2012.[111] New housing starts are also on an upward trend since the bottom of the recession, but with the same environmental regulations and market competition still in place, how far the timber rebound can go remains to be seen.[112]

Booms and busts have come and gone, and the region now has a chance to embrace its past while adapting for a new future. Forests, even if not heavily logged, require thinning and maintenance to manage fire risk.[113] When this fire maintenance, along with the logging that still remains, is combined with the national focus on renewable energy, an opportunity is presented for the region to take on a new

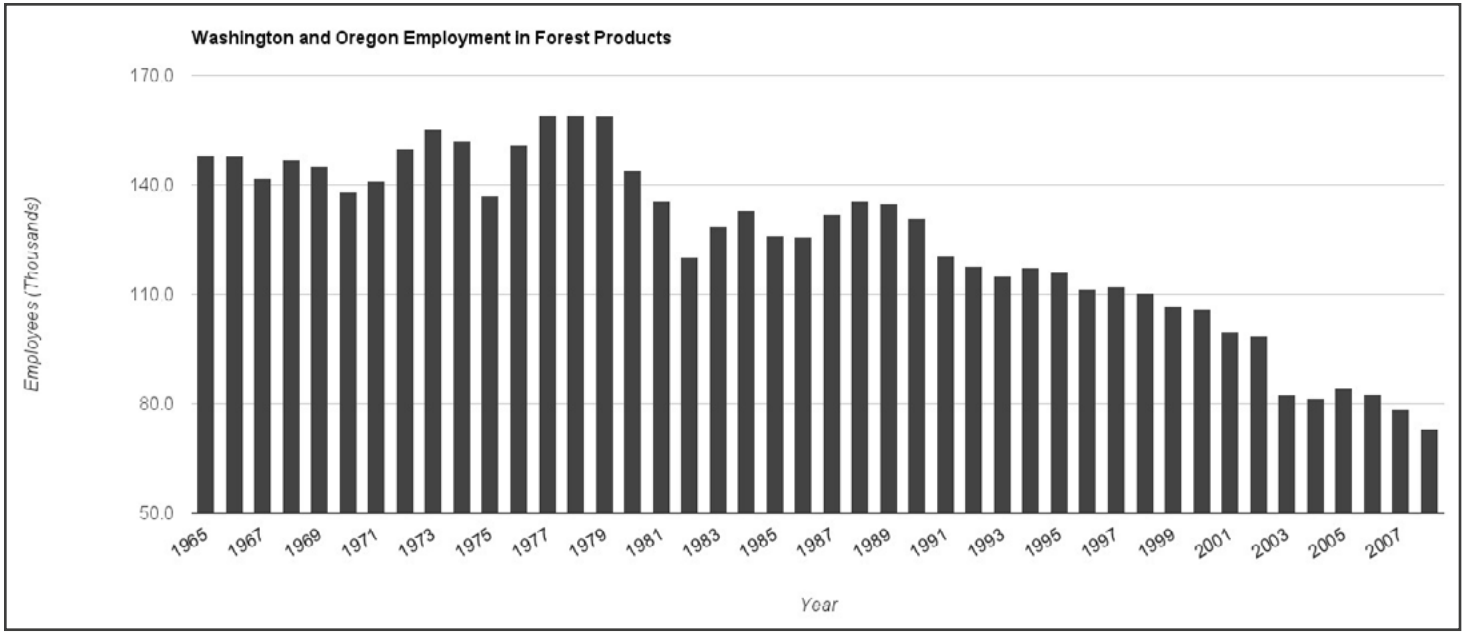


Figure 4.2.12. Washington and Oregon employment in forest products for 1965-2007

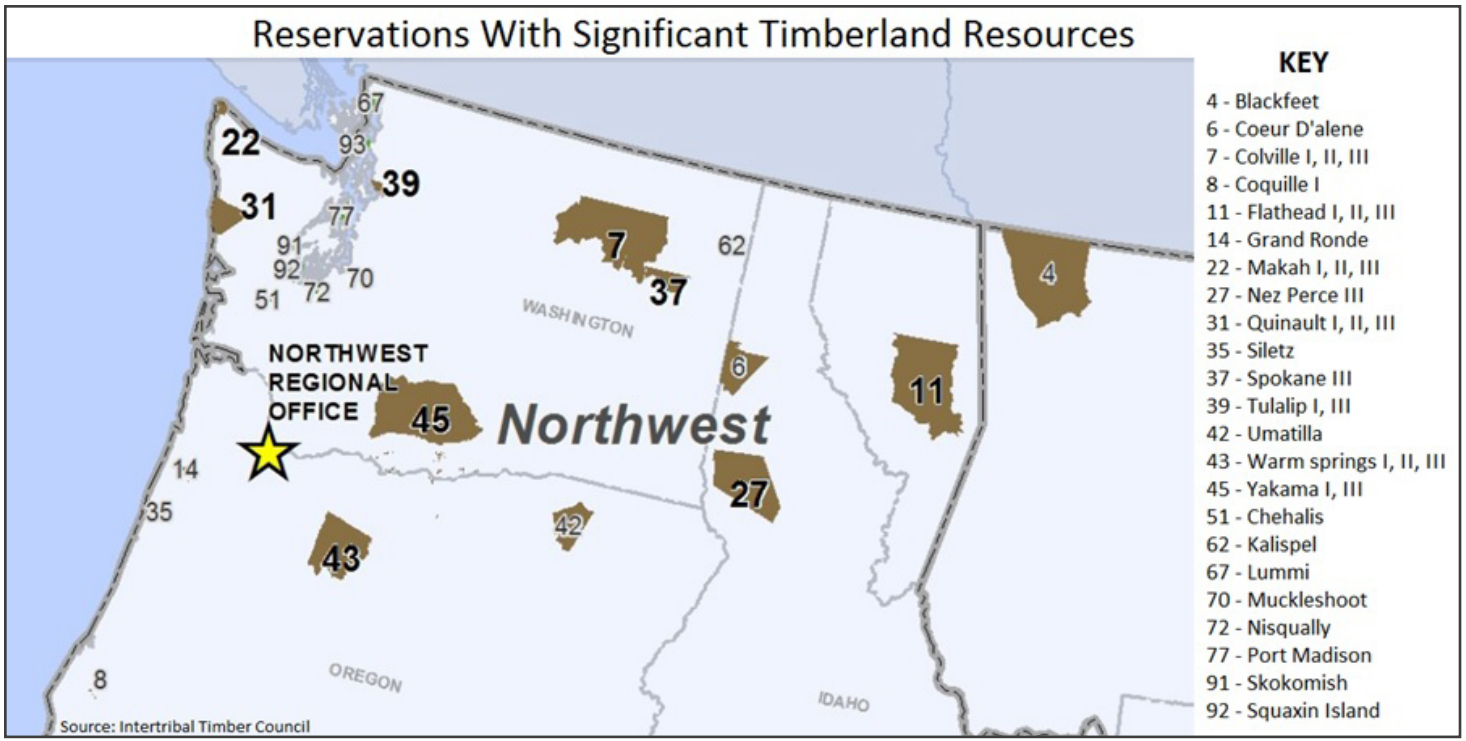


Figure 4.2.13. Reservations with significant timberland resources

identity as a producer of wood-based biofuels. The Northwest Advanced Renewables Alliance (NARA), created by a United States Department of Agriculture (USDA) grant, is a way to address this opportunity. The USDA recognizes an urgent need for domestically-produced fuels and related products, and sees the Pacific Northwest as being well-positioned to help meet this need, with established oil industry assets, a high need for aviation fuels, and abundant woody biomass.[114]

NARA is Coordinated Agricultural Project (CAP) in the Sustainable Bioenergy challenge area of the USDA National Institute of Food and Agriculture (NIFA), as part of the Agriculture and Food Research Initiative (AFRI) program. Working in Washington, Oregon, Idaho, and Montana, the overall goals of NARA are to (1) Develop a sustainable biojet fuel industry in the Pacific Northwest using woody feedstock, (2) Create valuable co-products from lignin - a byproduct of the process, (3) Sustain and enhance rural economic development, (4) Facilitate and promote supply chain coalitions, and (5) Improve bioenergy literacy to enhance the workforce and improve stakeholder understanding.[115] NARA provides the potential for the Pacific Northwest to retain its forest identity while putting people back to work, creating sustainable fuel, and making the nation more energy independent.

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