

A woman with dark hair tied back, wearing a dark t-shirt and light blue jeans, is operating a large industrial machine in a wood processing facility. The machine has a control panel with several gauges and buttons. The background shows a large industrial space with various equipment and materials.

An Assessment of the Downturn in the Forest Products Sector in the Northern Region of the United States

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ABSTRACT

The forest industry within the northern region of the U.S. has declined notably in employment, mill numbers, wood consumption, and forest harvests since 2000...a downturn exacerbated by the recession of 2007 to 2009. Longer term industrial decline (since 2000) has been evidenced by reductions in secondary products (e.g., furniture) and print paper manufacturing which can be attributed, respectively, to the lack of global competitiveness due to high U.S. wages and ascent of electronic media. In contrast, shorter term (since 2008), yet sharper declines occurred in industries such as composite panel production that serve the housing industry. Despite a decade of decline, there are future opportunities for this region's forest industry. The region's forests are predominantly within private ownership and represent tremendous volumes of some of the world's most valuable sawtimber (e.g., select hardwoods). Coupled with this natural resource is a present, but underutilized industry with excess capacity and a skilled work force. As evidenced by recent trends in positive trade balances, the decline of the northern region's forest industry may be mitigated with a focus on new markets (e.g., wood energy) and balancing increased export of unfinished products (e.g., logs) with increased use of the region's skilled secondary product workforce (e.g., increasing international competitiveness of U.S. production).

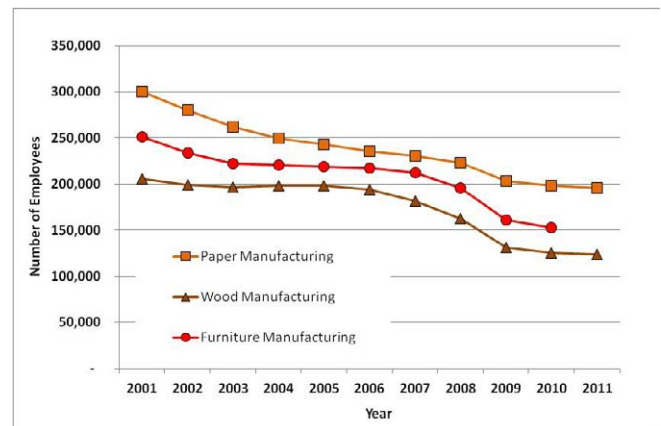
OVERVIEW

The northern region, which broadly includes New England, upper mid-Atlantic, Great Lakes, Central hardwood, and eastern Plains states, contains about contains about a quarter of the Nation's forests. Commensurate with this land base, the forests in this region support 27% of the Nation's timber volume and 46% of its hardwood resource (Smith et al. 2009). These hardwood dominated forests contain over two thirds (FIA 2012) of the nation's high-valued select hardwoods (e.g., select white oaks, select red oaks, hard maple, ash, and black walnut) and accounted for approximately 18% of the Nation's hardwood removals in 2006 (Smith et al., 2009). These hardwood removals supply a large share (48%; Smith et al. 2009) of U.S. hardwood lumber production, furniture production, and hardwood plywood/veneer, and support a chain of skilled primary manufacturers (e.g., sawmills and veneer mills) and secondary manufacturers (e.g., kitchen cabinet, millwork, and furniture manufacturers). Following the same trends as found across the U.S. (Woodall et al., 2011), the northern region had initial declines in numerous forest products industries in 2000 followed by a precipitous drop in the wake of the housing construction downturn (~2006) and recession of 2007 to 2009.

EMPLOYMENT TRENDS

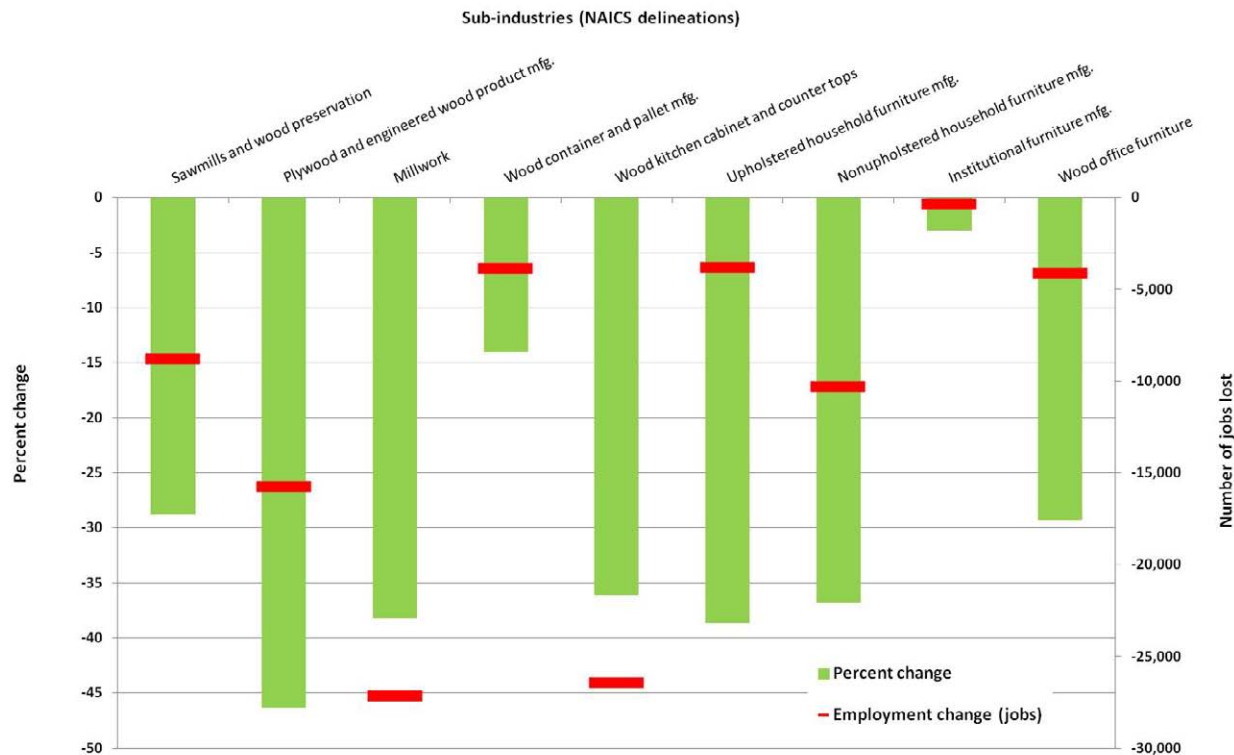
Employment trends in the northern region in wood-related industries have varied over time due to macro/micro economic drivers, production capacity, age of facilities, and availability of various forest resources (e.g., price of various forest resources). Since 2001, employment in the three major sectors of the wood-related industry: wood product manufacturing (including lumber and wood panels, North American Industrial Classification System; NAICS 321), paper manufacturing (including pulp, paper and paperboard mills and converted paper products; NAICS 322), and furniture and related product manufacturing (NAICS 337) has been in continuing decline (Fig. 1, BLS 2012). These declines were especially steep preceding and during the recession years of 2007 and 2009, with

Figure 1. Employment trends for traditional wood-related industries (Paper, NAICS 322; Wood, NAICS 321; Furniture, NAICS 327) in the northern region, 2001-2011



total employment declining by 28% or 194,000 jobs between 2005 and 2010. Three-quarters of these job losses occurred in the wood and furniture manufacturing sectors and can be, respectively, tied to the collapse in housing construction since 2005 and off-shoring of furniture manufacture over the past decade. The remaining jobs were lost from the paper manufacturing sector and can be tied to the general downturn of pulp and paper industry nationally (Ince et al. 2011) and the structural shift of advertising and communication technology to electronic media (Soirinsuo 2009). The increasing competitiveness of the northern pulp and paper sector (Ince et al. 2011) may also explain this sector's smaller proportional share of the regional total job losses since 2005. Although declining employment trends are cause for serious concern, and also reflect overall declines in industry output or economic activity, it is also true that some of the decline in employment is a result of the closure of less efficient operations and ongoing modernization and automation of production facilities. The percentage decline in number of pulp and composite panel mills in the northern region have exceeded the percentage decline in wood consumption at these mills. Thus, one potentially positive aspect of the declining employment trends in the northern region is that to some extent the surviving industry has become more efficient, more productive, and possibly more competitive in global markets.

Figure 2. Changes in employment (percent change and number of lost jobs) for manufacturing between 2005 and 2010 by sub-industry timber processors, inclusive of all northern region states



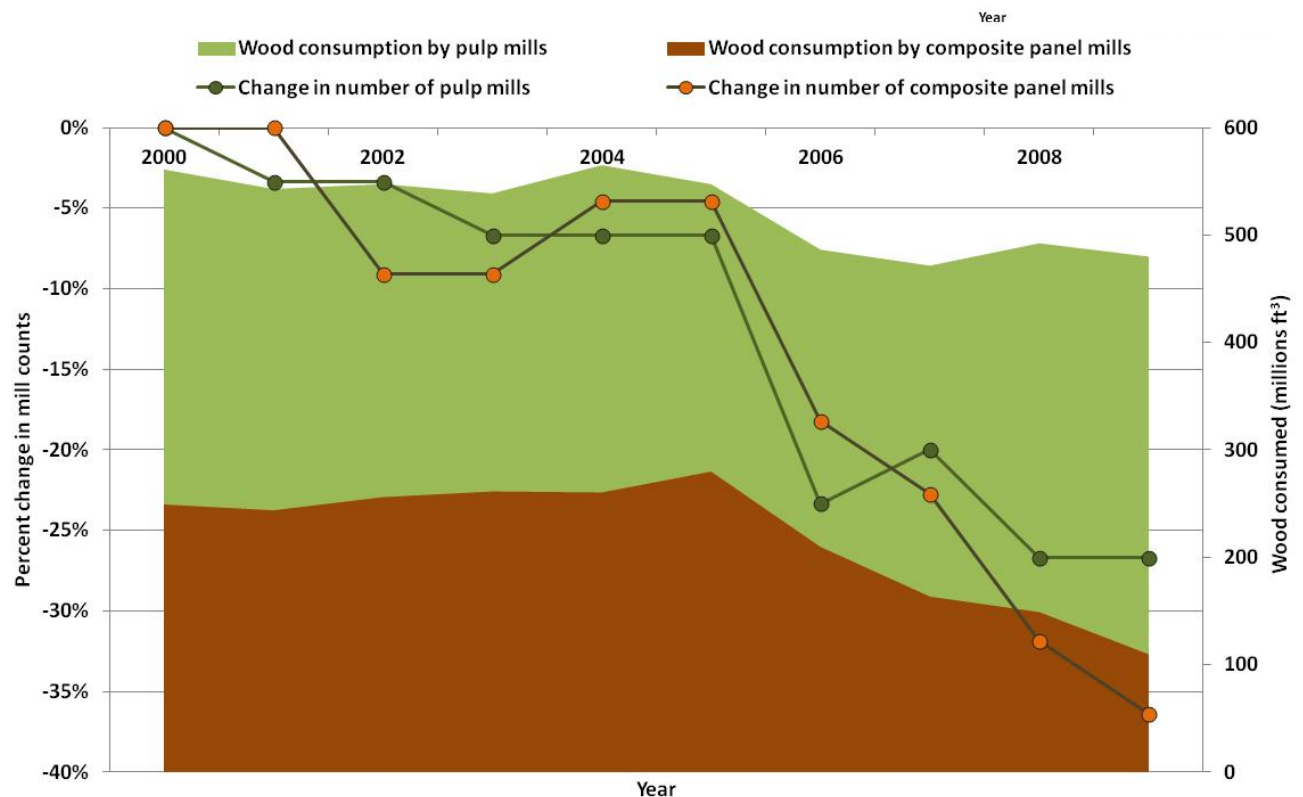
Changes in employment (percent change and number of lost jobs) for manufacturing between 2005 and 2010 by sub-industry timber processors, inclusive of all northern region states except as indicated: Sawmills and wood preservation (excludes NH, RI, CT, DE, ND), Plywood and engineered wood (all states), Millwork (excludes DE and SD), Wood containers and pallets (excludes NH, DE, SD), Wood kitchen cabinet and counter tops (NH, RI, DE), Upholstered household furniture (excludes ME, VT, NH, RI, DE, WV, NE, SD, ND), Non-upholstered wood furniture (excludes WV), Institutional furniture (ME, VT, NH, RI, DE, WV, NE, SD, ND), Wood office furniture (excludes ME, VT, NH, RI, WV, NE, SD, ND)

Within the broad wood manufacturing industries, trends (2005-2010) within selected sub-industry employment can further identify causes of the industrial decline (Fig. 2, USDL 2012a, 2012b). First, there are sub-industries directly related to housing construction that have experienced substantial reductions in employment. The plywood and engineered wood product manufacturers (softwood plywood, oriented strand board, trusses or structural members, and non structural products such as hardwood plywood, particle board, and fiber board; NAICS 3212) experienced nearly a 46% reduction in employment (over 15,000 lost jobs). The millwork sub-industry (moldings, doors, windows, hardwood flooring; NAICS 32191) lost over 38% of total employment (over 27,000 lost jobs). Even the sawmills and wood

preservation sub-industry (NAICS 3211) lost over 28% of total regional employment since 2005. In contrast, the wood container and pallet sub-industries (NAICS 32192) had a 14% reduction in employment (more than 3,800 lost jobs) over the same time period which may reflect the steady use of pallets in the general manufacturing and transportation industries. Overall, these suppliers of home construction wood products across the region experienced tremendous reductions in employment, which - in percentage terms - exceeded the reductions in total manufacturing employment (as indicated by percent change in employment in wood container and pallet manufacturing).

The second cause of wood industry decline is due to the broader economic recession and

Figure 3. Change (percent) in number of pulp and composite wood panel mills since 2000 and wood consumed by pulp and composite panel mills, 2000-2009, North Central states (IL, IN, IA, KS, MI, MN, MO, NE, ND, SD, WI)



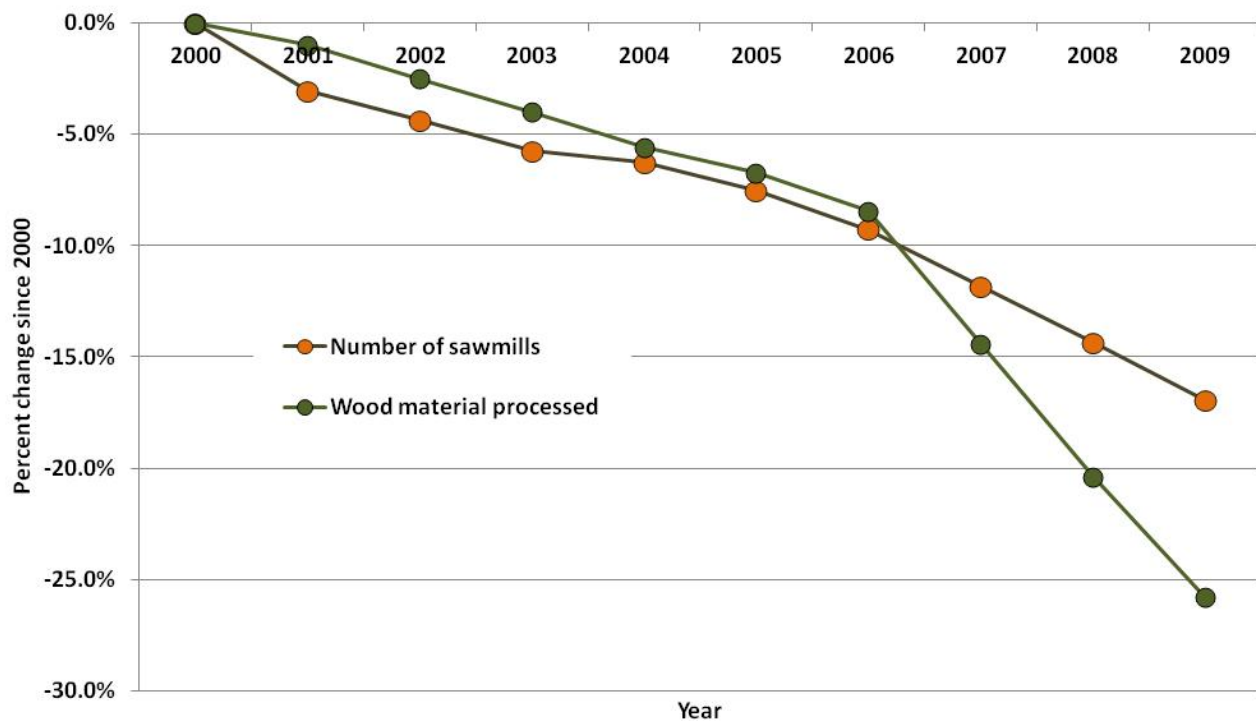
the offshoring of secondary wood processor employment. The wood kitchen cabinet and counter tops sub-industry (NAICS 33711) experienced tremendous employment declines both in terms of percentage (36%) and lost jobs (26,000). Three other sub-industries, upholstered household furniture (NAICS 33712), non-upholstered household furniture (NAICS 337122), and wood office furniture (NAICS 337211) had substantial declines in terms of employment percentages had a 25% decline in employment with a lower number of jobs lost. The non-upholstered wood household furniture sector is traditionally the dominate consumer of higher grade hardwood lumber and was the largest consumer of hardwood lumber in 1997 (Luppold and Bumgardner 2008), and this furniture sector's decline is another likely reason for the downturn in the sawmill sector. Certainly, the decline in wood kitchen cabinet and countertop manufacture is due to the housing crash; however, the decline in furniture manufacturing is likely due to

secondary processor employment offshoring as even sawmills didn't experience declines as great as in furniture manufacturing.

WOOD CONSUMPTION AND MILL COUNT TRENDS

Declines in production have resulted in mill closures and a decrease in wood consumption at sawmills, pulp mills and composite panel mills within the north central subregion (IL, IN, IA, KS, MI, MN, MO, NE, ND, SD, WI) which reflects recent trends in these industries both nationally and regionally (Treiman et al. 2008, Reading and Whipple 2007, Reading and Jacobsen 2008, Reading and Bruton 2007, Piva and Weatherspoon 2010, Piva et al. 2006, Piva and Gallion 2007, Piva and Adams 2008, Piva 2010, Haugen and Hartsel 2005, Haugen and Michel 2010; Figs. 3 and 4). The mills numbers and wood consumption have generally fallen since 2000 for both pulp and composite panel sectors, with steep declines starting in 2005 (Fig 3). By 2009 there were 25% fewer pulp mills processing

Figure 4. Change (percent) in number of sawmills and quantity of processed wood since 2000, 2000-2009, North Central states (IL, IN, IA, KS, MI, MN, MO, NE, ND, SD, WI)



13% less pulpwood. These disproportional declines in mill counts versus wood consumption suggest a shifting of productive capacity to more efficient mills despite the economic downturn. This regional increase in efficiency mirrors a national trend that has allowed the pulp and paper manufacturing to better compete with international markets. In contrast 36% fewer composite panel mills in 2009 processed 56% less wood than peak production in 2005, a direct consequence of the fall of the housing market. This suggests lower capacity utilization and lower efficiency of use for composite panel mills.

Trends in capacity utilization in the sawmill sector mirror those of the composite panel sector and are linked to the plight of the housing market (Fig. 4). From 2000 to 2006, sawmill counts and wood consumption demonstrated similar percentages of decline. After 2006, the amount of wood consumed decreased faster than the decline in mill counts. This trend resulted in 17% fewer sawmills processing 26% less wood by 2009...an indicator that the remaining sawmills are running at less than full capacity.

The decline of the wood products industry sits in contrast to the increase in the forest resource that surrounds it. Within the northern region, merchantable growing stock volume on timberlands (i.e., forests potentially accessible to harvest) continues to increase, while region wide average annual harvests have been declining since 2007, a decline that is likely more substantial than indicated because harvests are reported as a 5-year moving average (Fig. 5, FIA 2012). In the hardwood producing states of IN, OH, WV, and PA there is an ever accumulating merchantable growing stock volume on an ever decreasing number of trees, indicative of a maturing forest resource (USDA 2011) (Fig. 6, FIA 2012). With the majority of this region's timberland in private ownership and wood markets in decline, the threat that substantial quantities of high value hardwood timber either senescing or lost to mortality is a real concern. The lack of markets for wood to support forest treatments limits the ability of managers and communities to maintain forest health in the face of new threats (e.g., emerald ash borer, *Agrilus planipennis*) and a maturing

Figure 5. Total number (millions) of live trees (DBH ≥ 1.0 inch) (solid line) compared to the total merchantable growing stock volume (cubic feet) on timberland in the central hardwood growing region of Indiana, Ohio, West Virginia, and Pennsylvania, 2004-2010

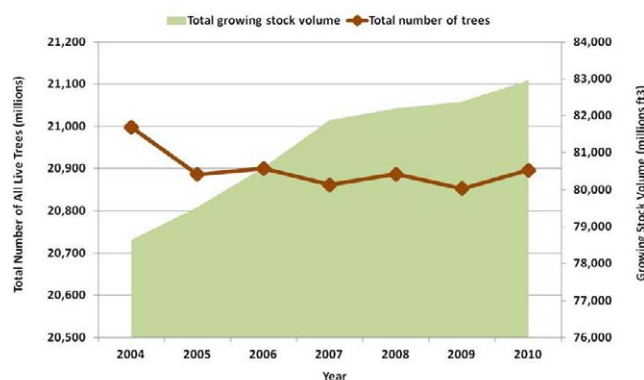
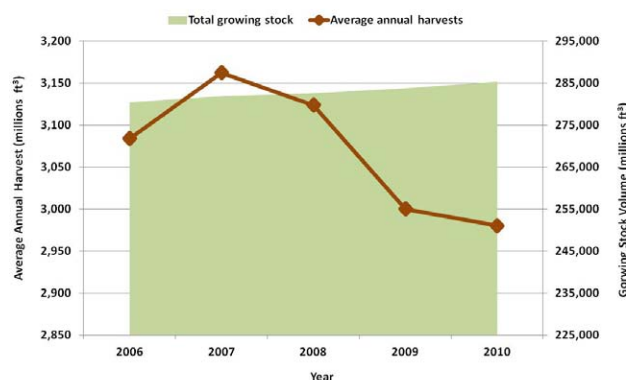


Figure 6. Average annual harvests (5-year moving average, thousands ft³) of merchantable growing stock volume (solid line) compared to the total merchantable growing stock volume (cubic feet) on timberland across all northern states, 2006-2010



forest resource. In summary, the high value forest resources of the northern region continue to mature and could provide more wood for an expanded wood products manufacturing industry. An opportunity exists to both improve the health and resiliency of these maturing forests while developing the local economies with improved competitiveness, capacity, and production of wood industries.

REGIONAL TRADE WITHIN GLOBAL CONTEXT

In recent years the U.S. ran up large trade surpluses in pulp, paper and board products with countries like Mexico, China, and Japan, while still having trade deficits with Canada, Brazil,

Scandinavia and Indonesia. Canada remains the largest source of U.S. pulp, paper and paperboard imports, but the value of imports from Canada have declined by over 40% since 2000, while overall U.S. net exports have increased globally. Northern region states contributed substantially to U.S. exports of pulp, paper and paperboard mill products, accounting for roughly 23% of total U.S. exports to the world in 2010 (ITA 2012) (Fig. 7a), a key reason why employment losses were proportionally smaller in this sector versus solidwood sectors. Leading paper industry export states for the region in 2010 included New York (\$790 million), Maine (\$685 million) and Wisconsin (\$397 million).

In 2010, the northern region contributed roughly

Figure 7. Value of 2010 exports to the world by state for (A) pulp, paper and paperboard mill products (NAICS 3221) and (B) for sawmills and wood products industry (NAICS 3211), northern region states outlined in black.

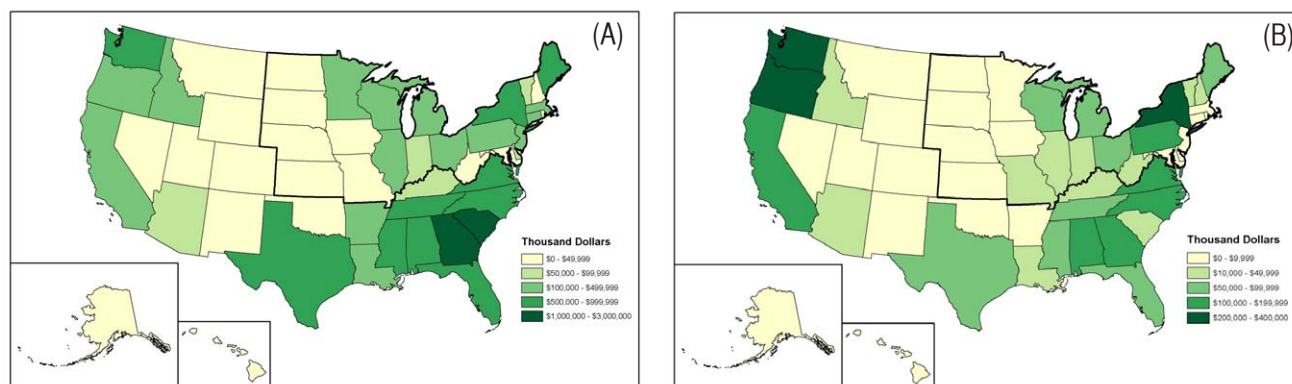
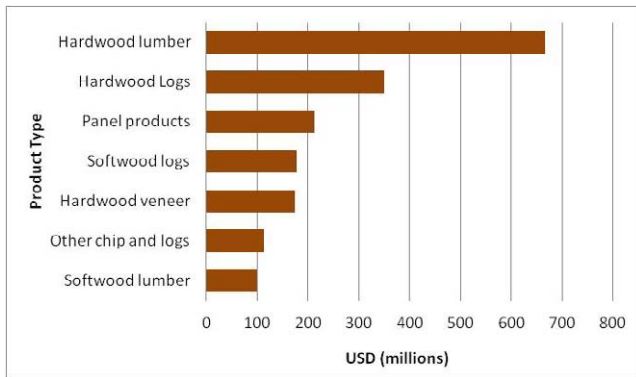


Figure 8. Total exports (USD) of northern region (US) wood products in 2010 by major product categories (Panel products include fiber board, particle board, softwood plywood, hardwood plywood, waferboard, oriented strand board, tropical veneer, softwood veneer, and other miscellaneous panel products; Other chips and logs includes hardwood chips, softwood chips, crossties, fuel wood, treated posts and wood wool/flour)



34% to total U.S. sawmill and wood products exports (Fig. 7b). Leading sawmill and wood products export states for the region in 2010 included New York (\$224 million), Pennsylvania (\$170 million) and Ohio (\$70 million). In totality, the northern region exported over \$1.6 billion of primary wood products and logs in 2010 with hardwood lumber being the most important product exported with \$677 million (37.6% of all primary forest product exports) of product exported in 2010 or equal to nearly half of all U.S. hardwood lumber exported (Fig. 8). Canada, China/Hong Kong, Italy, and Vietnam were the most important markets with a 34.1, 19.4, 6.1, and 5.5% market share, respectively. Hardwood logs are the second most important solid wood product export from the northern region with \$351 million of product exported in 2010 which accounted for nearly half of all hardwood logs exported from the U.S. The most important markets for hardwood logs were China/Hong Kong and Canada with 33.5 and 22.9% of total hardwood log exports, respectively. Softwood logs are a relatively minor export product in the northern region with Maine accounting for 50% of the northern region's \$178 million exported in 2010 (9.8% of U.S. total). Finally, although hardwood veneer products from the northern region account for 73.1% of the U.S.

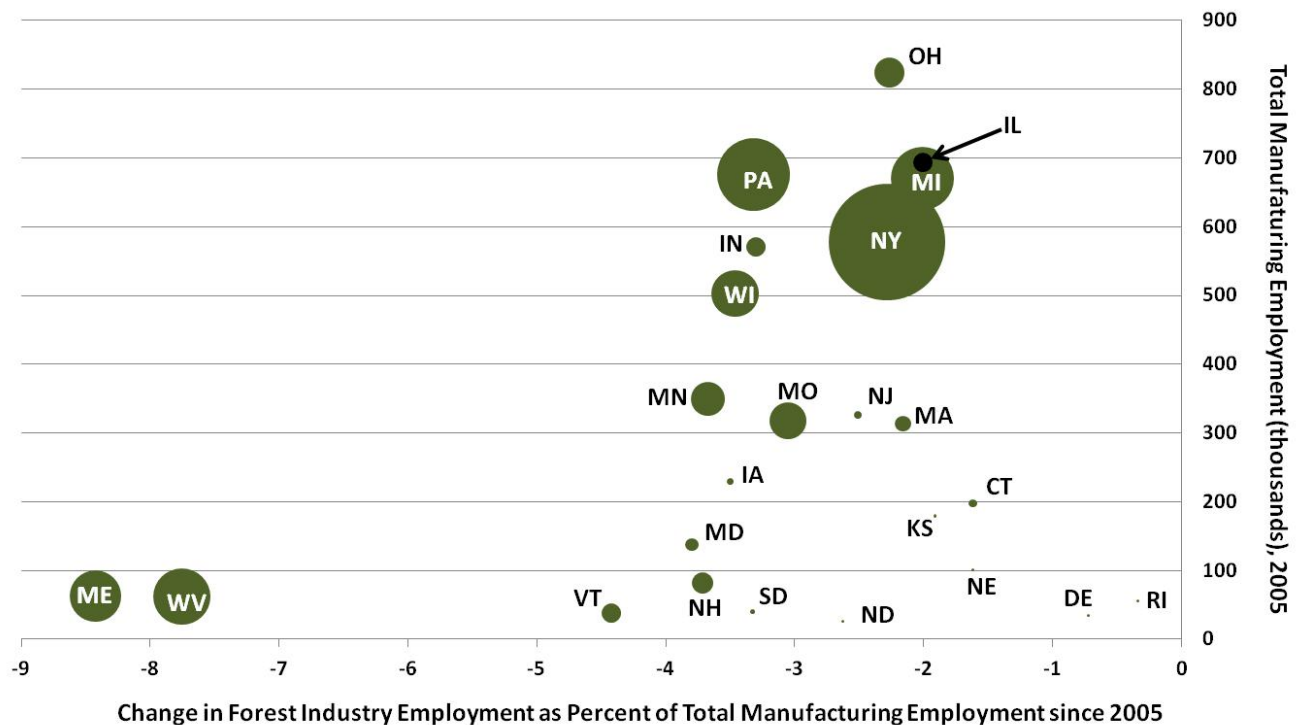
production they only accounted for \$175 million of the northern region's shipped products. Major hardwood veneer export states include Indiana, Pennsylvania, and Michigan with 35.6, 21.8, and 20.5% of the market share, respectively. In general, although the economic recession and downturn in housing construction have severely impacted domestic demand for forest products, U.S. producers have improved trade balances in recent years, indicating that export markets can help offset recent declines in domestic demands.

FUTURE PROSPECTS FOR GROWTH

The individual states of the northern region represent a range of relationships between the availability and attributes of forest resources, production capacity, the recessionary pressure on employment over the past decade and total state manufacturing employment (Fig. 9). For states such as Maine and West Virginia, where timberland resources are abundant and forest industries comprise a substantial portion of manufacturing employment statewide, there have been substantial declines in employment. States like Pennsylvania, Michigan, and New York also have large timberland resources, but since forest industry is a relatively minor component of the state's manufacturing base only moderate declines in manufacturing employment occurred there. Finally, states with relatively minor forest resources and associated forest industries (Nebraska, Delaware, and Rhode Island) were not disproportionately impacted. The prospects of future growth are inherently related to quantity of forest resources available to industry, the manufacturing capacity, and markets and policies that foster industrial competitiveness for these states.

Even though we have current historically low home mortgage rates, housing construction has remained low and it is unlikely that the housing construction boom of the 2000's will be repeated in the near future. Forest product industries that profited may not reach that level of production and employment again in the near-term. Instead, perhaps a sustainable and longer term level of production of basic building materials can be maintained. A focus on future

Figure 9. The change in forest industry employment (NAICS 113, 321, 322, 337) from 2005 to 2010 compared to each state's total manufacturing employment in 2005 with each state's circle scaled to its total timberland growing stock volume in 2010, northern region



economic trends and opportunities may highlight potential areas of growth for the forest product industries. Given the ever expanding presence of electronic media, one may assume that the paper industry will continue to have future challenges. Coupled with this negative aspect is the positive opportunity to expand the production of paperboard (e.g., shipping of online orders) and expanded international trade. Sometimes seen as a competitor for the same resources as the pulpwood industry, the wood pellet and biofuel industry presents an opportunity to partly offset declines in markets for low quality roundwood (i.e., pulp and paper industry wood consumption declines). Despite the decline in traditional wood product industries between 2005 and 2010, wood energy use has been increasing in the northern region, although the forest products industry itself still accounts for most of the wood consumed commercially for energy. This growth has been influenced by the escalating fuel oil and electricity prices since 2005 (Luppold et al. 2011). Although highly dependent on fossil fuel market conditions

and energy policies (e.g. State Renewable Portfolio Standards for renewable energy), wood energy currently accounts for an extremely low proportion of total U.S. energy production with notable opportunities for expansion.

Finally, the landowners of the northern region have been diligently managing their forests for generations as evidenced by the ever increasing volumes for decades (USDA 2011). The region's forests are to the high quality hardwood industry as what Saudi Arabia is to the oil industry...a colloquialism that is ever more relevant in today's economic climate. The continued development of competitive secondary industries in the U.S. can increase regional employment and contribute to a positive balance in international trade. Sawlogs provide a positive trade balance today but also represent the offshoring and loss of skilled U.S. labor into the future. In total, abundant forest resources and a skilled workforce in the secondary wood product industry in combination with efforts to foster competitiveness could help

the region recover production and employment lost during the housing downturn and longer term loss of secondary production to other countries.

LITERATURE CITED

Bureau of Labor Statistics (BLS). 2012. U.S. Department of Labor, Bureau of Labor Statistics. www.bls.gov/data. Last accessed February 20, 2012.

FIA. 2012. U.S. Department of Agriculture, Forest Service, Forest Inventory and Analysis Program. <http://www.fia.fs.fed.us/tools-data>. Last accessed February 20, 2012.

Haugen, D.E., Michel, D.D. 2010. Iowa timber industry—an assessment of timber product output and use, 2005. Resource Bulletin NRS-38. USDA Forest Service, Northern Research Station, Newtown Square, PA.

Haugen, D.E., Hartsel, R.A. 2005. North Dakota timber industry—an assessment of timber product output and use, 2003. Resource Bulletin NC-252. USDA, Forest Service, North Central Research Station, St. Paul, MN. 18 pp.

Ince, P., Akim, E., Lombard, B., Parik, T., Tolmatsova, A. 2011. Paper, paperboard and wood pulp markets, 2010-2011. Chapter 8. In: Forest Products Annual Market Review, 2010-2011, United Nations Geneva, 2011. Geneva timber and forest study paper 27, pp. 71-84. http://www.fpl.fs.fed.us/documnts/pdf2011/fpl_2011_ince003.pdf. Last accessed May 13, 2012.

ITA. 2012. International Trade Administration, U.S. Department of Commerce. Trade States Express. <http://tse.export.gov/TSE/TSEhome.aspx>. Last accessed May 13, 2012.

Luppold, W., Bumgardner, M. 2008. 40 years of hardwood lumber consumption 1963 to 2002. *Forest Prod. J.* 58: 7-12.

Luppold, W., Mace, T., Weatherspoon, A., Jacobson, K. 2011. Changes in the Fuel Pellet Industry in the Lake States Region 2005 to 2008. *North. J. Appl.* 28: 204-207.

Piva, R.J. 2010. Pulpwood production in the Northern Region, 2006. Bulletin NRS-39. USDA Forest Service, Northern Research Station, Newtown Square, PA. 104 pp.

Piva, R.J., Adams, D.M. 2008. Nebraska Timber Industry—An Assessment of Timber Product Output and Use, 2006. Resource Bulletin. NRS-28. USDA, Forest Service, Northern Research Station. Newtown Square, PA. 54 pp.

Piva, R.J., Gallion, J. 2007. Indiana timber industry—an assessment of timber product output and use, 2005. Resource Bull. NRS-22. U.S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA. 106 pp.

Piva, R.J., Josten, G.J., Mayko, R.D. 2006. South Dakota timber industry—an assessment of timber product output and use, 2004. Bulletin NRS-22. USDA, Forest Service, North Central Research Station, St. Paul, MN. 36 pp.

Piva, R.J., Weatherspoon, A.K. 2010. Michigan timber industry: an assessment of timber product output and use, 2006. Resource Bulletin NRS-42. USDA Forest Service, Northern Research Station, Newtown Square, PA, 66 pp.

Reading, W.H., IV, Bruton, D.L. 2007. Kansas timber industry—an assessment of timber product output and use, 2003. Bulletin NRS-25. USDA, Forest Service, North Central Research Station. St. Paul, MN. 72 pp.

Reading, W.H., IV, Jacobson, K. 2008. Minnesota timber industry — an assessment of timber product output and use, 2004. Bulletin NRS-25. USDA, Forest Service, Northern Research Station. Newtown Square, PA, 74 pp.

Reading, W. H., IV, Whipple, J.W. 2007. Wisconsin Timber Industry: An Assessment of Timber Product Output and Use in 2003. Bulletin NRS-19. USDA, Forest Service, Northern Research Station. . Newtown Square, PA, 93 pp.

Smith, W.B., tech. coord.; Miles, P.D., data coord.; Perry, C.H., map coord.; Pugh, S.A., Data CD coord. 2009. Forest resources of the United States, 2007. General Technical Report WO-78. USDA Forest Service, Washington, DC. 336 pp.

Soirinsuo, J. 2009. The Long-Term Consumption of Magazine Paper in the United States: Why consumption is declining and how should it be projected? Lambert Academic Press: Köln, Germany. ISBN: 978-3-8383-2053-3. 91 pp.

Treiman, T.B.; Tuttle, J.G.; Piva, R.J. 2008. Missouri Timber Industry — An Assessment of Timber Product Output and Use, 2006. Jefferson City, MO: Missouri Department of conservation. <http://mdc4.mdc.mo.gov/Documents/18636.pdf> . Last accessed February 21, 2012.

U.S. Department of Agriculture. 2011. National report on sustainable forests, 2010. WO-FS-979. USDA Forest Service, Washington, DC.

U.S. Department of Labor (USDOL). 2012a. Employment, hours, and from the current employment statistics survey (state). USDOL, Washington, DC. <http://data.bls.gov/pdq/querytool.jsp?survey=en>. Last accessed January 19, 2012

U.S. Department of Labor (USDOL). 2012b. Employment, hours, and from the current employment statistics survey (national). USDOL, Washington, DC. <http://data.bls.gov/pdq/querytool.jsp?survey=ce>. Last accessed Jan. 19, 2012.

Woodall, C.W., Ince, P.J., Skog, K.E., Aguilar, F.X., Keegan, C.E., Sorenson, B., Hodges, D.G., Smith, W.B. 2011. An overview of the forest products sector downturn in the United States. *Forest Prod. J.* 61(8): 595-603.