Maryland Forestry Economic Adjustment Strategy

Photo: Elizabeth Hill

ACDS, LLC

October 2021

Executive Summary

Maryland supports one of the most diverse and prolific forest ecosystems in the United States. It stretches from the pine stands on the Eastern Shore, renowned for quality and density, to the Appalachian hardwoods of Western Maryland, which are recognized worldwide as premier inputs for fine furniture cabinetry. When combined with the interests of our committed forest products entrepreneurs, these assets provide innovative products to the market, create well-paying urban and rural jobs, and are vital to the environmental health of the Chesapeake Bay.

The industry, however, is undergoing restructuring and contraction. This decline hits Maryland's rural communities hard, where job loss and economic transition can be painful and difficult from which to recover. In response, Western Maryland Resource Conservation and Development Council (WMRC&D) worked with the Maryland Department of Natural Resources (DNR), The Maryland Department of Commerce (DOC) and the U.S. Department of Commerce Economic Development Administration (EDA) to develop this Economic Adjustment Strategy (EAS) to help foster a resilient and sustainable transition by rebuilding and modernizing the forest products industry in the state. This effort engages both the private and public sectors in a unified campaign to assure a robust future for the industry for many years to come.

Vision Statement

The Economic Adjustment Strategy envisions a future in which the economic activities associated with Maryland's forest products industry supports vibrant communities and strong industry growth while also contributing to a healthy Chesapeake Bay.

Mission Statement

Take advantage of unique assets, resource diversity, and environmentally engaged consumers to build sustainable markets for Maryland's forest product entrepreneurs.

The EAS accomplishes this by focusing development efforts on a set of overarching goals that tie together the industry's common interests, community, and public policy. These goals are summarized below.

	***Support the existing entrepreneurs*** who anchor the industry and keep liquidity in local markets.
	***Raise awareness of the wood products industry*** by building more supportive relationships within and outside of the industry and by focusing on the renewable nature of the resource.
	***Encourage innovation in emerging sectors*** through entrepreneurial support and a renewed focus on technology commercialization.
	***Enhance local and international market opportunities*** by building a brand linked to the industry's stewardship of natural resources and local economies.

Carrying out the mission and vision of the EAS is supported through the nine initiatives and 53 action strategies found in the full document. At stake is the future of an industry that already contributes $3.86 billion to the state economy while also providing the necessary economic incentives to keep more than 2.15 million acres in forest cover.

Initiatives				
A. Increase knowledge of the public and policymakers about the forest products industry.	✓	✓		✓
B. Foster a more supportive state and local policy environment.	✓	✓	✓	✓
C. Improve supply-chain coordination.	✓	✓	✓	✓
D. Expand the use of renewable biomass energy.	✓	✓		✓
E. Enhance Maryland forest product industry's export competitiveness.	✓	✓	✓	✓
F. Support entrepreneurial success in wood products.	✓		✓	
G. Improve the adoption of innovative practices, new technology, and emerging product segments.	✓	✓	✓	
H. Expand domestic marketing opportunities.	✓	✓	✓	✓
I. Create a workforce for the future.	✓		✓	

Introduction

Maryland supports one of the most diverse and prolific forest ecosystems in the United States. It stretches from the pine stands on the Eastern Shore, renowned for quality and density, to the Appalachian hardwoods of Western Maryland, recognized around the world as premier inputs for fine furniture and cabinetry. However, the industry is shrinking. This decline hits Maryland's rural communities hard, where job loss and economic transition can be painful and difficult from which to recover.

In response to these difficulties, the Western Maryland Resource Conservation and Development Council (WMRC&D) worked with the Maryland Department of Natural Resources (DNR), the Maryland Department of Commerce (DOC), and other partners to develop a statewide proposal, undertaken with funding from the U.S. Department of Commerce Economic Development Administration. WMRC&D then contracted with ACDS, LLC to develop an Economic Adjustment Strategy for the industry. It focused on an analysis of the value chain and developing recommendations for rebuilding and modernizing the forest products industry in the state. The EAS is a roadmap for leveraging Maryland's leadership in a sector that already contributes $3.86 billion to the state economy. It focuses on both short-term project support and long-term infrastructure and research and development efforts to guarantee a robust future for the industry for many years to come.

The EDA investment supports the WMRC&D to produce an informed EAS and associated action plan for realigning Maryland's forest products sector with available and potential assets that best engage future opportunities. The EAS is aimed at countering the economic impact of numerous mill closures across the state of Maryland and developing strategies that will lead to job creation and new businesses, both in Maryland's designated Opportunity Zones and throughout the state. The following report is the culmination of an exhaustive investigation and analysis of the forest products industry.

Section I is an overview of the full report. It reviews the industry statewide, its importance, and current issues impacting forest products businesses in the state. What follows is a summary of the overarching goals of the report, foundational strategies that are required to begin the process, and then concrete initiatives and actions. The rest of the report goes into depth about the industry, identifying issues impacting businesses in the state, strategies, actions, and implementation. Section II details the timber resource statewide and in the state's four regions: Western, Central, and Southern Maryland, and the Eastern Shore. It covers details about timber species, numbers, tree size and land ownership, markets, and issues unique to each region. Section III distills the project team's findings into a listing of strengths, weaknesses, and mixed issues. Section IV describes the goals, strategies, initiatives, and actions in detail, and Section V lays the groundwork for implementation.

Section I: Maryland Forest Products Industry Strategy Summary

The closure of the Verso Luke Paper Mill in Western Maryland meant the end of the state's participation in the large, commodity-based forest products industry. This industry segment typically includes firms producing lumber, other solid wood products, pulp, paper, or other fiber-based commodities. Such companies are often the economic driver of rural communities, employing hundreds of people at a single location and generating thousands of ancillary jobs. This was the case for the Luke Mill, which had been in continuous operation for over 150 years. It supported generations of employees and their families, filled the role of a major economic provider, and was a source of social and cultural strength.

Now that the Luke Mill is closed, the state is left to grapple with significant employment and social issues, particularly in Western Maryland. It has also triggered a critical look at the rest of Maryland's forest products industry, which has also seen several smaller, family-owned sawmills cease operations over the past few years.

Inevitably, such an effort raises major questions regarding what the state might do via policy changes to prevent future closures and attract new businesses to fill the existing void. It also draws attention to the economic and environmental impact of the forest products industry in Maryland's rural areas.

Developing a strategy for the industry's future must begin with a thorough understanding of the economic, political, social, environmental, and cultural forces that shaped it. Given the great diversity within the state's industry, attempting to apply a single strategy statewide is ineffective. Thus, this report will examine each timbershed from which common themes will arise that can better inform a statewide discussion.

Finally, there is a threshold question to be addressed. Is it better to nurture, support, and help grow the existing industry while recognizing that growth in economic activity will be slow and relatively small? Or should the state attempt to attract major, new forest-based companies on a scale that will quickly fill the economic void of the Luke Mill closure? Perhaps both are possible, but care must be taken to avoid creating competition with the existing businesses to the extent that their survivability is threatened.

About the Industry

With the closure of the last "big" forest products operation in Maryland, it is important to characterize the state's remaining industry. What is left is a collection of smaller, family-owned sawmills and other manufacturers of specialty wood products. Each occupies a specific niche, ranging from fine lumber used in unique handmade furniture to wood shavings for animal bedding to construction timbers. A cadre of loggers supplies the mills' wood needs. By-products, including wood chips, shavings, or sawdust, typically find their way to secondary mulch, pellet, or paper applications.

The Supply Chain

The forest products industry supply chain can be categorized into three broad categories or sectors:

- Forestry and Logging: Forest landowners, timber management firms, loggers, and foresters.
- Primary Manufacturing: Sawmills or pulp, paper, and paperboard mills.
- Secondary Manufacturing: Wood and paper product manufacturers.

The **Forestry and Logging** sector manages, harvests, and sells timber and logs to **Primary Manufacturing**. Most of Maryland's primary manufacturers are either sawmills or pulp, paper, and paperboard mills. Many companies in the state's forest products industry make a variety of goods, including sawn logs, veneer, engineered wood products, reconstituted wood products, and chips. Pulp and paper mills create paper and cardboard products (which was the function of the Luke Paper Mill) and pulp for secondary manufacturing.

The bulk of such products are sold to **Secondary Manufacturing**, in which companies make wooden furniture, containers, pallets, windows, flooring, millwork, prefabricated building components, and other wood products. Other secondary manufacturers convert paper and paperboard products from mills into packaging material, coated paper, specialty paper, stationery, and sanitary paper products. These firms also convert pulp into pulp products such as egg cartons and food trays.

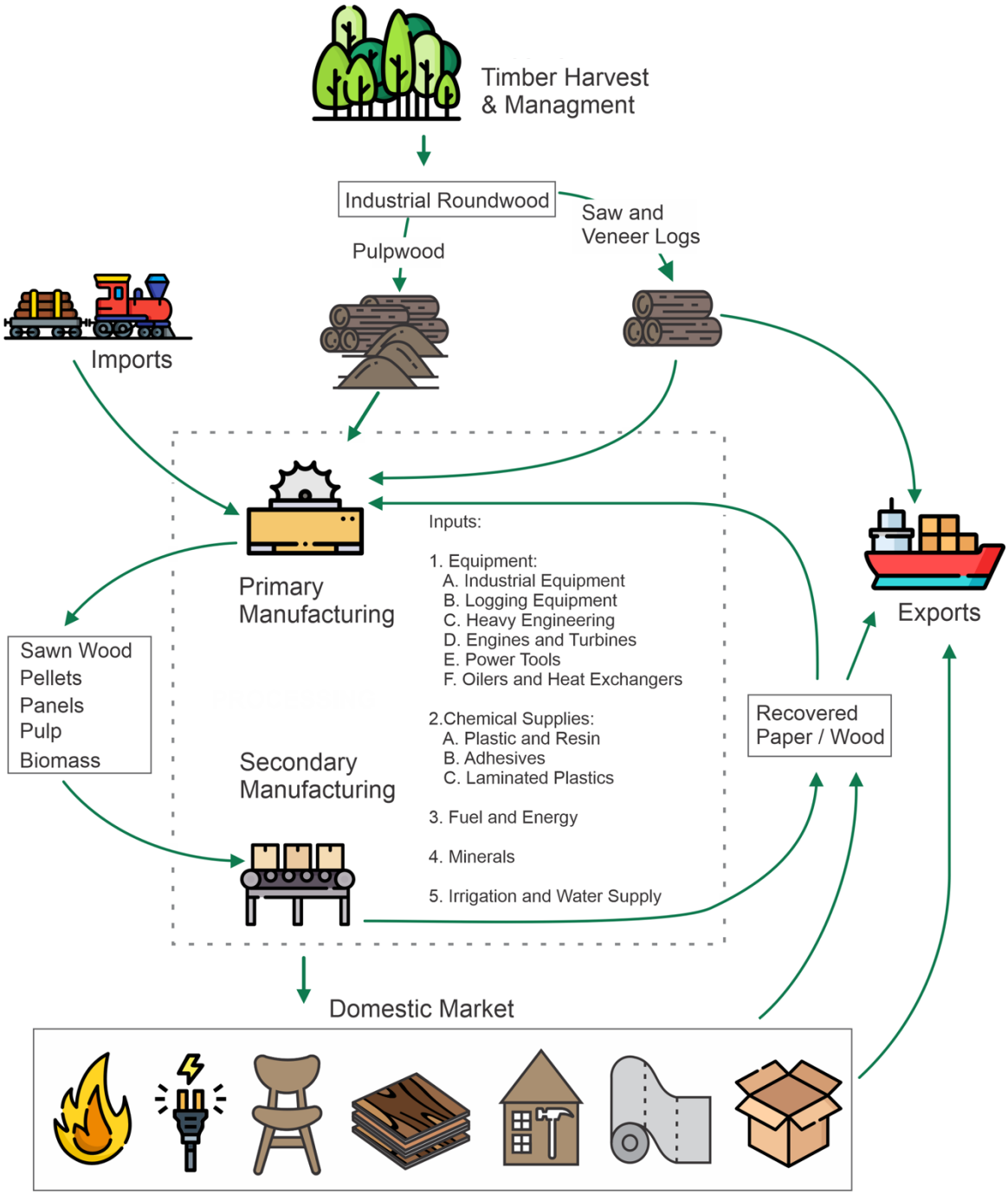
Table 1. Forest and Wood Products Sector in Maryland

Industry	Firms	Employees	Revenues
Logging	71	275	$27,202,500
Timber Tract Operations	17	39	$1,590,800
Sawmills and wood preservation	40	778	$84,379,699
Veneer, plywood, and engineered wood manufacturing	23	633	$75,240,199
Other wood product manufacturing	459	2,967	$1,314,441,340
Pulp, paper, and paperboard mills	48	2,155	$243,665,999
Converted paper product manufacturing	65	1,783	$425,953,796
Wood furniture manufacturing	341	1,695	$203,952,999

SOURCE: D&B HOOVERS, 2020

It is important to note the significance of the *"Other wood product manufacturing"* segment. These firms are part of the secondary manufacturing sector of the industry and drive a significant amount of economic output. While these firms rely primarily on non-Maryland timber, they create jobs and spur innovation. Moreover, the right set of policies and initiatives can encourage these firms to use more Maryland wood. Some firms have already indicated that there is interest from buyers in identifying local sourcing in wood products.

Log Flows in Maryland



Forest Products Industry NAICS Codes in Maryland

Sector	NAICS	Description
Forestry and Logging	113110	Timber tract operations
	113210	Forest nurseries and gathering of forest products
	113310	Logging
Primary Manufacturing	321113	Sawmills
	321114	Wood preservation
	321211	Hardwood veneer and plywood manufacturing
	321212	Softwood veneer and plywood manufacturing
	321213	Engineered wood member (except truss) manufacturing
	321214	Truss manufacturing
	321219	Reconstituted wood product manufacturing
	322110	Pulp mills
	322121	Paper (except newsprint) mills
	322122	Newsprint mills
	322130	Paperboard mills
Secondary Manufacturing	321911	Wood window and door manufacturing
	321912	Cut stock, resawing lumber, and planing
	321918	Other millwork (including flooring)
	321920	Wood container and pallet manufacturing
	321991	Manufactured home (mobile home) manufacturing
	321992	Prefabricated wood building manufacturing
	321999	All other miscellaneous wood product manufacturing
	3222	Converted paper product manufacturing
	337110	Wood kitchen cabinet and countertop manufacturing
	337121	Upholstered household furniture manufacturing
	337122	Non-upholstered wood household furniture manufacturing
	337127	Institutional furniture manufacturing
	337129	Wood television, radio, and sewing machine cabinet manufacturing
	337211	Wood office furniture manufacturing
	337212	Custom architectural woodwork and millwork manufacturing
	337215	Showcase, partition, shelving, and locker manufacturing

Vision Statement

The Economic Adjustment Strategy (EAS) envisions a future in which the economic activities associated with Maryland's forest products industry supports vibrant communities and strong industry growth while also contributing to a healthy Chesapeake Bay.

Mission

Take advantage of unique assets, resource diversity, and environmentally engaged consumers to build sustainable markets for Maryland's forest product entrepreneurs. The EAS accomplishes this by focusing development efforts on a set of Overarching Goals that tie together the industry's common interests, community, and public policy. These are summarized in the table below.

	***Support the existing entrepreneurs*** who anchor the industry and keep liquidity in local markets.
	***Raise awareness of the wood products industry*** by building more supportive relationships within and outside of the industry and by focusing on the renewable nature of the resource.
	***Encourage innovation in emerging sectors*** through entrepreneurial support and a renewed focus on technology commercialization.
	***Enhance local and international market opportunities*** by building a brand linked to the industry's stewardship of natural resources and local economies.

Initiatives

Achieving the overarching goals involves various initiatives. These initiatives are based on critical factors that provide the basis for the report's recommendations. These factors are as follows:

1. Maryland's forest products industry is a component of a larger and more comprehensive regional industry that does not function within political boundaries.
2. The region supporting Maryland's forest product operators consists of Maryland, Delaware, Virginia, West Virginia, and Pennsylvania.
3. The region, as defined above, has no state or regionally authorized or endorsed entity to carry out industry development efforts for the benefit of the entire supply chain.
4. The primary and secondary manufacturing sectors within the state are disaggregated, tend to be highly independent, and are not prone to cooperative development efforts.
5. Forestry, as an economic activity and an ecological practice, is poorly understood and often confused with forest conservation activities that are intended to regulate development activities. This has led to a common perception that tree harvesting is inherently bad for the environment rather than part of a sustainable supply chain that allows forests of diverse ages to persist on the landscape, making it difficult to advance policy in support of the industry.
6. The state's forest inventory is growing rapidly, with biomass buildup occurring across the state, meaning that there is ample standing inventory to support industrial growth.

7. The state is divided into four distinct timbershed regions. Each has a unique set of characteristics that cause them to function independently of one another.
8. Communication between and among sectors of the forest product supply chain is weak. As a result, business opportunities are lost, particularly between the primary and secondary manufacturing sectors and different timbersheds.

Below is a summary of the initiatives and the overarching goals they affect. Each initiative also has a set of actions to achieve the desired outcomes. Read **Section V** for further details.

Initiatives				
A. Increase knowledge of the public and policymakers about the forest products industry.	✓	✓		✓
B. Foster a more supportive state and local policy environment.	✓	✓	✓	✓
C. Improve supply-chain coordination.	✓	✓	✓	✓
D. Expand the use of renewable biomass energy.	✓	✓		✓
E. Enhance Maryland forest product industry's export competitiveness.	✓	✓	✓	✓
F. Support entrepreneurial success in wood products.	✓		✓	
G. Improve the adoption of innovative practices, new technology, and emerging product segments.	✓	✓	✓	
H. Expand domestic marketing opportunities.	✓	✓	✓	✓
I. Create a workforce for the future.	✓		✓	

Section II: Statewide

Importance of the Industry

The forest products industry in Maryland benefits the state on several levels. It contributes to the economy directly through employment in harvesting and manufacturing and indirectly through its trade with other industries and sectors. It is also crucial to the health of the agriculture sector and the Chesapeake Bay. Additionally, the industry plays a role in mitigating climate change and creating social enterprises. Understanding the industry's impact on the state is one of the keys to developing the appropriate strategies to encourage its growth.

Economic Contribution

The Maryland forest products industry plays an important role in the local economy by providing jobs, stimulating spending, and providing inputs for downstream industries. In 2016, the industry directly contributed about $3.86 billion and supported 16,518 jobs in the Maryland economy. A detailed table listing the economic impacts of the industry can be found in the Appendix.

16,518	$917.1 M	$1.45 B	$3.86 B
EMPLOYMENT[1]	LABOR INCOME[2]	VALUE ADDED[3]	OUTPUT

SOURCE: IMPLAN, 2016

The industry also provides positive indirect economic impacts. For instance, for every job created in the sector, another job is created elsewhere in the state. For every dollar it produces, an additional $0.54 is generated in the local economy. Stable or thriving rural economies are critical for maintaining a rural landscape that also provides wildlife habitat and water quality protection for local streams, the Chesapeake Bay, and other major river systems.

Driven by Manufacturing

Manufacturing drives this industry, which includes wood products, wood furniture, and converted paper manufacturers. They contributed $2.19 billion in output and almost 10,000 jobs in 2016. Additionally, sawmills, along with paper and pulp mills, contributed $1.58 billion in output and about 5,600 jobs.

Forestry and Logging Can Drive Spending

Although forestry and logging operations contribute less, these businesses have greater potential to generate spending in the rest of the economy. For every dollar of production in this segment, another $0.72 is created elsewhere. Primary and secondary manufacturing would only create an additional $0.58 and $0.52, respectively.

[1] Based on a full-time/part-time annual average.
[2] Labor Income (LI) includes Proprietor Income (PI) and Employee Compensation (EC).
[3] Value Added is a large portion of Output, as it encompasses Labor Income (LI), Other Property Income (OPI), and Taxes on Production and Imports (TOPI).

Other Sectors Benefit

The intermediate output data shows other sectors are impacted by spending in the forestry sector. Industries that benefit the most include wholesalers, management firms, real estate, truck and rail transportation, electric utilities, and architectural and engineering services. This job creation and spending enables more home ownership, home improvements, healthcare, insurance, investments, banks, telecommunication, and restaurants. Both primary and manufacturing sectors contribute significantly to wholesale trade, real estate, management firms, transportation, and utilities. These are the core sectors that support these firms.

Table 2. Top 15 Industries by Contribution to Intermediate Output

Industry	Output ($)
Wholesale trade	186,406,618
Management of companies and enterprises	82,229,159
Owner-occupied dwellings	79,383,110
Real estate	69,717,652
Electric power transmission and distribution	52,095,864
Truck transportation	33,620,512
Hospitals	32,919,697
Architectural, engineering, and related services	29,822,485
Limited-service restaurants	27,329,507
Wireless telecom. carriers (except satellite)	25,234,652
Maintenance and repair construction of non-res. structures	23,642,488
Other financial investment activities	21,823,743
Rail transportation	19,379,153
Insurance carriers	19,234,964
Electric power generation - fossil fuel	18,561,440

SOURCE: IMPLAN, 2016

	Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
All Forestry	Direct Effect	8,304	430,346,592	642,773,416	2,497,118,333
	Indirect Effect	4,274	292,727,815	457,459,762	790,126,972
	Induced Effect	3,941	193,983,411	348,429,732	568,586,937
	Total Effect	16,518	917,057,819	1,448,662,910	3,855,832,241
	Multiplier	1.99	2.13	2.25	1.54
Forestry & Logging	Direct Effect	645	31,100,466	28,425,672	54,237,032
	Indirect Effect	132	5,018,940	7,016,060	11,362,243
	Induced Effect	191	9,366,209	16,851,338	27,456,523
	Total Effect	968	45,485,615	52,293,070	93,055,798
	Multiplier	1.50	1.46	1.84	1.72
Primary Manufacturing	Direct Effect	2,301	137,214,016	216,158,427	999,049,655
	Indirect Effect	1,818	130,282,440	207,770,795	362,957,462
	Induced Effect	1,477	72,732,277	130,622,085	213,180,946
	Total Effect	5,596	340,228,732	554,551,306	1,575,188,063
	Multiplier	2.43	2.48	2.57	1.58
Secondary Manufacturing	Direct Effect	5,357	262,032,111	398,189,317	1,443,831,646
	Indirect Effect	2,324	157,426,436	242,672,906	415,807,267
	Induced Effect	2,272	111,884,925	200,956,310	327,949,468
	Total Effect	9,953	531,343,472	841,818,534	2,187,588,380
	Multiplier	1.86	2.03	2.11	1.52

SOURCE: IMPLAN, 2016

Environmental Benefits

An active forest products industry is essential for safeguarding forestland, supporting the Chesapeake Bay, and mitigating climate change. While it may appear counterintuitive, forests that are actively managed for harvests maintain forested tree cover and ensure a sustainable and growing supply of timber. Having viable timber markets provides incentives to landowners to maintain their forests, often as an alternative to selling their land, largely for development, which permanently changes land use. It also encourages the implementation of forest management plans that promote healthy and sustainable forests.

Supporting the Chesapeake Bay

The Chesapeake Bay is both a national and state treasure. Many Marylanders care deeply about protecting and improving the Bay. Here, the industry contributes through both conservation and active forest management. Conservation efforts that keep lands forested and streams buffered provide the highest form of water quality protection and improve stream and wetland functions, maintaining forested land, stream, and wetland health. Active timber markets provide financial incentives to maintain forest cover, which protects Bay health.

Carbon Sequestration

A vibrant and active forest products industry is also critical for addressing climate change through carbon sequestration and the use of carbon-neutral renewable energy. Carbon sequestration can be achieved through reforestation and wood product manufacturing. Wood products that are long-lasting, such as furniture and building materials, are great options for carbon storage and may be more cost-effective than pursuing carbon capture technology. Sustainable forest harvests are essentially agricultural operations, and it can be helpful to think of it in those terms. The growing season is longer than most other crops, but it shares many characteristics of other agricultural crops and processing needs. New trees regrow to create the next generation of forest benefits and future products.

Additionally, other wood products such as wood pellets can be used as renewable energy that can diversify Maryland's energy portfolio, and when viewed through 30-year life-cycle carbon accounting, is carbon neutral. While wood biomass cannot supply all renewable energy needs in the state, its steady supply and ability to produce energy on demand is a great complement to other renewable energy sources as Maryland works towards greenhouse gas reduction goals. A modest wood energy market can allow landowners to afford basic forest health practices such as thinning and invasive species control needed for forest health. Today's forests face a changed ecology due to lack of landscape-scale fire, expansion of the population of deer and other animals browsing on native tree seedlings, and the introduction of many non-native plants, insects, and diseases, some of which become invasive and overtake native species.

Consumer Demand

Forest and wood products are an integral part of our daily lives. Maryland's 6 million residents drive the market by consuming about 278 million cubic feet of wood in the form of various consumer products each year.[4] Although self-evident, it is important to acknowledge that much of the wood products purchased in Maryland come from other states and countries. Increasingly, this dependency on imported wood products has deepened.

While it is unreasonable to assume that all or even a significant portion of this demand could be supplied by local industry, minor increases in local purchasing can improve the industry outlook. Moreover, supporting sustainable harvests and wood product manufacturing can align with consumer interests for sustainable and environmentally friendly products and bolster the ability to maintain rural landscapes critical to healthy watersheds.

Given that Maryland consumers have significant purchasing power and favorable purchasing behaviors, there is an opportunity to encourage them to buy local wood products. Additionally, developers can continue to push for green buildings that use materials sourced from local industry.

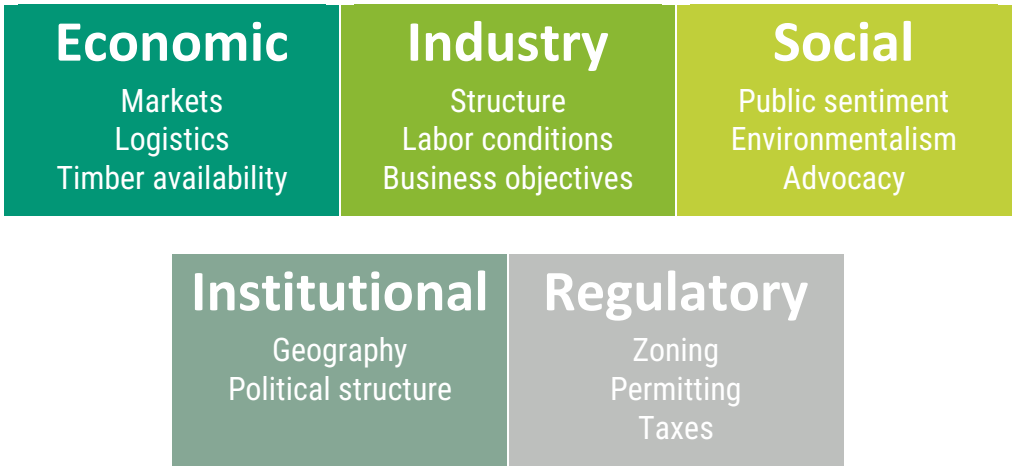
[4] Calculation is derived using the methodology from the 2004 Forest Production, Industry and Forest Retention Assessment produced by The Irland Group. The values are updated with USDA Forest Service's Forest Inventory and Analysis (FIA) data from 2018, Maryland population in 2019, and US per capita consumption from USDA Forest Products Lab, 2016. Please note that the most recent data on per capita consumption is dated to 2011.

Maryland Consumer Psychographics

SOURCE: ESRI BUSINESS ANALYST, 2020

Current Conditions and Issues

Strategy development requires a look at the current condition of Maryland's forest products industry. It is crucial to identify critical issues that presently or potentially pose as barriers to industry growth in the state. Some of these issues are institutional, the result of geographical and political makeup within the state. Others are economic, directly related to markets, logistics, and timber availability. Several are a function of the nature of the industry itself, its structure, labor conditions, and business objectives. Finally, there is a mix of regulatory, social, and environmental issues that influence the industry.



Industry Conditions

A Cottage Industry

Maryland's forest products industry consists primarily of a diverse collection of small entrepreneurships, each filling a unique niche market, ranging from animal bedding to construction timbers to fine hardwood lumber. The state's industry has been structured this way since the last large commodity sawmill closed over twenty years ago, well before the loss of the Luke paper mill.

It is an industry with few shared markets, little competition between the individual members, and virtually no shared interests. Indeed, many members of the industry do not even have personal or business relationships with others. Each mill's business can largely operate within its own sphere, unaffected by the decisions and operations of even nearby companies.

The result of this collection of independent "cottage businesses" is an industry in name only. It has no cohesion and no shared interests that lead to trade associations and advocacy groups common in other states. Political influence is very low, largely restricted to ad hoc efforts to fend off unfavorable policy proposals. The industry supports few organized efforts for public education about forest management or wood manufacturing.

Lack of Business Transition

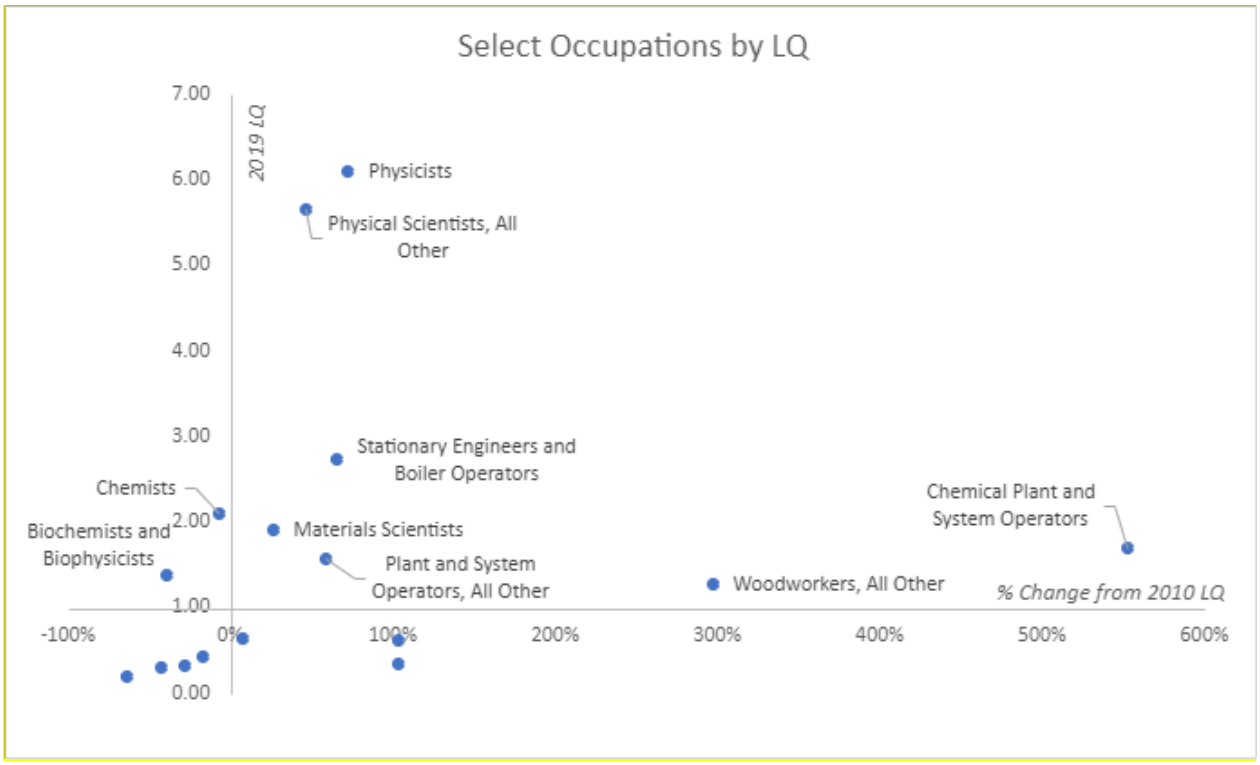
A 2015 University of Maryland study found that only half of forest product operators had any transition plan, and the logger confidence index in future profitability in the forest industry was 2.6 out of 5 (5 being

very confident.)[5] Those knowledgeable about the industry will verify that virtually all mill owners are over 60 years old and few have succession plans for their businesses. Many have expressed a desire to retire in the near term. While most have been and remain successful, they exhibit little appetite for expansion. In fact, of the recent mill closures, only the Verso closure is the result of market forces. All others have been voluntary, with family members choosing to exit the business even though it has been profitable.

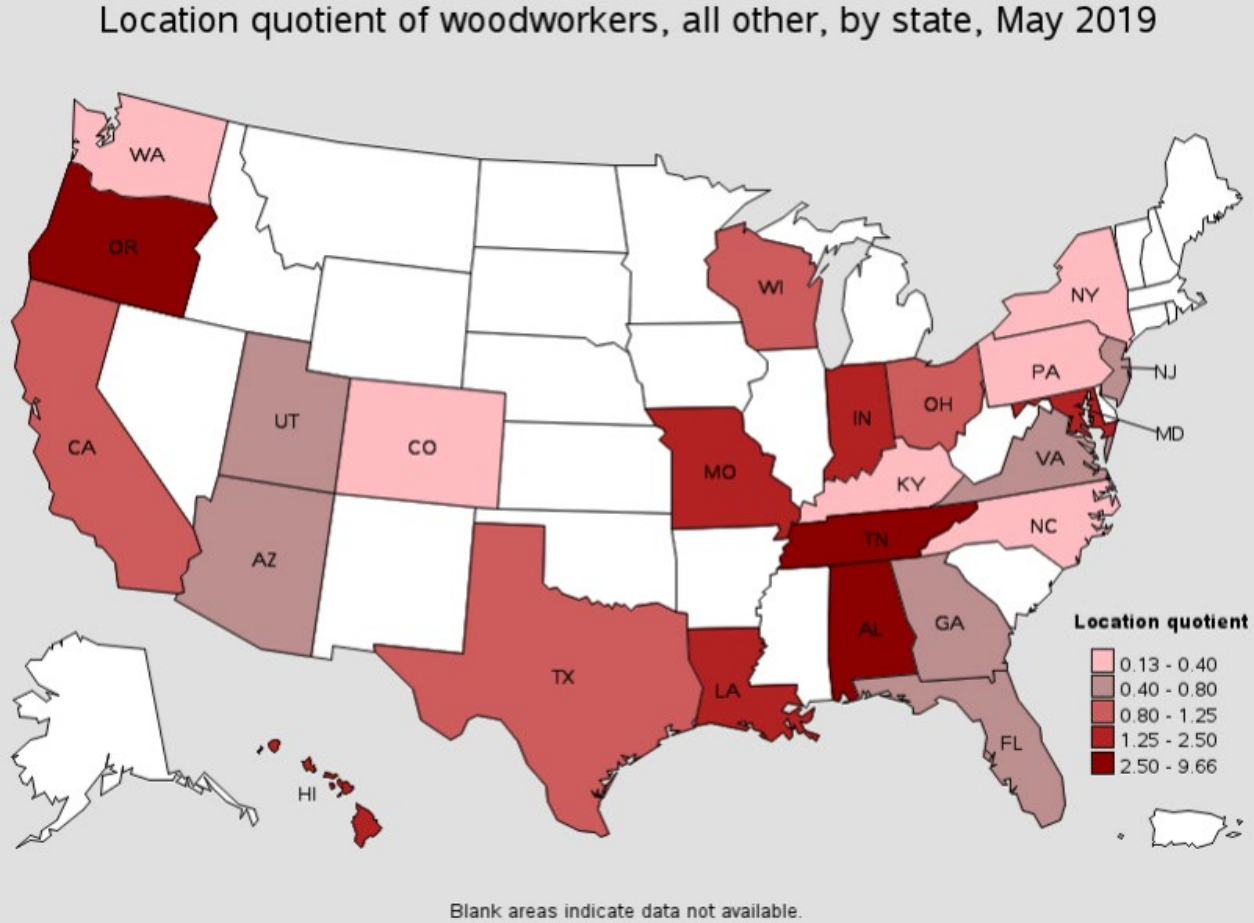
Workforce Concerns

Many forestry businesses face a lack of skilled labor both in the short and long term. There is a need for workforce development programs and Career and Technical Education (CTE) programs to train adults and youth for jobs in this sector. In addition, these programs need to integrate technology-based training to develop a workforce that can adapt to and adopt new technologies. The developmental activities will augment a workforce that is already beginning to specialize in skills related to sector growth and can be beneficial to future cluster development.

The following graphics indicates that the core job functions required to support the industry can be found in higher concentrations, as measured by Location Quotient (LQ), than in other parts of the US.



[5]https://www.researchgate.net/publication/282120965_MARYLAND'S_FOREST_RESOURCES_IN_A_DYNAMIC_ENVIRONMENT_ASSESSING_THE_FUTURE_CONFIDENCE_AND_SUSTAINABILITY_OF_MARYLAND'S_FOREST_INDUSTRY



Source: ACDS, LLC

Public Climate

Limited Public Support

The industry in Maryland operates largely outside of the public view. Most Marylanders experience forestry through urban contexts and do not view it as an economic activity. Thus, rather than outright public opposition, the industry suffers from benign neglect. Without active civic engagement at the local and state level, complex and unsuitable zoning restrictions on logging or mill operations have developed in many counties. Some loggers who live in Maryland prefer to work in surrounding states. The rules for protecting water resources outside the state are similar. Still, they are implemented through consistent statewide processes with few delays, aiding business planning and workflow even though on-site inspections can be more frequent.

Lack of United Timber Advocacy

Private landowners own 2.2 million acres of timberland in Maryland. These landowners depend on a viable and coordinated value chain to provide the economic returns to incentivize proper forest management. With the closure of so many of the state's primary mills in the last two decades, the support system that advocated for the industry has dwindled. In its place is a patchwork of organizations leaving the state without clear and coordinated advocacy on forestry issues. Landowner political potential remains untapped.

The gap means Maryland's industry lags the region in value chain development. As a result, the state rarely promotes wood energy as a major component of its renewable energy mandate or offers payments for carbon sequestration or water quality restoration for the Chesapeake Bay. Some efforts to stimulate forestry investments, such as MARBIDCO and Maryland Energy Administration woody biomass design assistance, have not been well-subscribed without the other elements to support robust business growth, such as workforce development and supply chain coordination. Without the profit incentive of a vibrant timber market, landowners will be driven to alternative land uses, such as development, to monetize the value of their timber asset.

Possible Increased Regulatory Restrictions

Although forests are a renewable resource, forest product operators in Maryland are concerned about environmentalist opposition to logging and expansion of existing regulations, particularly at the local level, that can generate complicated patchworks of differing rules. Permitting requirements vary from county to county, often dramatically, and these differences collectively lead to inefficiencies and higher costs and missed opportunities. Local jurisdictions typically regulate logging with ordinances not specific to timber harvesting (e.g., zoning, highway use, land grading), which when amended can inadvertently impact what is required of loggers. Also, opponents to logging have used these "indirect" regulatory pathways to further restrict timber harvesting into increasingly narrow limits.

Also, there is large acreage of state-owned lands in Eastern and Western timbersheds. Harvesting is guided by sustainable forestry plans that factor in local socioeconomic needs, but public review of annual work plans frequently requests more limited harvesting. Operators or mill owners evaluating sources of wood supply fear that political decisions could sway the application of the sustainable forestry criteria and alter future timber availability. Measures to address concerns such as fiber supply agreements have not been frequently used. This undercuts confidence in long-term private infrastructure investment.

Economic Factors

Market Conditions

The cottage nature of Maryland's industry insulates it somewhat from most major economic pressures. Global market forces largely drove the closure of the Verso paper mill. Even though the rest of Maryland's industry is largely immune from the nearly day-to-day swings in commodity prices for softwood lumber or panel products, a slowdown in housing starts would ultimately affect the Maryland mills producing hardwood finishing lumber. Constraints on construction impact those mills that produce construction timbers, specialty lumber, or treated poles.

Logistical Challenges

Paradoxically, transportation is an issue for Maryland's industry. The Chesapeake Bay and the Port of Baltimore offer access to international markets. However, high trucking costs prohibit all but the highest value products from reaching the port from the state's timber regions. The lack of cost-effective rail options in Western Maryland limits what products can be trucked economically. The lack of alternatives for transporting wood across the Chesapeake Bay also hamstrings opportunities for interregional trade.

For instance, Eastern Shore mills could easily access Virginian timber, and mills could easily access Eastern Shore's timber. However, transportation is prohibitively expensive and difficult to organize. Additionally, port activities in Norfolk, VA, and Baltimore, MD add complexity to truck availability, as do the frequent delays caused by congestion in urban corridors. Consequently, wood from the two major timbersheds

within the state must either be consumed in the immediate area or, increasingly from all areas but the Eastern Shore, exported to neighboring states for primary processing.

Competition from Adjacent States

Three of the surrounding states have vibrant forest product industries with strong public policy support from their state. The cumulative impact of favorable policies regarding marketing, taxes, permits, logging, and incentives helps lower firms' operating costs based in those states. As a result, Maryland mills face a competitive disadvantage.

More importantly, forest and wood product firms considering start up in Maryland must do so despite attractive incentives and a more welcoming business climate in an adjoining state. Virginia, for example, through its Governor's "Agriculture and Forest Industry Development Fund," offers direct grants of up to $500,000 to forest products business ventures so long as they buy at least 30 percent of their timber from Virginia timber lands. Maryland has significant assistance available through low-interest loans such as MARBIDCO programs as well as myriad economic development incentives, but there is additional opportunity to expand and scale up incentives, policies, and initiatives that will attract, maintain, and grow the forest products industry.

Timberland Availability

In Maryland, the issue of availability is significant. Despite having a growing volume of timber resources, not all of it is harvestable. Increasingly, forested acres are shifting out of the timberland as they are purchased for other uses, such as wildlife habitat or as rural retreats. In rural counties, where access to the forest resource is critical to sustaining the milling and manufacturing sectors, industry interests can perceive the state as an uncertain variable in investment decisions in timber supply.

Some public and private land management trends have raised concerns about timber availability. Public ownership categories include a strong focus on recreational and wildlife habitat needs as opposed to maximizing timber production. State Forests have a focus on timber production that other state ownership categories do not, guided by sustainable forestry plans, certification, and auditing to balance harvest goals with other environmental and social goals. Meanwhile, the increasing number of small and noncontiguous tracts reduces the feasibility of harvest, as do zoning regulations and changing landowner management objectives.

Entrepreneurial Interest in Forest Products

During the course of the project, the study team discovered numerous proposed projects that are ready for implementation within the next eighteen months. These projects, many of which may play a significant role in supporting the outcomes of the EAS, are far from certain within the state unless they have direct support. The most often cited reasons for considering locations outside of Maryland are the unsupportive regulatory structure, lack of direct economic development support, poor availability of qualified labor, lack of critical supply chain functions, and poor inter-industry cooperation.

The table below highlights elements of these projects.

Project Type	Timber-sheds	Est. Employ-ment	Est. Invest-ment	Forest Product Utilization	Challenges
Processor of Wood Pellets (2)	Western Central	48	$70 MM	250,000 tons	-Permitting -Financing -Workforce training -Certified supply
Cooperage	Central	26	$8 MM	Unknown	-Financing -Workforce training -Local supply
Wood Products Accelerator	Central	Unknown	Unknown	Unknown	-Supply chain development -Project financing -Site development -Workforce training
Mass Timber - Panel Assembly (2)	Western Central	50	$30 MM	1.8 million board feet (bf)	-Permitting -Financing -Workforce training -Supply chain development
Mass Timber - TMW Process	Central	Unknown	Unknown	100,000 bf	-Permitting -Financing -Workforce training -Product development -Marketing -Supply chain development -Logistics
Renewable Biomass Energy Center	Statewide	3	$750,000	N/A	-Fundraising -Industry relations -Marketing
Angel Capital Fund	Statewide	4	$10 MM	N/A	-Industry relations -Marketing
Phytosanitary Facilities for Export	Central	6	$1 MM	4,000 tons	-Permitting -Financing -Workforce training -Supply chain certification -Logistics
Supply Chain Management/	Statewide	6	$1.2 MM	N/A	-Finance -Supply chain certification

Project Type	Timber-sheds	Est. Employ-ment	Est. Invest-ment	Forest Product Utilization	Challenges
Small contract carbon trading					-Logistics
Hydrophobic Pulp Mill	Western	Unknown	$100 MM	700,000 tons	-Finance -Commercialization & scale-up -Secondary product R&D -Permitting
Urban Wood Aggregator	Central Eastern	15	$2.5 MM	300,000 tons	-Finance -Permitting
Hardwood Mill Expansion	Central	3	$300,000	500,000 bf	-Finance -Permitting
New Hardwood Mill (3)	Central Eastern	45	$8 MM	10 million bf	-Finance -New product R&D -Permitting
New Pine Mill	Eastern	27	$30 MM	10 million bf	-Finance -Supply chain certification -Logistics -Permitting

Collectively, the addition of these projects would significantly affect the future of the forest products industry in Maryland by creating significantly more demand for locally harvested timber than currently exists. They also represent a move forward in technology and innovation for the industry and would help both the existing and emerging sectors to better monetize their supply chains. This further reinforces the need for action by a dedicated organization in Maryland.

Utilizing Opportunity Zones for Industry Support

While these project opportunities are extant, it is not guaranteed that they will settle on Maryland as their place to do business. In fact, recent history indicates that they are more likely to locate in Virginia, West Virginia, Ohio, or North Carolina. This situation highlights the need for Maryland to actively market its Opportunity Zones to enhance the state's competitiveness in retaining, expanding, and attracting forest product operators.

The Opportunity Zone program is a federal incentive designed to increase business investment in low-income, low-opportunity communities. In addition to certain grant prioritization, the program's primary benefits to investors come in the form of a tax incentive through Opportunity Funds, the tool used for investing in Opportunity Zones. Three primary tax advantages are offered:

1. Deferral of taxes on previously earned capital gains until 2026.
2. Basis step up for previously earned capital gains invested up to 15 percent for investments of seven years or longer.
3. Permanent exclusion of taxable income on new gains for investments over ten years.

Guidance for the use of Opportunity Funds is complex. Its application for a particular project is based on the specific tax situation facing the individuals and corporations engaged. The Internal Revenue Service is a definitive federal source for this information which can be found here.

At the state level, Maryland launched the Maryland Opportunity Zone Information Exchange, which is the first interactive resource of its kind in the nation. It serves as a virtual meeting place for investors, fund managers, property developers, new or expanding businesses, and local stakeholders. The Information Exchange features a locator for projects and businesses located in Maryland's 149 Opportunity Zones and information on financial and other incentives available at the state, county, and municipal level. In 2019, the Information Exchange won the State IT Innovation of the Year Award at the StateScoop 50 awards, beating out more than 40 other nominees from across the country.

Maryland's local jurisdictions have also been aggressive in establishing and marketing Opportunity Zones in both rural and urban areas, many of which are targets for investment in the above project list. This map highlights these areas, and more information on each Opportunity Zone can be found through the

Opportunity Zones in Maryland

responsible local jurisdiction.

While many Opportunity Funds operate in urban areas, there have been significant investments made in rural economies and even within the forest products industry. In fact, Opportunity Funds can be used for wide-ranging purposes to support the industry, such as timberland acquisition, real estate purchases, and capitalizing innovation.

Opportunity Zone Example

"One major success story of the legislation has been the reopening of a shuttered sawmill in Vicksburg, Mississippi. In fact, the President invited Roy James, the Plant Manager of Vicksburg Forest Products, to attend his 2019 State of the Union address to highlight the success of the legislation. The hardwood sawmill was previously called the Anderson-Tully mill and was closed. Roy James, a 26-year veteran of the company and the vice president of operations at the mill at that time, lost his job along with many others

when the mill closed. The area was designated a qualified opportunity zone under the Tax Cuts and Jobs Act and a new investor purchased and re-tooled the mill, re-opening it as a southern pine sawmill using this new program. Mr. James was rehired by the new mill owner along with 100 others."

Source: Forest Landowner Magazine, January/February 2020

Maryland Timber Resource

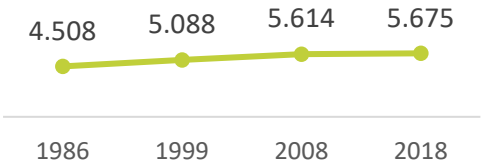
This section examines key statewide trends involving the timber resource as well as timber ownership. Much of the data used in this report comes from the USDA Forest Service's Forest Inventory and Analysis (FIA) database. Please note several important details: (1) the data represents average annual data for any given inventory year, and (2) most of the data focuses on timberland rather than forestland. Timberland is the subset of forestland that is not reserved from harvesting.

Growing Timber Supply

The volume of timber in Maryland has grown 26 percent since 1986 despite an 11 percent decline in timberland acreage. Currently, there is approximately 5.67 billion cubic feet (BCF) of timber.

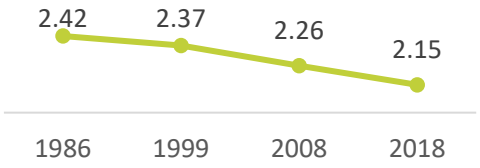
VOLUME OF STANDING TIMBER

5.67 BCF
TIMBER



AREA OF TIMBERLAND

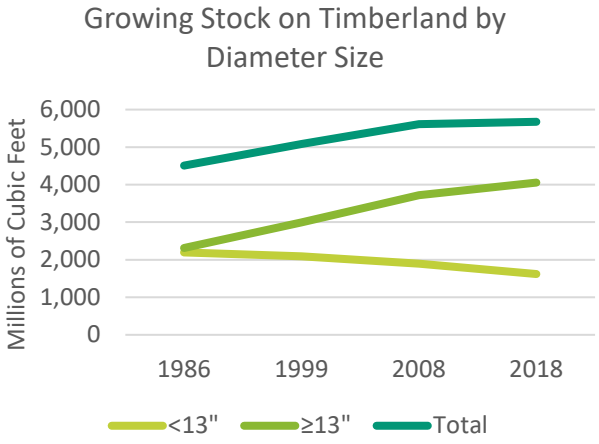
2.15 MM ac.
TIMBERLAND



Larger and Denser Timberland

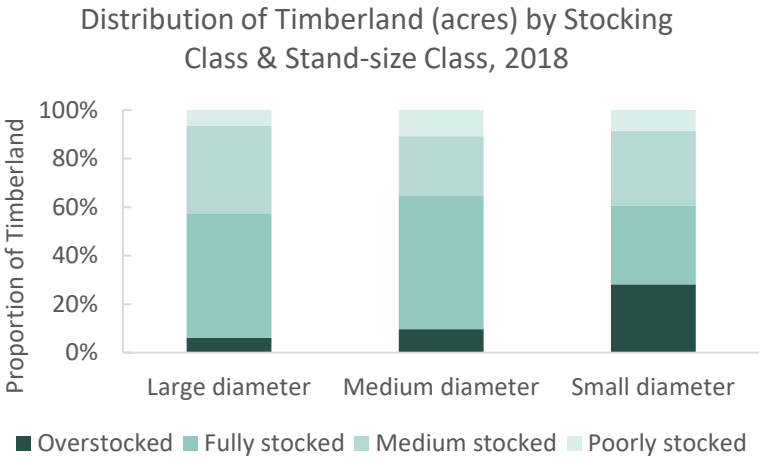
The growth in timber volume and decline in timberland indicates that trees are growing larger and that forests are becoming denser. While larger trees may lead to higher-value wood, denser and overstocked forests can present potential forest health risks, such as disease, forest fire, or insect outbreaks.

The data shows that timber inventory is growing; it is driven by a 75 percent increase in trees at least 13 inches in diameter between 1986 and 2019. Meanwhile, trees less than 13 inches in diameter declined 26 percent during the same period.



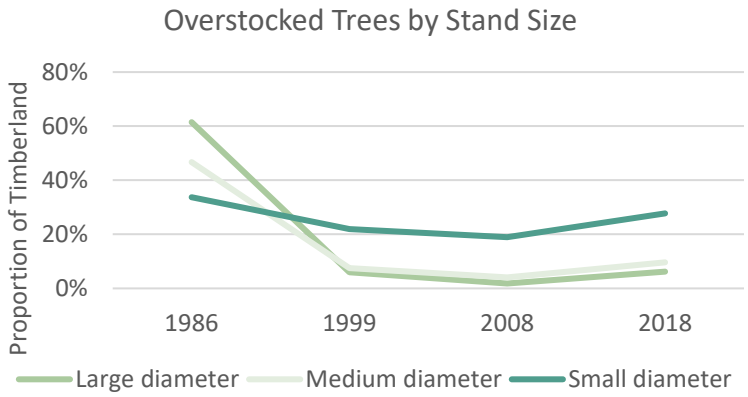
SOURCE: FIA

Overstocking of Small Diameter Trees



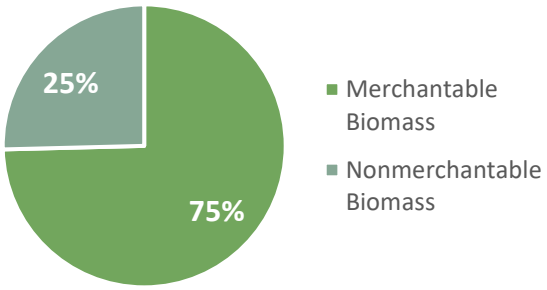
Even as the inventory of small-diameter trees is declining, there is continued overstocking of small diameter stands (those generally less than 20 years). The most recent peak of overstocking for small diameter stands was 1986 when about 34 percent of small diameter stands were overstocked. At the same time, the rate of overstocking for large diameter and medium diameter trees has been relatively stable since 1999. This suggests that high-grading may be an issue where the largest, most valuable, and best-adapted trees are taken, leaving the slower-growing, less desirable trees to grow and provide seed stock for the next stand.

Supply of Pulpwood and Non-Merchantable Biomass

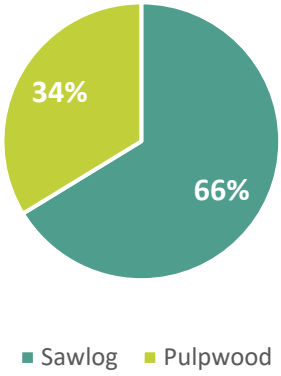


Maryland has about 166 million dry short tons of aboveground biomass. About 49 percent of the total aboveground biomass of live trees is pulpwood, and about 25 percent is non-merchantable wood. This represents about 124 million dry short tons of pulpwood and non-merchantable wood that could be used for pulp, paper, wood chips, and wood pellets. In particular, the 42.2 million dry short tons of non-merchantable wood (includes treetops and limbs as well as small or cull trees) is ideal for bioenergy.

Aboveground Biomass, 2018



Merchantable Biomass, 2018



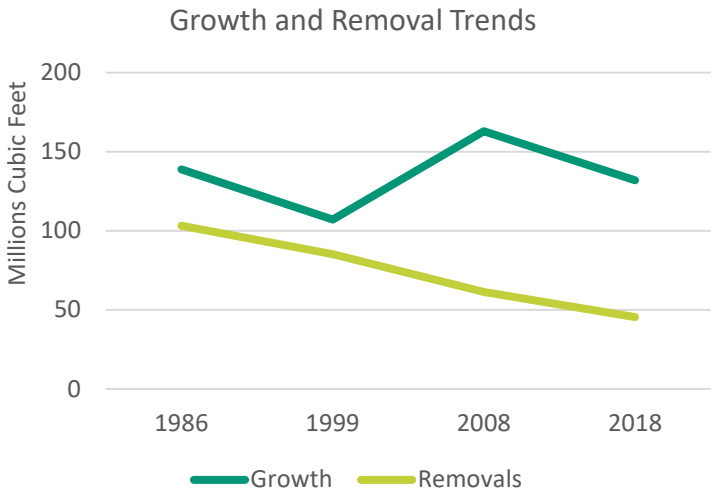
Hardwood and Softwood

Hardwood species represents the majority (83 percent) of timber resources in Maryland. Much of it is located in Western and Central Maryland. Meanwhile, the majority of the softwood is located on the Eastern Shore. The key species include yellow poplar, pine, oaks, and maple.

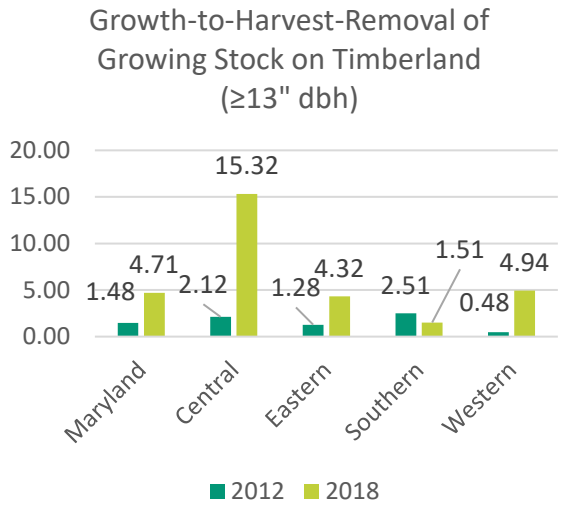
Top 5 Species	Cubic Feet
Yellow poplar	1,126,488,218
Loblolly and shortleaf pine	765,649,965
Red Oaks	748,472,154
White Oaks	747,922,844
Soft maple	573,184,226

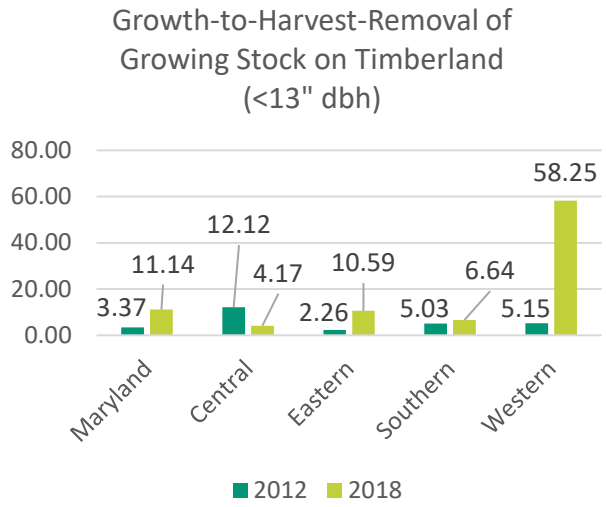
Opportunities for Harvest

Currently, loggers in the state harvest very little of the total available timber. In fact, timber removal activity has declined remarkably since 1986. Meanwhile, forest growth has continued over the same time period. The low removals present opportunities for increased harvests of sawlogs and pulpwood. The growth-to-harvest-removal ratios also indicate that the opportunity to harvest either small diameter or large diameter trees has increased over time for most of the sub-regions. In particular, these opportunities are significant in Western Maryland and the Eastern Shore.



Positive growth-to-removal ratios over one mean that more biomass is growing than being harvested. Regional patterns vary, but no ratios fall below one, which would indicate over-harvesting





Timberland Conversions

In 2018 there was an additional 12.6 million cubic feet of harvest removals generated from timberland converted to non-forest use (i.e., development). This means about 27 percent of all harvest removals occurred on land with permanent land-use changes. Although this number appears high, it should not cause unnecessary alarm. 12.6 million cubic feet is still a very small percentage of the total available timber inventory.

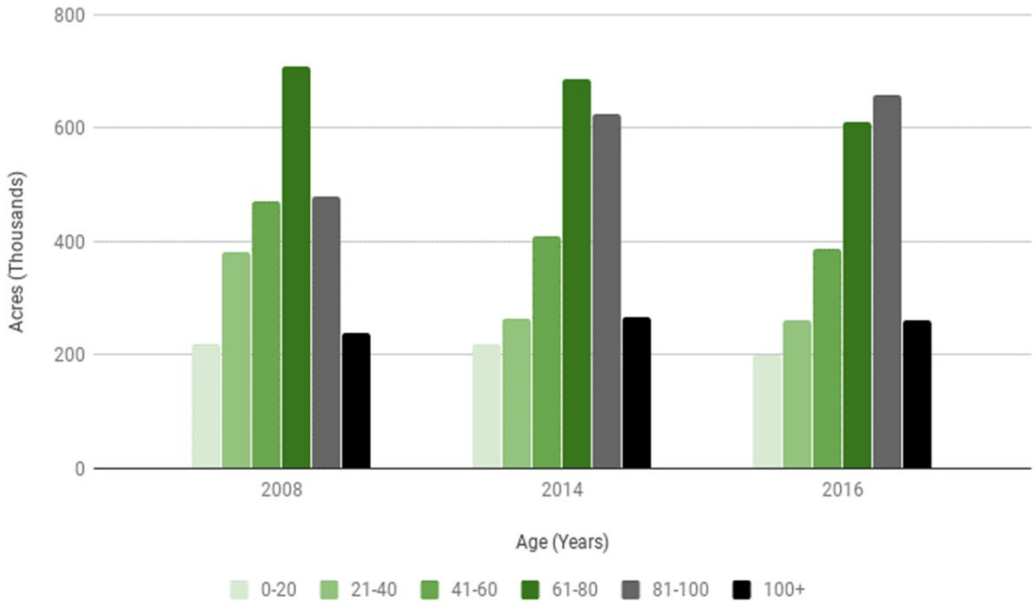
Timber Mortality Concerns

In 2018, about 46.5 million cubic feet of timber died from some cause other than logging. This is an 18 percent increase from mortality levels in 2009. Interestingly, the leading cause of death is the "unknown/other" category. According to the FIA, this includes death from human activity not related to silvicultural or land clearing activity (accidental, random, etc.). However, death attributed to this category has declined 18 percent since 2009.

Weather and biological causes represent the other causes of mortality. Biological causes are driven mainly by insects, disease, invasive species, and competition from other vegetation. Both weather and biological categories have increased significantly over the last decade and reflect growing concerns. First, there is the issue of overstocking and lack of commercial thinning, which can lead to weaker forest stands that are susceptible to disease, insects, and competition from overcrowding. These weaker stands are also less likely to withstand storms, wind, and droughts.

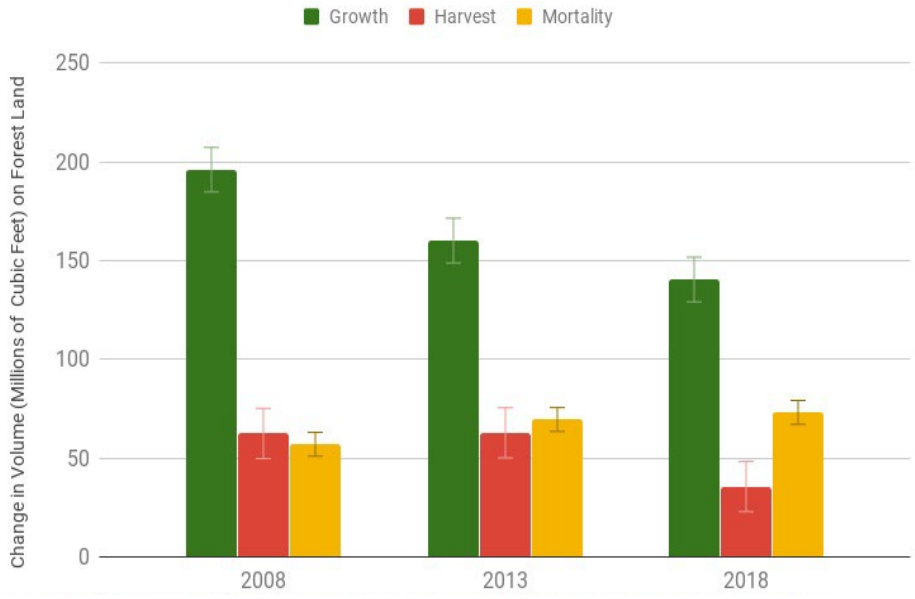
The largest cohort of stand ages in Maryland is now 80 to 100 years old, as shown in Table 3. These older stands are expanding and provide unique high quality resources. Harvesting is important because age-related diseases and stressors are increasing, as noted in Table 4. Recent swings in moisture and temperature from changing climate have further exacerbated forest health issues. For example, trees lost root mass during very wet years, then died in a fall drought because of the root system damage. According to the National Climate Assessment, the number of two-plus inch rainfalls has increased 71 percent in the region over the last sixty years, which is a concerning trend relative to natural mortality. Thinning, timber stand improvement, and managing for good species and age diversity can help counter the trend of declining forest health.

Table 3. Forest Age Classes by Survey Period

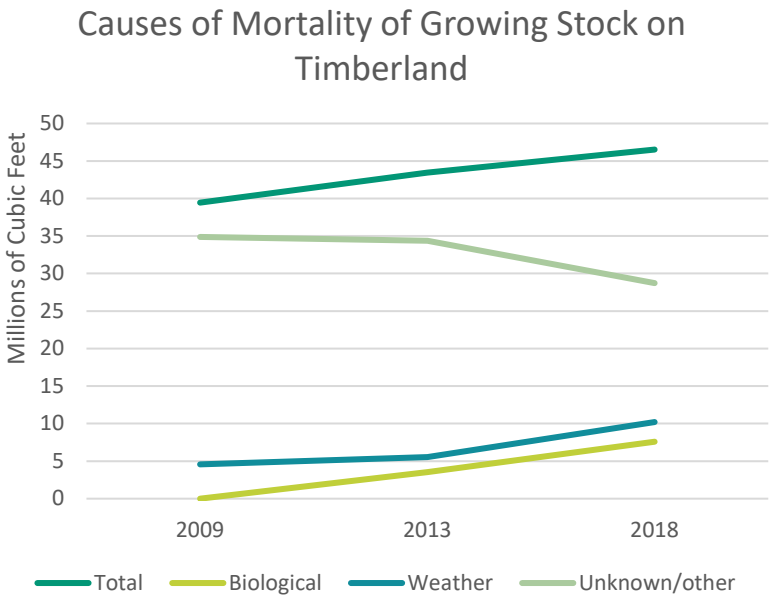


Source: Maryland DNR Forest Action Plan

Table 4. Annual Growth Rate, Harvest and Mortality



Source: Maryland DNR Forest Action Plan

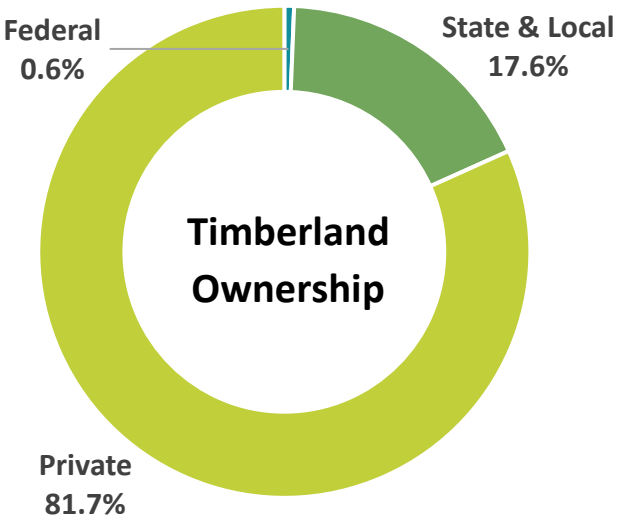

Causes of Mortality of Growing Stock on Timberland
Millions of Cubic Feet
50
45
40
35
30
25
20
15
10
5
0
2009
2013
2018
Total
Biological
Weather
Unknown/other

SOURCE: FIA

Who Owns the Timber?

Understanding who owns the timber is critical for assessing issues surrounding availability and accessibility of the resource. Please note that this report focuses on timberland rather than forestland whenever possible. Timberland is the subset of forestland on which some level of wood harvesting is potentially allowed. Additionally, the USDA's Forest Service National Woodlands Owner Survey (NWOS) from 2013 is the most recent dataset available at the state level. When publishing this report, the 2018 NWOS has national data available and is comparable to data from the 2013 NWOS.

In Maryland, the issue of availability versus accessibility is significant. Despite having a growing volume of timber resources, not all of this is harvestable. Currently, the majority of timberland is under private ownership. However, state ownership has increased significantly over the last several decades, while private ownership has declined. In rural counties, the state is often seen as the largest competitor for sales of timberland. In fact, policies and regulations restrict access to harvestable timber and do not favor timber sales on public forestland, at least as compared to the timber volumes that would potentially be available if these were privately owned. Meanwhile, small and noncontiguous tracts, zoning regulations, and landowner decisions can make it difficult to harvest from private timberland economically.



SOURCE: FIA

13,752 ac.
Federal
▼ 36% from '86

379,979 ac.
State and Local
▲ 47% from '86

1,760,037 ac.
Private
▼ 18% from '86

Private Landowner Objectives

Most private forestland owners do not own land primarily to sell timber. The top reasons for ownership: wildlife, beauty, privacy, nature.[6] Only an estimated 20 percent of Maryland forest landowners on the 2013 National Woodland Owners Survey view timber harvesting as a primary reason for ownership.

[6] USDA Forest Service National Woodland Owner Survey (NWOS), 2013

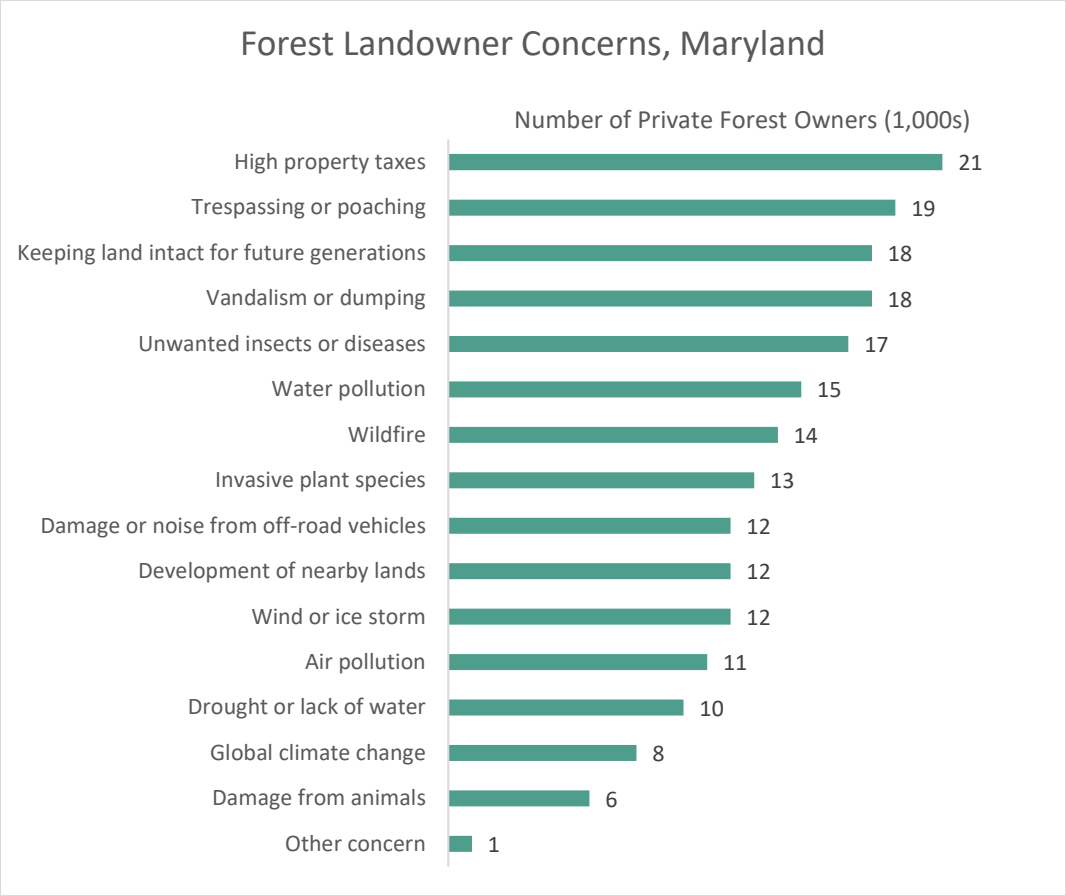
A comparison of the top five activities in the past five years and activities anticipated for the next five years also indicates a strong preference for owning land for environmental, wildlife, and recreational purposes. Even when trees are cut, they are primarily cut for personal use rather than for sale.

Past Activities (last 5 years)	Likely Activities (next 5 years)
1. Cut trees for own use	1. Getting rid of invasive species
2. Getting rid of invasive species	2. Cut trees for own use
3. Improving wildlife habitat	3. Improving wildlife habitat
4. Constructing or maintaining trails	4. Constructing or maintaining trails
5. Collecting nontimber forest products	5. Eliminate unwanted insects/diseases

SOURCE: USDA FOREST SERVICE NATIONAL WOODLAND OWNER SURVEY (NWOS), 2013

Landowner Concerns

Private forest owners are concerned about a wide range of issues. Many of them must deal with environmental concerns such as diseases, insects, pollution, wildfire, invasive species, weather, and climate. Most importantly, there are concerns related to high property taxes and land transfer, particularly inheritance taxes. These concerns present opportunities to educate current and future landowners about potentially valuable programs such as the Tree Farm System, Forest Conservation and Management Program and Forest Conservation Management Agreement (FCMA). Participation in these programs would allow landowners to reduce their tax burden, manage environmental concerns, and open opportunities for sustainable wood product harvests.



SOURCE: USDA FOREST SERVICE NATIONAL WOODLAND OWNER SURVEY (NWOS), 2013

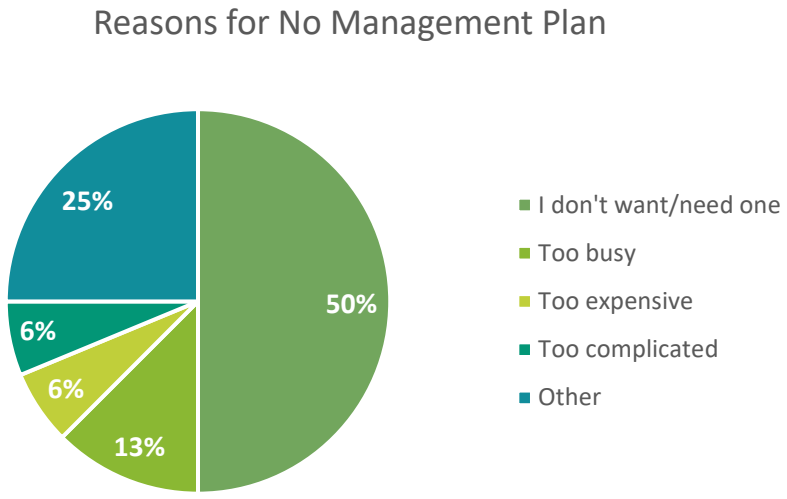
Forest Management Activities

Participation in the various management activities indicates there is more room for improvement. In particular, increasing the number of landowners who have forest management plans or who might participate in various educational or cost-share programs can benefit both the landowner and the forest products industry.

Management Activity	
Advice	31.1%
Management Plan	28.0%
Tax Program	20.0%
Cost Share	19.7%
Easement	12.0%
Green Certification	4.0%

SOURCE: USDA FOREST SERVICE NWOS, 2013

According to the National Woodlands Owner Survey, about 28 percent of the landowners have a written management plan, but only about 30.8 percent have implemented it. Of those without management plans, the top listed reason is that the landowner does not want or need one. At the same time, about 25 percent of the respondents indicated that time, money, and complications are obstacles for adopting management plans.



SOURCE: USDA FOREST SERVICE NATIONAL WOODLAND OWNER SURVEY (NWOS), 2013

State and Local Ownership

Primarily funded by Program Open Space (POS), Maryland has an active program of purchasing private lands and easements and managing them for public uses through a variety of conservation programs including: Program Open Space (POS) Stateside, Program Open Space Local, Rural Legacy, and the Maryland Agricultural Land Preservation Program. Through POS Local, investments result in parks, athletic fields, playgrounds, and other active recreation facilities. POS Stateside is most frequently used to

preserve natural areas for public recreation and watershed and wildlife protection across Maryland through the purchase of fee-simple and easement acquisitions. This includes acquisition of ecologically significant land identified in Targeted Ecological Areas which are mapped statewide. Proximity to existing public lands, public waterfront access, and other land management goals are among the considerations included in scoring. Acquisitions have been most common in rural parts of the state, where forestland has been acquired and added to the state forest system or occasionally to wildlife management areas or state parks. Over the last three decades, state and local ownership of forestland has increased 67 percent.[7] In particular, state ownership has increased by 32 percent, with a significant portion represented in the Chesapeake Forest Lands.

POS funds are also used to extinguish development rights and keep land in rural uses through easements, such as county-sponsored Rural Legacy applications and farmland protection through the Maryland Agricultural Land Preservation Program. Easements are also donated through local land trusts and the Maryland Environmental Trust. Most of these easements now use agreement language that requires Forest Stewardship Plans and that maintain rights to harvest timber under the guidance of those plans.

While the ability to harvest timber is present on many of these lands, forest industry interests have raised concerns about actual future harvest levels and frequently communicated unwillingness to make significant private investments based on the possible future availability of wood supply. Concerns have included political shifts that could preclude timber harvesting on public lands. Given these concerns, the continued fee simple acquisition of land being added to state and local ownership is seen as increasing uncertainty about wood supply. Addressing these concerns will require improved communication on the issues, questions, and concerns between forest industry representatives and public land managers. Options include fiber supply agreements at levels supported by sustainable forest management plans or shifts in use of fee simple versus easement options.

Land protection to further state goals for open space and public recreation also supports regional goals for watershed restoration. The 2007 Forestry Conservation Initiative, "Protecting the Forests of the Chesapeake Bay Watershed," includes goals for land protection summarized in the following table. Public conservation NGOs and easements have been included in the protected land estimates. Future land acquisitions and easements are envisioned to meet these goals and the recreation, open space, and rural working land goals associated with the various actions of Program Open Space.

Table 3. Chesapeake Bay Watershed Forest Conservation Goals

State	Total Forest in Watershed (ac.)	Forest Already Protected (ac.)		2012 Protection Goal (ac.)	2020 Protection Goal (ac.)
Delaware	175,900	48,400	28%	5,000	15,000
Maryland	2,358,000	724,000	31%	96,000	250,000
New York	2,433,000	295,000	12%	5,800	15,000
Pennsylvania	8,716,000	2,896,000	33%	38,500	100,000
Virginia	8,367,000	2,093,000	25%	135,000	315,000

SOURCE: THE TRUST FOR PUBLIC LAND, 2010

Land acquisition by the state accomplishes the objective of preventing these lands from being converted to another purpose, addressing a primary threat to keeping forestland rural. However, the wider variety

[7] Please note that this value is for state and local ownership of **forestland** not timberland. The data source is FIA.

of public health benefits that state and local public lands support, from habitat to recreation, can reduce the rate of commercial timber harvest. DNR Forest Service estimates that 46 percent of Western Maryland state forests (with many steep areas excluded), 81 percent of Chesapeake Forest, and 61 percent of Pocomoke State Forest are available for timber harvest. While large portions of state forest land can be harvested, other management priorities, such as providing suitable habitat for forest interior species and Delmarva fox squirrel, can lower volumes of harvest. For issues such as Delmarva fox squirrel, the state investments in core habitats have helped ease restrictions on private lands.

Confidence in future timber availability has a strong impact on current investments in forest products businesses. There are significant volumes of timber on state lands. For example, on the Lower Eastern Shore, DNR owns almost 119,000 acres of forest, about 22 percent of the 529,000 acres of total forest. The public lands tend to be the larger tracts in the region, well suited for sustainable forest management and cost-efficient wood supply. An additional concern expressed by forest industry was potential vulnerability to future political constraints, which could change rapidly from one administration to the next.

Methods to assure a predictable fiber supply that reflects continued protection of sensitive resources could increase industry confidence. Regular, coordinated planning on timber supply is needed to address industry concerns about future availability from the public land sector.

Timber Availability Impacted by Inconsistent Regulation

The regulatory environment influences timber availability. Currently, regulatory frameworks are not consistent regarding each county's power to regulate forestry in a manner more stringent than state regulations. This, combined with confusion with construction regulations regarding sediment and erosion plus the mandates of the Forest Conservation Act, has allowed a bewildering patchwork of permitting requirements, fees, waiting periods, and final regulatory authority within individual counties for even the most routine logging operations. The resulting uncertainty and discouragement within the forestry community are well-documented.

Table 6 below summarizes the current regulations in each county. By assigning a degree of difficulty for each county based on that county's requirements, the map below highlights the differences among the counties.

Table 4. County Regulation Summary

County	Standard Plan	Other Plan Requirements	Grading Permit	Bond	Waiting Period	Inspecting Authority	Final Authority
Allegany	Yes			$85+ $0.50/ac		SCD	SCD
Anne Arundel	Yes	Construction entrance and silt fence plans	Yes	$125	4 days to 2 weeks	DNR	SCD
Baltimore	Yes	Buffer mgmt		$100+$1.00/ac	2 weeks	County	County
Calvert	Yes			None		DNR	SCD
Caroline	Yes	Sediment and erosion control		$100		SCD	SCD
Carroll	Yes		Yes	$60	2-4 weeks	County	SCD
Cecil	Yes	If in "critical area"		$250	30 days	MDE	SCD
Charles	?	Sediment and erosion control		$175 + $3.00/ac	5 days	SCD	County
Dorchester	Yes	If in "critical area"		$125		DNR	County
Frederick	Major Logging Permit	Plot plan and project info		$453	5-10 days	County Env compliance	SCD
Garrett	Yes		Yes	$25 + $0.05/ac		SCD	SCD
Harford	Yes			$50	2-3 weeks	County	County
Howard	Yes		Maybe		10 days	County	County
Kent	Yes			$200	2 weeks	SCD and County	SCD and County
Montgomery	Sediment control	Harvest plan, stand delineation		$390	30 days	County and NCPPC	County, SCD and NCPPC
Prince George's	Sediment control	Streamside management zone		$280		DNR	SCD
Queen Anne's	Yes	Must be approved by licensed forester		$95	3-5 days	SCD and County	SCD and County
St. Marys	Yes	Must be approved by licensed forester			14 days	SCD or County	SCD
Somerset	Yes			$25		SCD	SCD
Talbot	Yes	Sediment and erosion control		$25		SCD	SCD
Washington	Yes			$100		SCD	SCD
Wicomico	Yes			$30		DNR	SCD
Worcester	Yes	Must be approved by licensed forester		$175	30 days	County	SCD and County

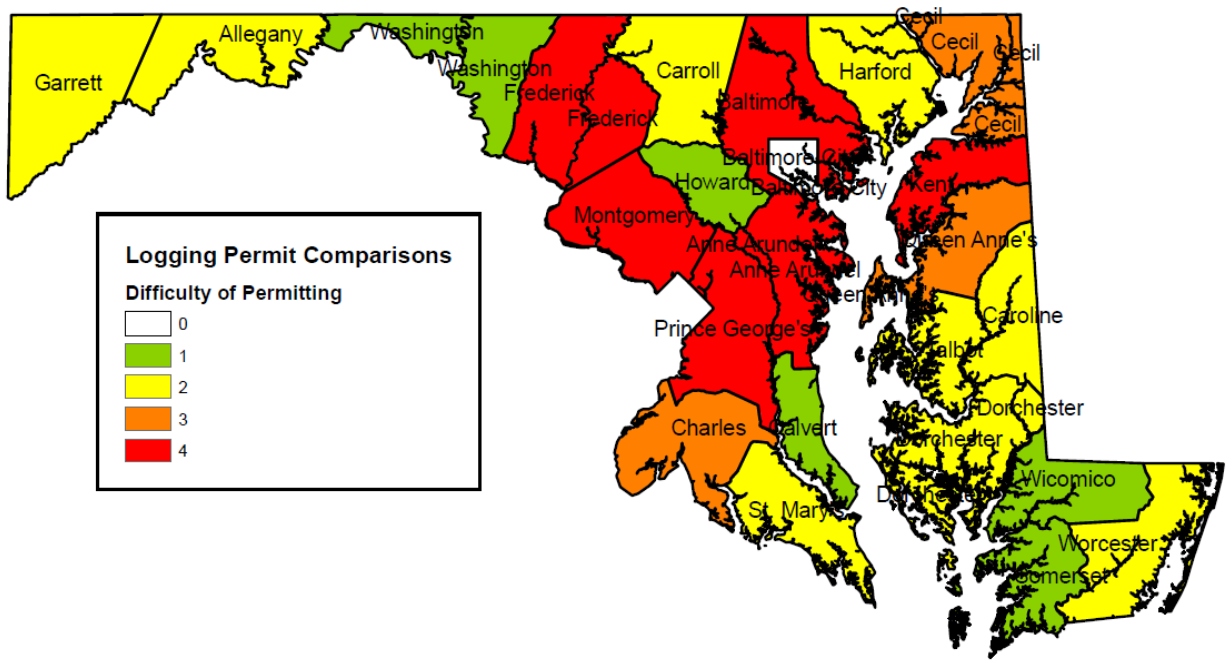


Figure 1. Logging Permit Comparisons

From data represented in Table 6 and Figure 1, several conclusions can be drawn. First, regulation is generally more reasonable, from a logger's standpoint, in the counties where logging and forest management is more prevalent. (i.e., the Eastern Shore, Western and Southern Maryland.) Second, most counties rely heavily on soil conservation districts (SCD) for ensuring compliance with forestry regulations. Finally, sediment and erosion control regulations for forestry are enforced at both the state and county level. The Maryland Department of Environment (MDE) is responsible at the state level, while SCDs are responsible at the county level.

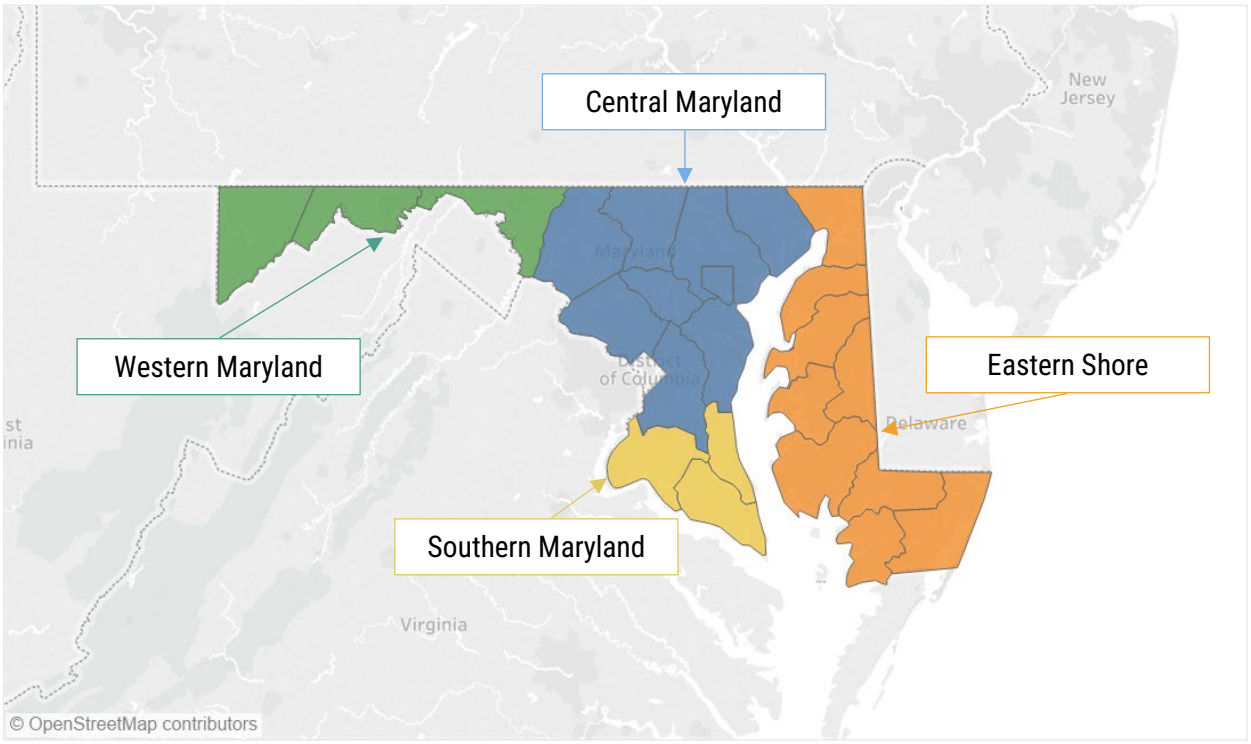
That said, recent agreements have expanded the role of the DNR in providing field inspections of forest harvesting operations and providing consistent technical assistance for best management practices for agencies who have the approval authority. The forestry community would welcome a more timely, business-friendly, consistent approach in permit requirements, fees, and regulations by modeling adjacent states such as Virginia. Transparency and efficiency can be improved throughout the process during permitting and field inspections.

Distinct Timbersheds

Firms in Maryland's forest products industry operate within distinct regions or **timbersheds,** defined by the timber resources within reach of their operations. These are largely influenced by the state's diverse ecology, ranging from the northern hardwoods in the highest elevations of Western Maryland to loblolly pine and cypress wetlands on the Eastern Shore. As a result, the regions have little in common. Little to no wood or products are exchanged or traded between the timbersheds, and firms have little idea of what companies produce outside their own regions.

This study evaluates the unique conditions and challenges for the following timbersheds:

- Central Maryland
- Eastern Shore
- Western Maryland
- Southern Maryland.



Section III of this report discusses in detail the timber resource and industry conditions for the entire state as well as by each timbershed. The rest of this section examines overarching issues and opportunities that require a statewide effort to either mitigate or address.

Section III – Regional Timbersheds

Western Maryland

Key Industry Stats

101
Firms

1,317
Employees

$303.6 MM
Revenue

1.12 BCF
Timber

570,759 ac.
Timberland

3,167
Private Forest Landowners

Table 5. Forest Products Industry Overview (4-Digit NAICS)

Industry	Firms	Employees	Revenues
Sawmills and wood preservation	6	157	$28,253,699
Veneer, plywood, and engineered wood product manufacturing	4	73	$9,342,800
Other wood product manufacturing	38	291	$35,714,300
Pulp, paper, and paperboard mills	3	148	$79,735,399
Converted paper product manufacturing	4	333	$110,652,798
Wood furniture manufacturing	14	161	$23,887,300
Timber tract operations	3	9	$397,900
Logging	27	142	$15,412,600
Forest nurseries and gathering of forest products	2	3	$168,100

SOURCE: D&B HOOVERS, 2020

Timber Resource

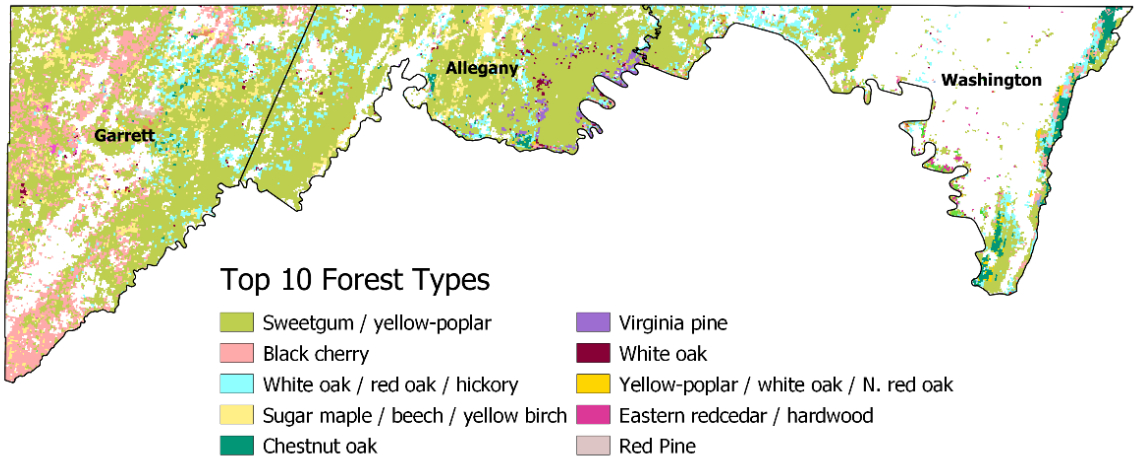
The forests in Western Maryland are quite different from the rest of Maryland and are a part of the vast Appalachian hardwood region. The timbershed is characterized by mountains rising as high as 3,300 feet, narrow valleys, and forests comprised of oaks, poplar, cherry, maple, other eastern soft hardwoods, along with some white pine and hemlock.

About 89 percent of the timberland in the region is hardwood. Western Maryland has 996.8 million cubic feet of hardwood, which represents 21 percent of the state's total hardwood inventory. In comparison, the region has about 127.1 million cubic feet of softwood, which is about 13 percent of the total softwood inventory in the state. Overall, about 20 percent of the state's timber resources are located in Western Maryland.

Table 6. Top 5 Species by Volume of Growing Stock on Timberland, Western MD

Species	Cubic Feet
White Oaks	237,241,747
Red Oaks	194,852,268
Other Eastern Hardwoods	130,149,074
Soft Maple	116,243,688
Yellow Poplar	86,417,519

SOURCE: FIA, 2018



Source: US FOREST SERVICE NATIONAL FOREST TYPE DATASET, 2008

Timberland Ownership

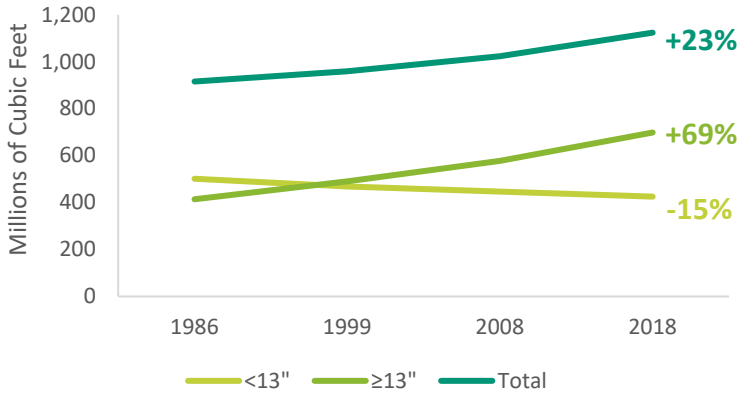
Timberland in Western Maryland is largely in the hands of private, nonindustrial landowners. These landowners account for 406,104 acres of timberland. In addition, there are three state forests, all of which provide some timber to support the local industry. The Potomac-Garret State Forest, Green Ridge State Forest, and Savage River State Forest are comprised of a total of 123,247 acres. Over the past decade, state forest ownership in Western Maryland has grown by over 3,500 acres. All of these lands are managed to meet both Sustainable Forest Initiatives and Forest Stewardship Council standards.

Forest	Acres, 2020	Acres Available to Harvest	Tons Harvested, FY2019	Net Timber Sales Revenue
Savage River	55,180	19,473	13,411,600	$344,055
Green Ridge	48,839	30,640	3,575,100	$109,554
Potomac-Garrett	19,228	6,977	3,975,500	$77,600
Total	123,247	57,090	20,962,200	$531,209

Growing in Volume and Size

Despite a three percent decline in timberland since 1986, the volume of timber has increased 23 percent. Most significantly, the trees have been growing larger. Due to declining harvests and continued growth, many trees have increased in diameter size and stand size. Trees with less than 13 inches in diameter have grown beyond 13 inches. Similarly, poletimber and seedling-sapling size trees have grown with age, contributing to the 42 percent increase of the sawtimber size class.

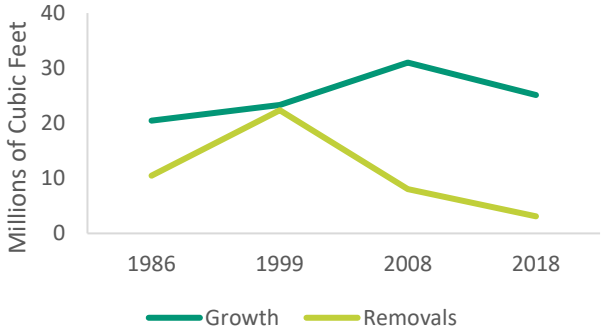
Growing Stock on Timberland by Diameter Size, Western MD



Reasons for Declining Removals

Trends over the past years indicate that timber removals have been declining. Interviews with loggers point to two key reasons for the decline. First, production and log consumption at the mill have steadily decreased since 2000, culminating in losing the state's largest log buyer. Second, loggers prefer to log in neighboring West Virginia or Pennsylvania because it is less expensive and most of the log markets are in those states. At any rate, it is clear that logging levels have decreased, and most of the logs harvested are shipped to out-of-state primary producers.

Growth and Removal Trends, Western Maryland



Sawlogs and Pulpwood

In the broadest term, sawlogs are logs that are suitable for being processed into lumber, veneer, and plywood. Generally, these trees need to be at least 13 inches in diameter. In Western Maryland, about 62 percent of the logs are 13 or more inches in diameter. However, not all of these logs are usable due to knots, bends, or other defects.

That is why FIA also provides estimates of sawtimber tree volumes. These are growing stock trees that meet certain diameter and grade requirements depending on the species. The table below shows that about 64 percent of the total growing stock can be classified as sawtimber. However, only 277.9 million cubic feet or 61 percent of the sawtimber is Grade 1 or 2. This represents trees that are most likely to be used as sawlogs. Although, it should be noted that timber prices and limited market access can create conditions where sawlogs, which are higher-value, can be used for lower-value products such as wood chips.

Thus, an estimated 846.0 million cubic feet, or 75 percent of growing stock, can be considered pulpwood. These are small diameter and low-grade trees that will most likely be used for wood chips, pulp, firewood, and biomass. Looking at the growth-to-harvest-removal data reveals that there is ample room to harvest pulpwood, which can contribute to improving forest health, generating biomass, and reviving primary manufacturing.

Table 7. Net Sawlog Volume of Sawtimber by Grade in Cubic Feet, Western MD

Tree Grade	1986	1999	2008	2018	% Change
Grade 1 & 2	215,976,432	201,753,032	346,843,095	277,871,502	29%
Grade 3 & Other	460,725,314	329,755,634	270,848,207	442,776,315	-4%
Total	676,701,746	531,508,666	617,691,302	720,647,817	6%

SOURCE: FIA

High-Grading

The high volume of pulpwood reflects the prevalence of high-grading within the region. In forestry, high-grading is a form of selective timber harvesting that removes the highest grade of trees, which can be marketed as sawlogs. It threatens long-term viability by creating a less diverse forest composition dominated by small-diameter, lower-value trees and selectively removing the seed source of the fastest-growing, best-adapted trees. While such harvesting yields a high immediate return, it reduces the returns landowners receive over time and results in stands that are underproductive, with smaller, lower-value trees.

The high-grading issue is also reflected in the growth-to-harvest-removal ratio, which is the annual net growth in forest inventory divided by the annual volume removed. A ratio above 1.0 may indicate opportunities for additional harvests, whereas a ratio below 1.0 indicates timber is removed faster than the growth or regrowth.

The data reveals three trends:

1. First, the region is harvesting significantly fewer trees than it did in 2012.
2. Second, there is ample opportunity to harvest trees over 13 inches in diameter; the growth to removal ratio for this diameter class is 58.25 in 2018.

3. Third, there is significant opportunity to harvest pulpwood. The data shows that while the growth of low-grade (Grade 3 and Other) trees increased 201 percent, little was harvested in 2012 and none was harvested in 2018.

Having excess low-diameter and low-grade trees can lead to weaker and disease-prone stands. Without forest management, these conditions cause the stands to ultimately become less valuable for logging and often for the many ecological services that increase with forest stand growth rates.

Table 8. Growth-to-Harvest-Removal Ratio of Growing Stock by Diameter Class in Cubic Feet, Western Maryland

	Diameter Class	2012	2018	% Change
Growth	<13"	8,780,394	10,023,249	14%
	≥13"	4,210,807	5,966,367	42%
	Total	**12,991,201**	**15,989,616**	**23%**
Harvest	<13"	1,705,674	172,068	-90%
	≥13"	8,795,559	1,208,152	-86%
	Total	**10,501,233**	**1,380,220**	**-87%**
GRR	<13"	5.15	58.25	1032%
	≥13"	0.48	4.94	932%
	Total	**1.24**	**11.58**	**836%**

SOURCE: FIA

Table 9. Growth-to-Harvest-Removal Ratio of Sawtimber by Grade in Cubic Feet, Western Maryland

	Grade	2012	2018	% Change
Growth	Grade 1 & 2	6,843,702	5,171,495	-24%
	Grade 3 & Other	-1,965,280	1,976,489	201%
	Total	**4,878,422**	**7,147,984**	**47%**
Harvest	Grade 1 & 2	6,736,542	1,005,967	-85%
	Grade 3 & Other	980,854	0	-100%
	Total	**7,717,396**	**1,005,967**	**-87%**
GRR	Grade 1 & 2	1.02	5.14	406%
	Grade 3 & Other	-2.00	n/a	n/a
	Total	**0.63**	**7.11**	**1024%**

SOURCE: FIA

Limited Availability

The region has both timberland and growing stock available for harvest. However, timber tract sizes greatly influence what is available for harvest. Generally, tracts less than 10 acres are not good candidates

for logging, given the costs of moving equipment to the tract and developing access to it. Analysis of property holdings show that less than half of the current forested properties have sufficient forestland to warrant harvest. Loggers and mill owners clearly and consistently report diminished interest in buying timber tracts in Maryland unless the economics are favorable or high demand warrants the additional effort required to meet Maryland's regulations. This decline is partially caused by the large number of small tracts in Maryland compared to neighboring states, which fuels Maryland's reputation as offering a difficult working environment for the industry.

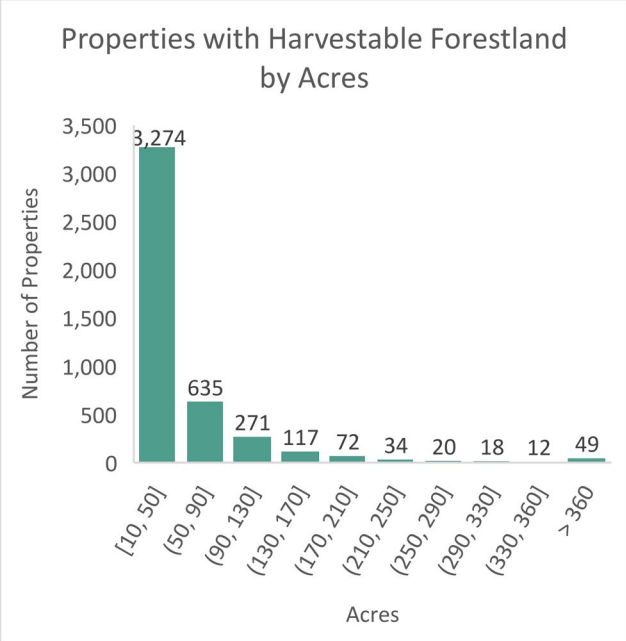
This analysis shows that there is a high proportion of low acreage forestland in Western Maryland. There are about 9,644 properties in Western Maryland with at least one acre of forestland. However, only 46.7 percent of these properties of a size likely to be harvested. The data also reveal that 72.7 percent of the harvestable properties have 50 or fewer acres and about 19.7 percent of the harvestable properties have between 10 and 14 acres. It is clear that properties skew towards small acreage, which presents a challenge for logging activity.

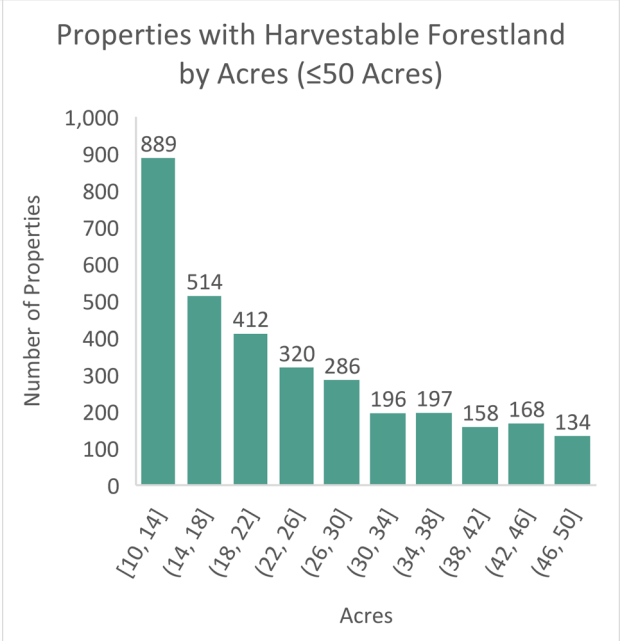
The trend towards smaller acreage forest land plots is expected to continue as landowners sell off parcels or heirs split inherited property. That said, the larger plots constitute a reliable source of forest management and sustainably harvested raw material and occupy large areas of timberland.

Table 10. Properties with Forestland in Western Maryland

	Western MD	Allegany	Garret	Washington
1+ ac. forestland	9,644	1,624	3,978	4,042
10+ ac. forestland	4,502 (46.7%)	1,077 (66.3%)	2,255 (56.7%)	1,170 (28.9%)

SOURCE: MARYLAND DEPARTMENT OF PLANNING, 2015





SOURCE: MARYLAND DEPARTMENT OF PLANNING, 2015

Impact of the Verso Luke Mill Closure

The closure of the Verso Luke Mill was a catalytic event that has negatively impacted the region's forestry sector. It can also be seen as a symptom of the many problems and challenges that Western Maryland faces in its efforts to retain or revitalize what is left of its logging and forest-based manufacturing capacity.

The most visible impact involves the timber supply and loggers. While the largest harvest opportunity is in pulpwood, the closure of the Verso mill has left a void in the market for nearly one million tons of pulpwood. In the short term, this loss is buffered by loggers exporting to pulpwood buyers outside of the state that have excess demand due to inventory shortages created by several seasons of poor harvest conditions.

Even though many logging operations have been able to find new buyers outside of Maryland, interviews and surveys with loggers indicated that access to markets, prices paid for delivered logs, distance to buyers, and operating costs all were worsened due to the mill closure. There are concerns regarding how long loggers can sustain these exports. Most importantly, this indicates that jobs and economic activity will leak out of the region and the state without great demand within Western Maryland.

Meanwhile, local loggers also continue to support markets for higher quality sawlogs that were unaffected by the Verso closure. However, buyers within the state remain relatively small-scale in comparison to the demand created by large-scale mills like Verso. If logging operations leave the state or local sawmills do not have the capacity to process larger logs, fewer Maryland trees will be harvested.

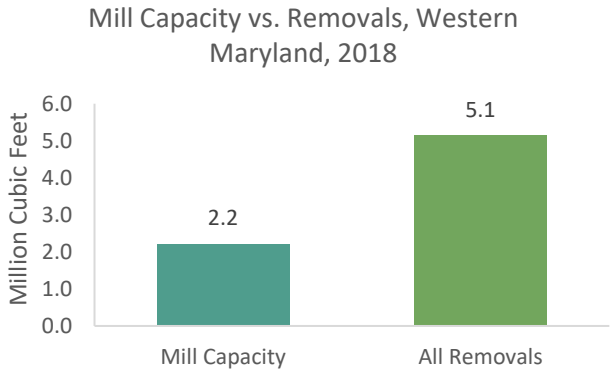
Furthermore, even as Western Maryland forests have become denser and the trees have grown larger, harvest activity continues to decline. Other factors such as small tract sizes and business decisions confound the region's ability to capitalize on a renewable resource. Without structural changes, remaining forest product manufacturers that want to expand in Western Maryland are likely to be even more reliant on imports from West Virginia and Pennsylvania.

Manufacturing Capacity

Primary manufacturing is an integral part of the local economy. This includes firms that produce pulp, paper, veneer, plywood, and engineered wood products. Unfortunately, these industries have shrunk and many of the businesses have either closed or moved. According to DNR records, there are only four sawmills remaining in Western Maryland and only one produces more than 10 million board feet of lumber per year.

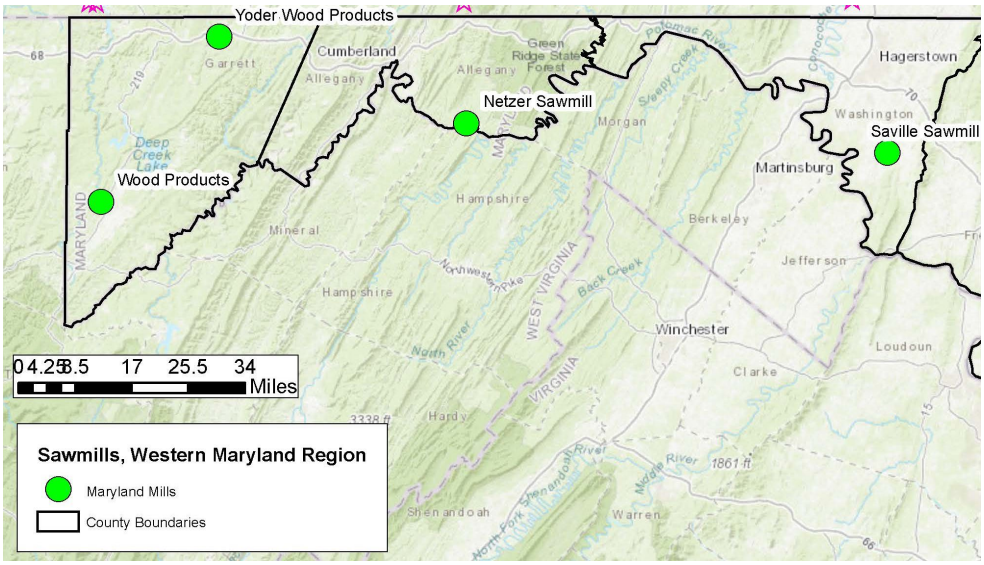
With declining manufacturing capacity and declining removals, two impacts are observed. First, some mills must purchase wood from other states. Second, many loggers find it more profitable to sell to out-of-state mills.

In fact, there are numerous mills in southern Pennsylvania and nearby in West Virginia that receive wood from Western Maryland. This includes a large oriented-strand-board (OSB) mill in central West Virginia and several pulp



SOURCE: MARYLAND DNR; FIA, 2018

mills in Pennsylvania and Ohio. This is fortunate since there are over 50 individual logging operations within the area. Most of these have remained in business despite the Verso Luke Mill closure, relying on the remaining mills both inside and outside the state. However, the number of logging operations is almost sure to decline as less efficient operators drop out and other operators retire due to age or lack of interest by the next generation.



Note: Only one sawmill, Wood Products, might be considered relatively large. The other mills are very small.

Supply and Demand Mismatch

Currently, timber management, harvesting firms, and loggers are unable to capitalize on the oversupply of pulpwood. While interviews and surveys with loggers indicate a desire to move more pulpwood volume, conversations with pulp and paper mills and wood panel manufacturers revealed that there is not sufficient demand for the excess pulpwood. In general, pulpwood demand is static and buyers are declining in number. Similarly, mills and manufacturers appear to be satisfied with the current supply of higher-value log products and their ability to source these logs.

Meanwhile, local loggers also continue to supply markets for higher quality sawlogs that were unaffected by the Verso closure. Many of these markets are out-of-state. Buyers within the state remain relatively small-scale in comparison to the demand created by large-scale mills like Verso. If logging operations leave the state or if local sawmills do not have the capacity to process larger logs, fewer Maryland trees will be harvested.

Transportation

Most sellers and buyers of logs maintain that local transportation of logs within a 150-mile radius is cost-effective and that trucks are in good supply. Accessing markets outside of a 150-200-mile radius becomes more difficult to do economically. There are few alternatives to trucking available to local businesses. Although most woodyards and mills still have abandoned rail lines and switches, they are unwilling to consider rail as an alternative transportation method. The predominant issues raised are lack of trust in the main rail transportation companies and perceived high costs.

Business Transition Challenges

Logging businesses in the region, especially in Maryland, struggle with intergenerational transition. When asked about business intentions for the next five years, 22.2 percent of the respondents indicated they plan to retire. Similarly, interviews indicate that many small logging businesses are not expecting to have the next generation of operators and have difficultly hiring the necessary skilled labor. That said, 44.4 percent of the respondents indicated a desire to grow their business, and about one-third planned to maintain the status quo. Also, no one indicated a desire to shrink their own business operations.

Key Opportunities

Wood Pellet Manufacturing

The Verso Luke Mill facility can be repurposed to produce more environmentally friendly wood pellets and other advanced materials. Wood pellet manufacturing uses similar equipment to pulp manufacturing and can be augmented with pyrolysis capabilities to produce advanced wood pellets. Specifically, there are opportunities to attract businesses with innovations and proprietary processes, such as producing advanced wood pellets and chemical products without generating toxic by-products like black liquor. Ultimately, wood pellet manufacturing can also power regional- and community-level bioenergy projects.

Hardwood CLT

There is an opportunity to attract hardwood cross-laminated timber (CLT) manufacturing and take advantage of the region's yellow poplar resource. Yellow poplar is the most promising species; it is strong, abundant, inexpensive, and has good mechanical properties compared to softwoods. About 24 percent of Maryland's hardwood inventory is yellow poplar. (1.13 billion cubic feet). Western Maryland has 86.4 million cubic feet, Central Maryland has 503.0 million cubic feet, and Southern Maryland has 406.5 million cubic feet.

Biomass Energy Development

With the current availability of one million tons of pulpwood, Western Maryland has the potential to support and develop significant wood energy projects. With the appropriate supply chain elements in place, the region's wood supply could be used to supply inputs to a regional network of community and institutional heat and power systems or a large, utility-scale energy project.

Advanced Materials and Wood Products Development

There is an opportunity to augment existing R&D efforts in Western Maryland and establish connections with other innovative businesses in Maryland using wood to develop advanced materials (e.g., transparent wood, insulating wood, lightweight and high-strength wood). These companies are often unaware of the timber resources and manufacturing capabilities required to scale. R&D and supporting services will play a critical role in establishing a supply chain for advanced materials manufacturing, retaining innovative firms, and bringing products to market.

Central Maryland

Key Industry Stats

775
Firms

6,727
Employees

$1.77 B
Revenue

1.75 BCF
Timber

550,194 ac.
Timberland

5,722
Private Forest Landowners

Table 11. Forest Products Industry Overview (4-Digit NAICS)

Industry	Firms	Employees	Revenues
Timber tract operations	10	23	$888,600
Logging	18	42	$2,917,100
Forest nurseries and gathering of forest products	8	24	$809,000
Sawmills and wood preservation	16	306	$12,281,900
Veneer, plywood, and engineered wood product manufacturing	11	338	$48,036,999
Other wood product manufacturing[8]	332	2,422	$1,245,394,939
Pulp, paper, and paperboard mills	40	990	$5,798,100
Converted paper product manufacturing	56	1,424	$293,023,597
Wood furniture manufacturing	284	1,158	$160,804,699

SOURCE: D&B HOOVERS, 2020

[8] The industry revenues are significantly higher than expected because Enviva is headquartered in Bethesda, MD. Despite being the largest producer and exporter of wood pellets in the United States, Enviva does not operate in Maryland.

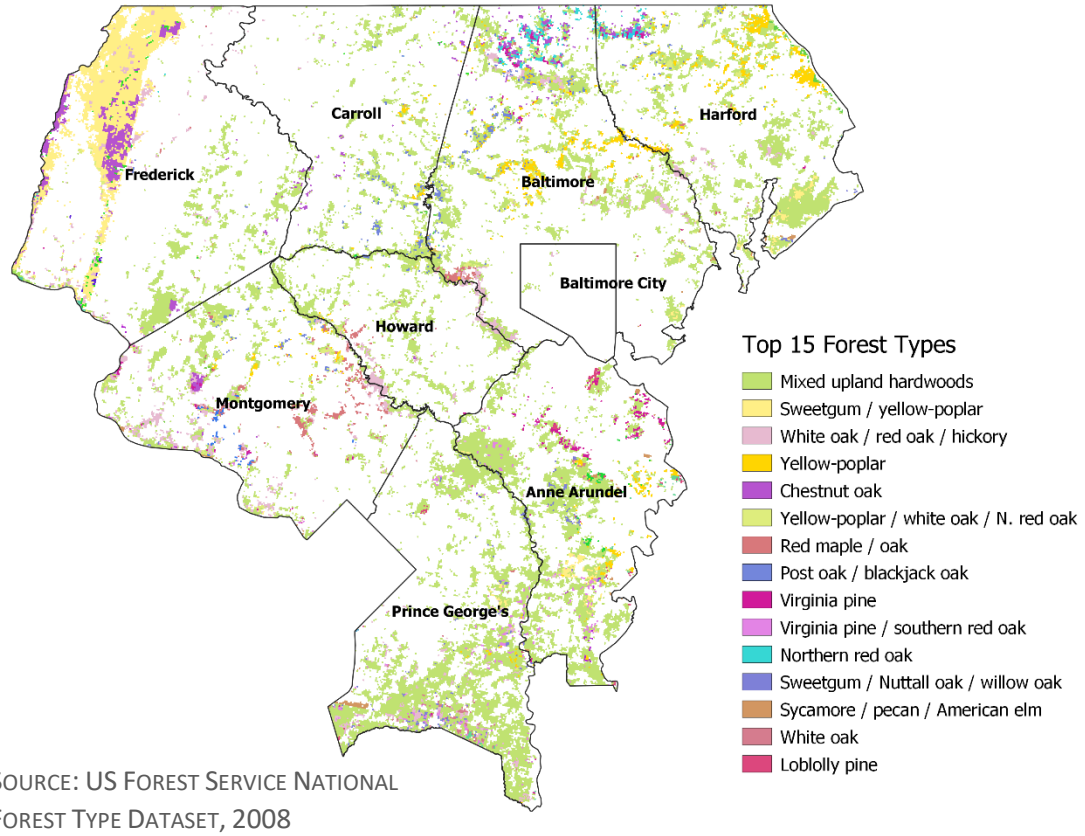
Timber Resource

Like most of Maryland, hardwood species represent the majority of the forest landscape in Central Maryland. About 97 percent of the growing stock of timberland in the region is hardwood. The primary species include yellow poplar, oaks, maple, and other hardwoods. Maps indicate that forests are concentrated further away from population centers, such as the western part of Frederick County or the southern parts of Prince George's County.

Table 12. Top 5 Species by Volume of Growing Stock on Timberland, Central Maryland

Species	Cubic Feet
Yellow poplar	634,373,866
Red oaks	293,567,541
White oaks	250,370,496
Soft maple	123,039,543
Other eastern soft hardwoods	94,444,740

SOURCE: FIA, 2018



SOURCE: US FOREST SERVICE NATIONAL FOREST TYPE DATASET, 2008

Increasing County and Municipal Forest Ownership

With the expanding urban and suburban landscape, forestland owned by local governments has increased significantly over the years. Since 1986, county and municipal ownerships in the region grew by about 105,685 acres. Many of these trees are located in parks, agricultural reserves, and other protected areas.

Most of the public ownership is currently not generating timber supply, forgoing opportunities to provide urban wood supply and help manage for a healthy forest.

Note: The FIA values are based on samples taken during the inventory time period and reflect the class to which the landowner at the time of the inventory belongs. As a result, the area of forestland or timberland by ownership class in any given year has margins of error. These values provide insight into overarching land ownership trends and not the precise acreage.

Declining Private Timberland

Urbanization has also led to private owners selling their properties to developers. Central Maryland experienced the largest percentage decline (-17 percent) in total forestland among the four regions. The decline was primarily driven by loss in private forestland (and timberland) ownerships.

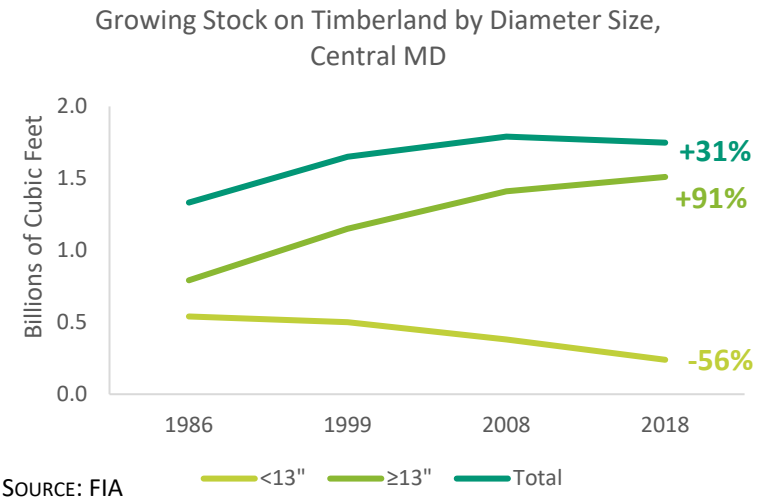
Table 13. Timberland Acres, Central Maryland

Ownership	1986	1999	2008	2018	% Change
Federal	13,261	17,374	26,526	13,752	4%
State	0	48,757	27,131	29,607	n/a
County/Municipal	10,147	62,197	37,045	43,091	325%
Private	652,850	541,401	496,275	463,744	-29%

SOURCE: FIA

Trees are Getting Larger

Despite a 19 percent decline in timberland in the region, the volume of harvestable trees continues to grow. This volume increase is driven by trees that are getting larger in size. Like the rest of the state, trees in Central Maryland are growing larger in diameter. Between 1986 and 2018, the volume of trees that were at least 13 inches in diameter almost doubled, while those less than 13 inches in diameter more than halved.



SOURCE: FIA

Similarly, data on stand size class indicates that sawtimber (large diameter) trees have increased by 47 percent since 1986 and currently represents the majority (98 percent) of total timberland inventory. This means there are very few poletimber (medium diameter) and seedling-sapling (small diameter) trees. Furthermore, grade data on sawtimber indicates the volume of higher value sawtimber is growing while lower value timber is shrinking.

Table 14. Net Sawlog Volume of Sawtimber by Grade in Cubic Feet, Central Maryland

Tree Grade	1986	1999	2008	2018	% Change
Grade 1 & 2	225,743,840	604,201,643	859,618,812	874,310,558	287%
Grade 3 & Other	812,446,125	512,241,343	449,056,521	484,007,337	-40%
Total	1,038,189,965	1,116,442,986	1,308,675,333	1,358,317,895	31%

SOURCE: FIA

While there are large trees that can be harvested, the conditions in the region greatly restrict harvest opportunities. Future harvests will often be opportunistic (e.g., as a result of weather events) or through permanent removal of trees for new development. The following sections will evaluate the opportunities for harvest and existing limitations.

Growth and Harvest Removals

Timber harvest in the region is heavily influenced by development activity, with harvest occurring as part of land use changes from forest or agricultural to residential or commercial. The data shows that both growth and harvest have declined in the region over the last decade, with small diameter trees experiencing significant mortalities, damage, rot, or disease. Meanwhile, larger trees are also declining in growth and have experienced declining harvests. Both statistics reflect the prevalence of urban tree canopy where small-diameter trees are planted and other larger trees are left to continue growth. There are still some areas with active timberland management, but these are located in the rural parts of the region and are becoming increasingly sparse and difficult to harvest.

Table 15. Growth-to-Removal Ratio (GRR) of Growing Stock by Diameter Class in Cubic Feet, Central Maryland

	Diameter Class	2012	2018	% Change
Growth	<13"	7,202,262	2,761,455	-62%
	≥13"	22,730,459	23,406,960	3%
	Total	**29,932,721**	**26,168,415**	**-13%**
Harvest	<13"	594,063	662,104	11%
	≥13"	10,728,576	1,528,316	-86%
	Total	**11,322,639**	**2,190,420**	**-81%**
GRR	<13"	12.12	4.17	-66%
	≥13"	2.12	15.32	623%
	Total	**2.64**	**11.95**	**352%**

SOURCE: FIA

Looking at the GRR by grade classification also reinforces the nature of the growing stock in the region. Due to urbanization and development, most of the trees left or planted are typically low value and are not intended for harvesting or high-value products. Many of the harvested trees will probably be converted into mulch, compost, and wood chips.

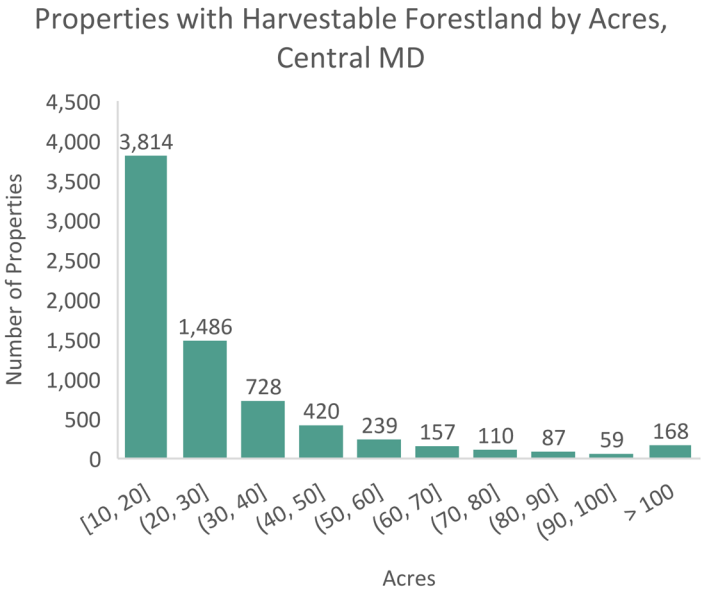
Table 16. Growth-to-Removal Ratio (GRR) of Sawtimber by Grade in Cubic Feet, Central Maryland

	Grade	2012	2018	% Change
Growth	Grade 1 & 2	14,790,148	17,499,548	18%
	Grade 3 & Other	7,730,442	3,074,465	-60%
	Total	**22,520,590**	**20,574,013**	**-9%**
Harvest	Grade 1 & 2	7,775,628	213,386	-97%
	Grade 3 & Other	1,654,765	1,406,936	-15%
	Total	**9,430,393**	**1,620,322**	**-83%**
GRR	Grade 1 & 2	1.90	82.01	4211%
	Grade 3 & Other	4.67	2.19	-53%
	Total	**2.39**	**12.70**	**432%**

SOURCE: FIA

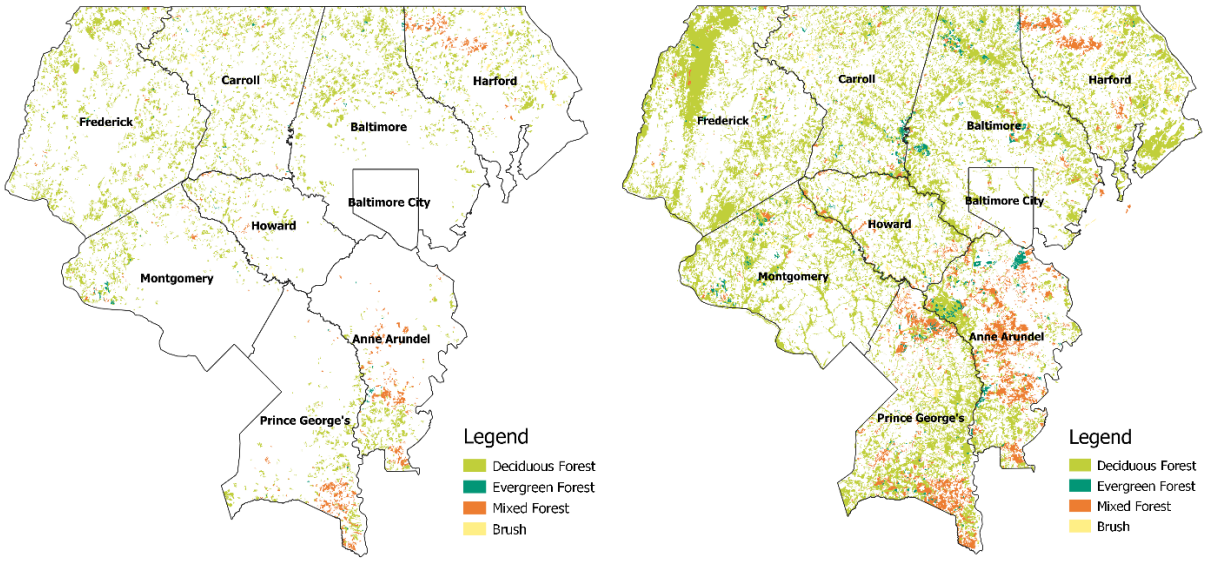
Timber Availability

In 2018, only about 0.62 percent of the growing stock was harvested. The low rate of harvest reinforces the fact that much of the timber resource is unavailable for harvest. About 14 percent of the growing stock is owned by federal, state, and local governments. Given the urban landscape, much of this is not available.



Additionally, only about 39 percent of the private forested properties in Central Maryland are harvestable. A harvestable property is defined as one with at least 10 acres of forestland. There are an estimated 7,268 properties with harvestable forests held by 5,722 unique property owners. It is also economically challenging to harvest in this region since most properties are small-scale. In fact, 50 percent of the properties have less than 20 acres of forestland. Beyond the issue of scale, the length of time for permit approvals and other regulations hinder accessibility.

The maps below show that private properties with harvestable forestland (LEFT) are far sparser than all forest land cover (RIGHT) in the region.

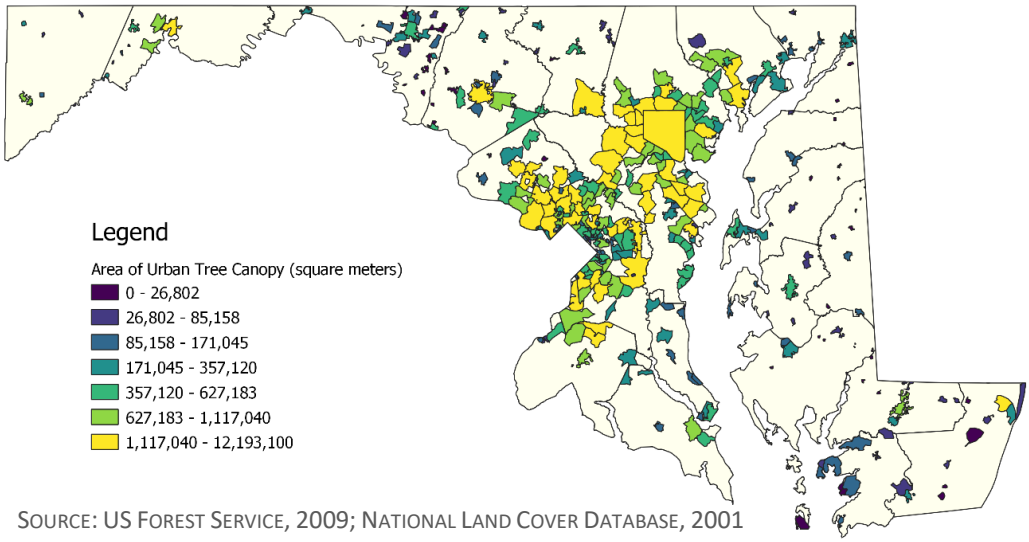


SOURCE: MARYLAND DEPARTMENT OF PLANNING, 2015; PRIVATE PROPERTIES WITH HARVESTABLE FORESTLAND [LEFT] AND ALL FOREST LAND COVER [RIGHT]

The Maryland Forest Industry Resource Viewer is another tool that has been created to help identify suitable forest parcels.

Urban Tree Canopy

Due to development in Central Maryland, it is worth noting the presence of urban tree canopy (UTC), areas with trees that are less than an acre and outside the definition of a forest. Statewide, about 28.0 percent of the urban land is covered with a tree canopy. Most of the UTC is located within Central Maryland. While UTC is not part of the primary timber supply, these trees contribute to urban wood waste in the form of yard trimmings and natural wood waste generated through residential and commercial



SOURCE: US FOREST SERVICE, 2009; NATIONAL LAND COVER DATABASE, 2001

activity. Natural wood waste integrates well with other environmental initiatives such as sustainable materials management policies called for in the 2017 Waste Reduction and Resource Recovery Executive Order, adopting life-cycle analysis for evaluating materials and reducing waste streams.[9]

Moreover, UTC provides other ecosystem services that are valued by urban and suburban communities. Key environmental services include the removal of pollutants, mitigation of the urban heat island effect, reduction of stormwater runoff, interception of rainfall, and carbon sequestration. UTC also contributes to other health, social, economic, and aesthetic benefits. For instance, tree cover can lead to energy savings and increased property values. Additionally, many communities benefit from state and local parks for recreation, quality of life, and human health outcomes.

Urban Wood Waste

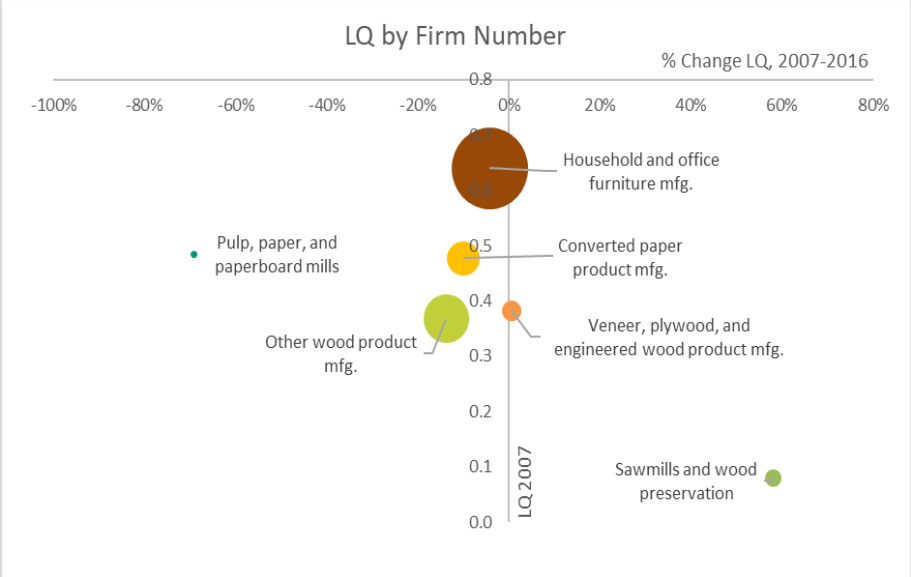
Urban wood waste is generated through land clearing for new development, residential landscaping activity, municipal maintenance of streets and parks, and trees or branches that fall from weather events. The wood waste is often converted into mulch, wood chips, shavings, and compost. However, it can also be used for biomass, firewood, and lumber.

The Maryland Department of the Environment (MDE) tracks data on natural wood waste (NWW). This includes tree stumps, brush and limbs, root mats, logs, and other natural vegetative materials. However, it excludes products such as pallets, crates, lumber, wood chips, firewood, or other products that may be made from NWW. In 2016, 46 facilities accepted 484,079 tons of NWW and recycled 429,121 tons.[10] Unfortunately, MDE does not have data on the total quantity of NWW generated.

Industry Conditions

Manufacturing Capacity

Wood product manufacturing is a key contributor to the forestry sector in Central Maryland. The main products that are manufactured include flooring, moldings, millwork, dimension lumber, cants, mulch, chips, and other miscellaneous wood products. Other contributors include label and packaging manufacturing as well as wood furniture manufacturing.



SOURCE: US CENSUS COUNTY BUSINESS PATTERNS, 2007 AND 2016

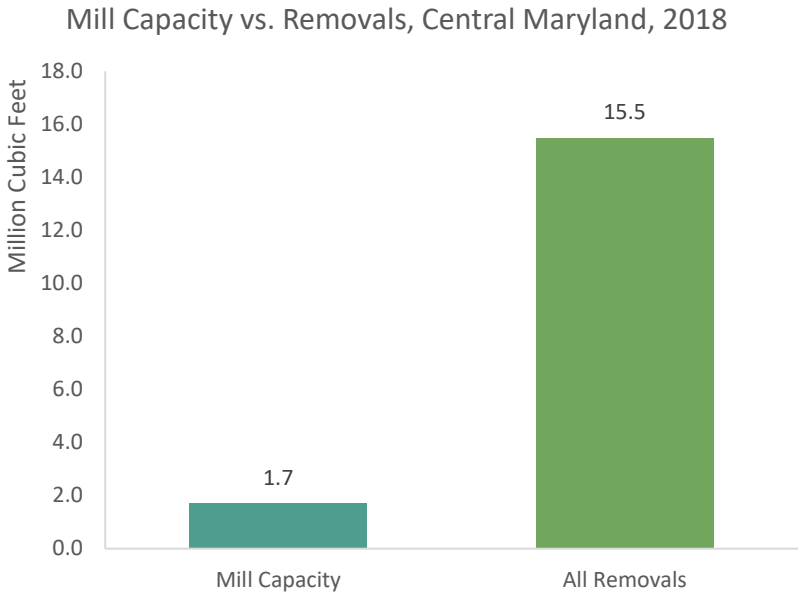
The stability and concentration of these sectors are at risk, though. Between 2007 and 2016, location quotient (LQ)

[9] https://mde.maryland.gov/programs/LAND/RecyclingandOperationsprogram/Pages/Waste-Reduction-and-Resource-Recovery-Executive-Order.aspx

[10] Maryland Department of the Environment.

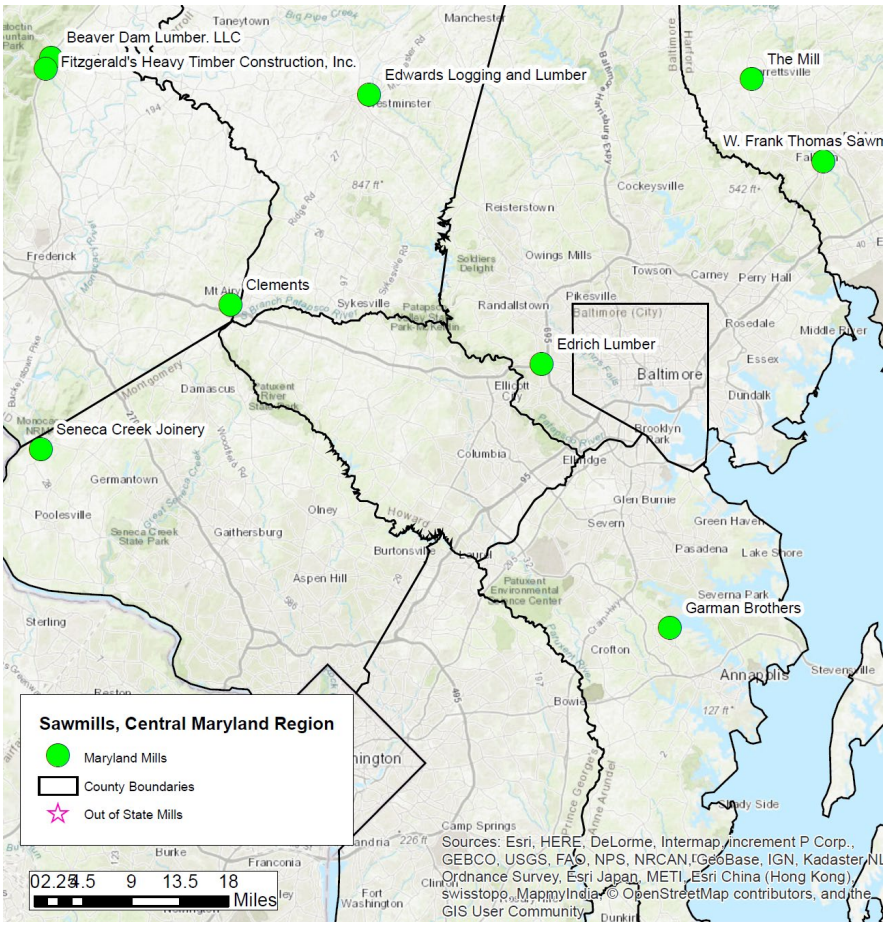
data indicates that many of these sectors are shrinking in firm number and are doing so at a faster rate than the rest of the country.[11] This is not surprising given that available timber resources in the region are largely limited to urban wood waste uses and boutique wood product manufacturing.

However, there are initiatives through Innovation Works and the Baltimore Wood Project that are working to catalyze the next generation of financially sustainable wood product businesses. These businesses are looking to capitalize on urban wood waste generated through tree trimmings and tree removals due to development, weather, and landscaping activities. Indeed, the chart below demonstrates that a significant amount of wood is removed each year in largely urban areas within the state. It suggests there is an untapped market opportunity that can position central Maryland as a leader in using urban wood for wood product manufacturing.



SOURCE: MARYLAND DNR; FIA, 2018

[11] Location Quotients (LQ) are a measure of a region's industrial specialization compared to a larger area (usually the nation). An LQ greater than 1.0 typically means that a sector is more concentrated in the study area than in the larger geography. In contrast, one less than 1.0 usually means the industry is less concentrated. It should be noted that this report uses the number of firms due to a limited amount of data available for the county yielding significant undisclosed employment data.



Role of Arborists and Wood Recovery Programs

With the decline in commercial harvests in Central Maryland, many mills rely on arborists, landscapers, land clearing operators, and wood recovery projects as sources of wood. While this may seem to be an inconvenient arrangement that is difficult to manage and plan around, many of the mills that were interviewed find the relationships to be a valuable source of affordable timber.

Mills must be able to accommodate the type of sorting and storage that allows them to maximize their returns on the logs, which often results in these mills having highly diversified income streams. Using this source of wood is challenging, though. Supplying businesses such as arbor care companies have limited training and knowledge on how to optimize a valuable tree during harvest while at the same time limiting nuisances such as metals in the tree. Timber sellers benefit because the alternative methods of disposal have higher cost parameters.

Importance of the Port

The Port of Baltimore is essential for supporting forestry exports. In 2016, Maryland closed its methyl bromide fumigation facility and gave up its EPA permit. So, exporters must use ports in neighboring states that have maintained their methyl bromide permits. The loss of the fumigation facility has catalyzed the need for alternative methods. New approaches include debarking or using vacuum and steam technology. Investments in new technology such as vacuum and steam phytosanitation could revitalize Maryland's log export market, with far-reaching consequences for improving forest landowner options for retaining land in forest and reducing toxic chemical use regionally. Revitalizing forest product exports through the Port

of Baltimore or through other Maryland port facilities will require strategic investment in new technology and coordinating with the industry to ensure the proper material handling equipment is available.

Human Resources and R&D Capabilities

Materials scientists, chemists, stationary engineers, boiler operators, plant and system operators are among the most concentrated jobs in Maryland. The region also has excellent R&D capabilities through UMD, JHU, and the Home Innovation Research Lab. There are opportunities to harness these for innovative products and renewable energy initiatives. Examples include transparent wood and MettleWood made by InventWood, a spinoff from UMD's NanoCenter research lab. Partnerships between public institutions and industry can also spur the use of biomass energy through Combined-Heat-and-Power (CHP) and biomass boiler facilities to meet renewable energy goals.

Key Opportunities

Urban Wood Aggregation

Most urban wood waste is landfilled, incinerated, or converted to compost, mulch, and firewood. However, there are opportunities to convert urban wood into lumber and secondary or niche products that garner higher prices and offset the need for imported resources. Accomplishing this requires investing in hard and soft infrastructure to aggregate, sort, pre-process, and distribute urban wood for optimal use. Sort yards such as Baltimore City's Camp Small, workforce development, and coordination with arborists and local governments will be crucial for aligning the supply chain. Innovation Works is already working in Baltimore to coordinate the key players to re-establish the region as a center for wood product manufacturing.

Wood Product Manufacturing

Given the region's assets and urban wood resources, several opportunities warrant additional research and investment. These include thermally modified wood, a cooperage, and a woodworking incubator or accelerator. Thermal modification can turn low-value wood into a high-value and environmentally friendly product. A cooperage can use short-length logs generated by arborists to make staves and barrels to supply a burgeoning local craft beverage industry. Finally, an incubator or accelerator would provide essential equipment, skills training, and business development support to create jobs in manufacturing millwork, flooring, panels, furniture, and other secondary products.

Wood Energy and Biochar

Much of the urban wood waste remains low-grade or non-merchantable. Wood-fueled thermal facilities can use this wood waste to generate affordable and clean electricity, steam, heat, and biochar. The characteristics of wood and its energy properties make it particularly efficient for thermal or combined heat and power uses, while other renewable sources such as solar and wind have favorable characteristics for the electricity side of the energy supply. Another advantage of wood is its local nature; wood energy is typically used close to where it is generated, meaning that wood-based energy supports local jobs and avoids long transportation paths. Wood energy is a fuel source that provides on-demand energy that complements more variable production profiles of wind and solar energy. The local supply of wood presents opportunities for community-scale combined heat and power plants and medium-scale operations co-located with manufacturing. Also, biochar is a by-product that can have agricultural and stormwater mitigation applications. Some of its benefits include increased nutrient and water retention, improved soil structure and biology, and decontaminated soil and water.

Eastern Shore

Key Industry Stats

128
Firms

822
Employees

$112.4 MM
Revenue

1.89 BCF
Timber

729,135 ac.
Timberland

4,786
Private Forest Landowners

Table 17. Forest Products Industry Overview (4-Digit NAICS)

Industry	Firms	Employees	Revenues
Timber tract operations	1	2	131,100
Logging	1	1	28,000
Forest nurseries and gathering of forest products	20	67	4,826,600
Sawmills and wood preservation	14	264	$40,385,500
Veneer, plywood, and engineered wood product manufacturing	4	131	$4,766,800
Other wood product manufacturing	63	176	$23,171,200
Pulp, paper, and paperboard mills	1	1	$75,500
Converted paper product manufacturing	4	21	$21,924,901
Wood furniture manufacturing	20	159	$17,136,500

SOURCE: D&B HOOVERS, 2020

Timber Resource

Pines and Softwood

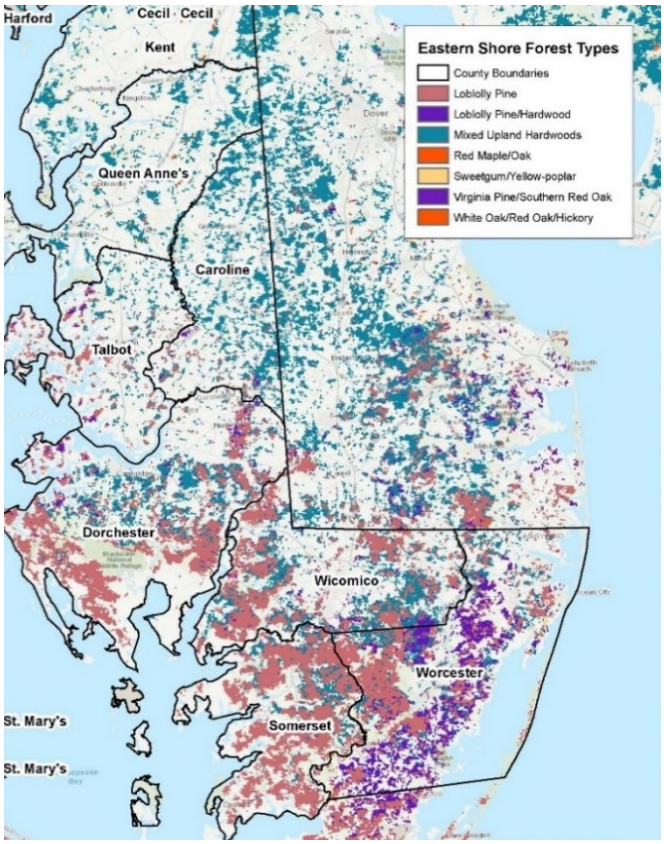
Traditionally, loblolly pine has been the mainstay timber required by mills on the Eastern Shore. This has been reflected in large efforts to maintain pine stands through intensive site preparation, planting genetically superior seedlings, and occasional fertilization of young stands. In particular, herbicides continue to be a widespread means to control competing hardwoods in the absence of the historical fire regime. Additionally, loblolly pine naturally reproduces well and many logged areas are left to successful natural regeneration from seed. As a result, the acreage and volume of pure pine stands remain significant on the Shore; the volume of softwoods increased 63 percent (1986 to 2018).

Table 18. Top 5 Species by Volume of Growing Stock on Timberland, Eastern Shore

Species	Cubic Feet
Loblolly and shortleaf pine	671,894,953
Soft maple	292,497,275
Sweetgum	220,948,837
Red oaks	169,290,772
Yellow poplar	130,559,691

SOURCE: FIA, 2018

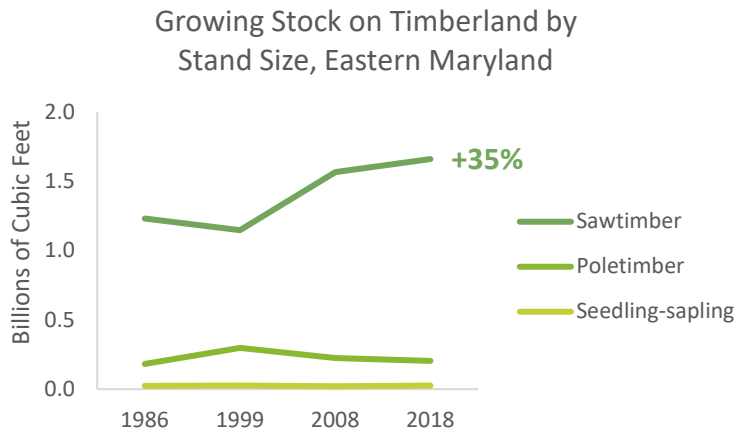
The current pine stand numbers result from extensive clear-cut logging from the 1970s to 2000 and declines in logging since 2000. The heavy logging produced extensive areas of seedling-sapling pine stands. As logging dropped precipitously, stands originating during that period are now aging and growing larger as more timber moves through the pole-pulpwood-sawtimber stages. In short, pine stands are becoming larger and older through limited logging of large trees and efforts to thin stands that are 20-35 years old.



Source: USDA Forest Service, "Forest Types," Spatial Data

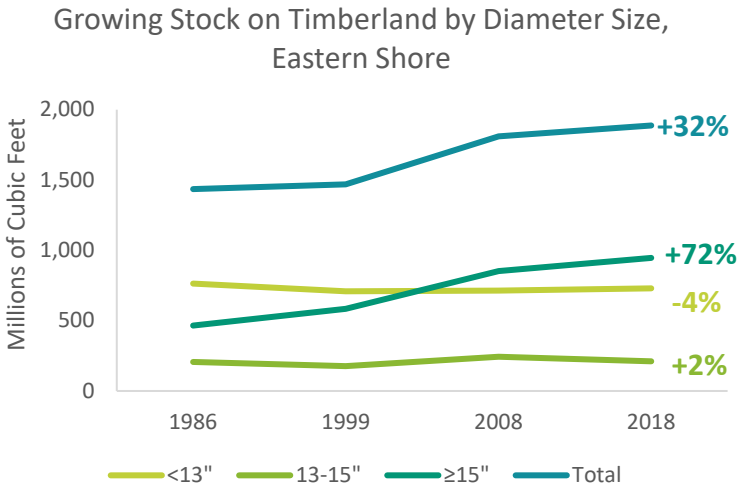
Trees are Getting Larger

Historical data on stand size class and diameter class reinforce the fact that larger trees continue to increase in volume while the volume of small trees remains relatively stable. Between 1986 and 2018, the volume of trees classed as sawtimber increased 35 percent. Similarly, trees that are 15+" in diameter increased 72 percent.



Economic Implications of Larger Trees

As trees get larger, the value of the timber resource increases. Pulpwood (typically <13") might yield a stumpage price (price paid for standing timber) of $4-$10 per thousand board feet. Meanwhile, timber in the 13-15" class, which are used for higher-value products, bring stumpage prices of around $100 per thousand board feet. Finally, larger sawtimber (15+") brings at least $150 per thousand board feet.[12]



The ability to capture the higher value depends on the ability to produce and market higher-value products that might come from the larger diameter trees. However, if markets for large timber do not exist, then these same trees will default to lower-value product uses. Thus, the buyer of large timber will not need to pay higher stumpage prices, while the timber seller bears the loss in potential value.

Hardwoods

Hardwood species are also prevalent on the Shore. About 65 percent of the total growing stock on timberland is hardwood. Since hardwoods are generally more shade-tolerant than pine, they persist in a pine stand and are ready to occupy a site whenever logging opens it up to full sunlight, hence the need for herbicides to kill or impede the growth of hardwood. Historically, wildfires would have reduced many of the thin-barked hardwoods, but native hardwoods such as red maple and sweetgum have greatly increased in dominance during a century of effective fire suppression.

Generally, even mature hardwood stands, especially on the Upper Shore, tend to be dominated by yellow poplar, oaks, sweetgum, and red maple. The red maple is usually of a lower grade and not as valuable as

[12] According to 2019 Maryland Forest Service data for timber sales from Eastern state-owned lands.

some other hardwoods. Due to the difference in value, hardwood sawtimber harvests have traditionally been dwarfed by pine harvests.

While there has also been demand for hardwood pulpwood, it is much lower than that for pine. Still, there are markets for hardwood timber mats, firewood, wood chips, and wood pellets. This demand allows for timber stand improvements in stands that would otherwise attract no economic interest or stimulate the conversion of such stand to more valuable pines.

Timberland Ownership

Ownership of the Shore's timberlands is best divided into three categories:

1. State-Owned Lands
2. Large Private Ownerships (>1,000 acres)
3. Small Private Ownerships (10 to 1,000 acres).

Eastern Shore Timberland Ownership by County

County	State Lands	Large Private >1,000 ac.		Small Private <1,000 ac.		Avg. Parcel Size Small
		Acres	Parcels	Acres	Parcels	
Caroline	1,295	1,326	1	37,993	967	39
Dorchester	14,072	1,819	3	61,741	863	72
Somerset	19,871	9,083	3	35,072	590	59
Talbot	121	0	0	28,691	837	34
Wicomico	18,858	4,094	2	46,072	931	49
Worcester	37,171	9,189	5	75,206	974	77
Total	91,388	25,511	14	284,775	5,162	55

SOURCE: MD. DEPT. OF PLANNING TAX PARCELS AND "LAND USE AND COVER" SPATIAL DATA

State-Owned Timberland is Growing

State ownership is significant, totaling 22.7 percent of all timberlands on the Shore. Most of this includes land formerly owned by the Chesapeake Corporation and the Pocomoke State Forest.

Over the last several decades, the growth was spearheaded by the state's acquisition of 50,000 acres of the Chesapeake Lands in 2000 and another 14,000 acres since then. These lands are a vital contributor to timber supply. The constraints imposed by multiple-use management of these lands coupled with the state's policy of managing these lands to meet more recreational and wildlife habitat needs means this acreage generally produces less timber than it did previously.

Few Large Private Ownerships

Larger owners are generally reliable producers of timber. Only the Forest Land Group represents ownership by a Timber Investment Management Organization (TIMO), with just over 12,000 acres on the Shore. The remaining larger ownerships belong to smaller timber or land investors or family-owned lands. However, these lands seem to be perpetually on the market; few buyers are focused on the timber value, so future availability for wood supply is questioned.

Small Private Ownerships

The vast majority of private lands are in the hands of individual owners, often as a component of a larger farm property. These smaller land ownerships are important timber producers as well. However, there are several challenges that limit harvest opportunities:

1. **Small parcels** frequently are not commercially viable since the high costs for moving logging equipment and logging are unattractive to timber purchasers.
2. **Landowner objectives** are increasingly aligned with recreational pursuits (e.g., hunting) or land development rather than timber management.

These issues contribute to the further fragmentation of forested ownership on the Shore and across the state with an increasing number of smaller parcels. The value of the timber on these lands or the inherent ability of the land to produce commercial crops of timber does not appear to be a major factor in their sales value. Rather, timber is treated as an incidental value; some landowners may take advantage of an opportunity to sell timber, particularly if the logging enhances the wildlife value, but such opportunities are not among their principal reasons for owning the land. Therefore, the result of recent trends to acquire lands for recreation on timber availability is, at best, unclear.

Growth and Harvest Removals

A quick look at growth and harvest removal data confirms state-wide trends. First, both large diameter and small diameter trees have growing opportunities for harvest. In particular, the GRR for small-diameter trees on the Shore is significantly higher than that of large-diameter trees. Similarly, the GRR for both high grade and low-grade sawtimber has increased between 2012 and 2018. Clearly, there is both an opportunity to better utilize pulpwood and to harvest larger timber.

Table 19. Growth-to-Removal Ratio (GRR) of Growing Stock by Diameter Class in Cubic Feet, Eastern Shore

	Diameter Class	2012	2018	% Change
Growth	<13"	19,843,157	26,424,217	33%
	≥13"	19,012,884	17,175,426	-10%
	Total	**38,856,041**	**43,599,643**	**12%**
Harvest	<13"	8,781,655	2,495,919	-72%
	≥13"	14,830,509	3,973,817	-73%
	Total	**23,612,164**	**6,469,736**	**-73%**
GRR	<13"	2.26	10.59	369%
	≥13"	1.28	4.32	237%
	Total	**1.65**	**6.74**	**310%**

SOURCE: FIA

Table 20. Growth-to-Removal Ratio (GRR) of Sawtimber by Grade in Cubic Feet, Eastern Shore

	Grade	2012	2018	% Change
Growth	Grade 1 & 2	16,178,332	15,837,710	-2%
	Grade 3 & Other	5,729,672	8,098,723	41%
	Total	**21,908,004**	**23,936,433**	**9%**
Harvest	Grade 1 & 2	13,794,135	2,460,440	-82%
	Grade 3 & Other	2,602,527	1,543,970	-41%
	Total	**16,396,662**	**4,004,410**	**-76%**
GRR	Grade 1 & 2	1.17	6.44	449%
	Grade 3 & Other	2.20	5.25	138%
	Total	**1.34**	**5.98**	**347%**

SOURCE: FIA

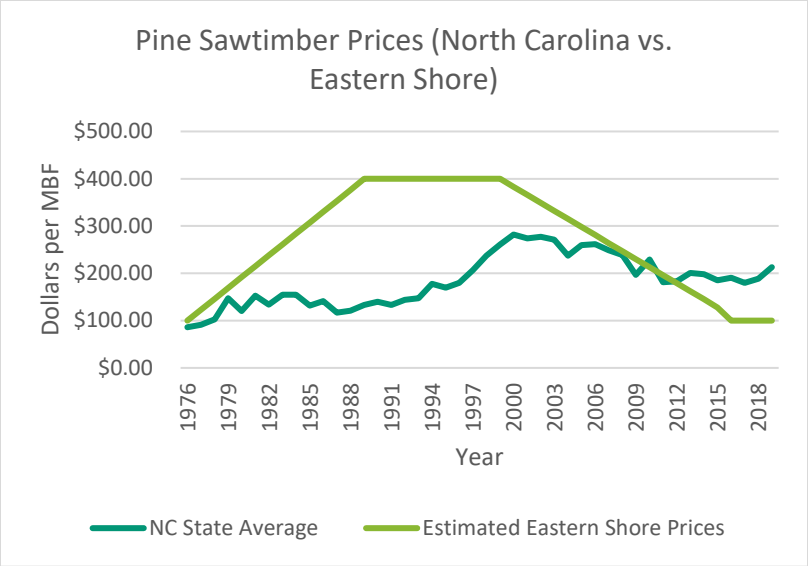
Industry Conditions

Decline in Manufacturing Capacity

In the post-war years, large forest products companies noticed the available mature timber in the region and began constructing modern mills and acquiring timberlands. Chesapeake Corporation operated a plywood mill in Pocomoke City, and Glatfelter built a chip mill in Delmar, Maryland. Even timber giant Weyerhaeuser purchased a small amount of land, and Koppers Corporation built a pole treating plant. There were also large family-owned sawmills in Maryland, such as Cropper Brothers, Paul Jones Lumber, Dorchester Lumber, Spicer Brothers, and J.I. Wells, which were substantial.

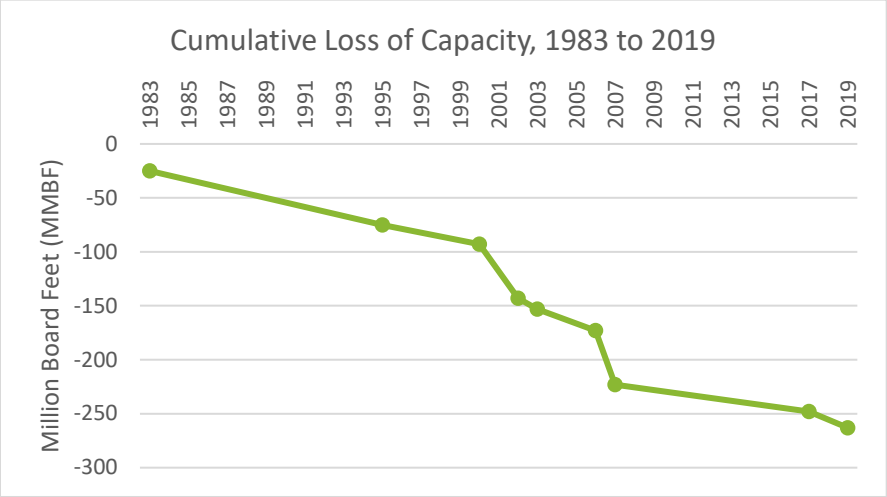
At the height of the timber boom on the Shore, around the mid-1980s, annual sawtimber harvests totaled an estimated 160 million board feet per year, or an amount equal to about 200 acres clear-cut every week, to supply the collective needs of the mills. This level of logging was probably not sustainable, with sawtimber harvests exceeding annual sawtimber growth. The reality of shrinking timber volumes and increasing competition for logs drove timber prices to record highs. At the peak, mature loblolly pine was reportedly priced at $400 per thousand board feet or as much as $6,000 per acre.

Predictably, mills began to close as competition for resources increased. Additional pressure from high mortgage rates during the 1970s and 1980s curtailed construction, adding to industry pressure. The closure of mills continued through 2018, with the loss of Cropper Brothers and Dorchester Lumber. Since 1983, there has been a cumulative loss of about 263 million board feet of milling capacity.



SOURCE: HISTORIC NORTH CAROLINA TIMBER STUMPAGE PRICES, 1976-2019, ROBERT BARDON, ASSOCIATE DEAN OF EXTENSION, DEPARTMENT EXTENSION LEADER & PROFESSOR FORESTRY & ENVIRONMENTAL RESOURCE, 2019.

At present, there are only two pine sawmills left on the Shore: Millville Lumber Company and Paul Jones Lumber Company. There are two remaining pulpwood mills: Pixelle and Eastern Shore Forest Products.[13] The consumption of these two mills is approximately 250,000 tons per year of pulpwood, some of which might be classed as small sawlogs in a different marketing area.

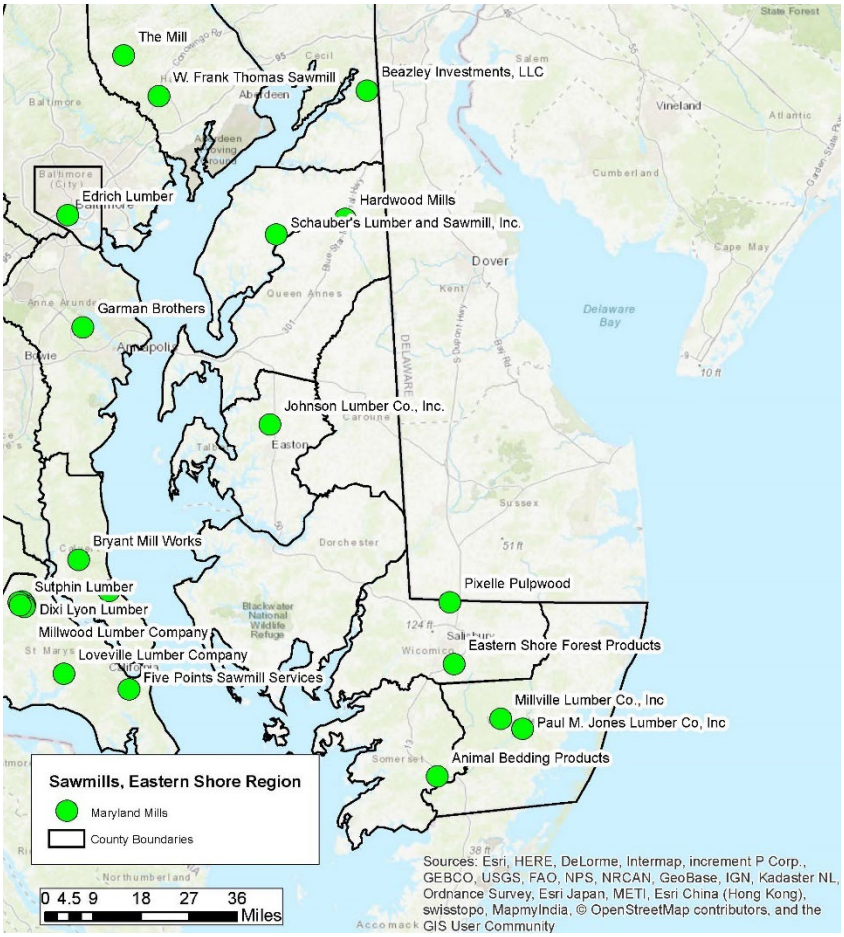


[13] Eastern Shore Forest Products is now the largest remaining forest products company in the state. It produces shavings for animal bedding, energy pellets, chips, and firewood.

Limited Capacity to Process Large Timber

The remaining forest products companies are well aware of the growing size and age of the pine timber inventory. However, the remaining pine sawmills do not have the capacity to utilize all of the bigger timber that is becoming available. Moreover, it is currently not economical or sustainable to build a large mill.

These firms point out that current economic conditions preclude the construction of a new mill that could use the large timber. The cost of a new mill is such that the only way to provide a return on the investment is to build a big mill, perhaps using 100 million board feet of logs each year, since the cost of a smaller mill is similar to that of a larger one. Also, no one believes the timber resource on the Shore could sustain a mill of that size.



Loggers and Landowners are Struggling

Loggers and landowners are integral to a healthy industry, but both are struggling. Stumpage prices are at a low, and there is little demand for pine sawlogs. Due to low prices, landowners see little incentive to invest in long-term forest management, which is reflected in the marketing of timbered parcels with prices that do not take into account timber values. Loggers are also closing business or postponing capital investments in equipment. Neither situation bodes well for a healthy, growing local industry in the future.

Industry Investment is Limited by Outlook on Resource Access

Each company on the Shore has a niche market with few competitors. Several indicated an interest in expansion, but there are obstacles. These include the multiple management objectives on public lands that were formerly private timberland that can slow or reduce timber output, changing landowner interests in forestry, public sentiment, and environmental regulations that might restrict mill expansions, all of which hamper new investments in Maryland.

There is also a feeling that the industry is neither understood nor particularly welcomed by the public. A commonly used example was the recent decision to convert the only biomass energy facility in Maryland, operated by Eastern Correctional Institute (ECI), as part of an Eastern Shore economic development strategy to increase energy availability. ECI had a three-decade history of using wood to power the facility; the decision to switch fuels will adversely affect loggers, mills, forest landowners, and the market for

small-diameter wood produced by thinnings. For many operators, this was evidence of the forest products industry being overlooked and points to the need for increased communication.

Key Opportunities

Support Expansion of Existing Industry

After undergoing consolidation due to mill closures, new investment is reinvigorating the Eastern Shore's forest product industry, and the local entrepreneurs plan to continue this growth trajectory. As operations grow and new players enter the market, entrepreneurs are seeking support in several key areas. The first relates to natural resource access. With increasing public ownership of standing timber resources, the industry is concerned about restricted access to timber inventory and looking for opportunities to consider timber availability more strongly in land acquisition and ongoing forest management policies. Second is the nature of regulatory controls for both land use and plant and equipment operations. For instance, without primary milling operations listed as an allowed use in zoning, growth and expansion become time-consuming and costly or restricted entirely. Lastly, the need to have a ready and qualified workforce is becoming a growth limiter. Expanding workforce training programs like Untangled Minds and WorkKeys may be necessary to sustain expansion.

Logistics Solutions

Being on a peninsula, most mills have difficulty developing efficient logistics. As a result, it affects both the cost and availability of inputs as well as access to markets. Finding a systems-based solution that fits the full transportation and procurement needs of the industry would be beneficial. Such a system would have embedded traceability and record-keeping systems to support the supply chain transparency required for building products, consumer products, and export markets.

Timber Exchange Through Baltimore

Baltimore and the surrounding urban areas are seeing a rebirth in secondary manufacturing and export capability as well as interest in biomass energy. These trends are creating demand for both high-quality pine timber as well as chips and biomass. Simultaneously, urban and suburban tree harvesting is making an excess supply of hardwood species that may serve the Eastern Shore's unsupplied demand. Developing marketing, procurement, and transportation linkages to bolster domestic trade between these timbersheds would be beneficial.

Southern Maryland

Key Industry Stats

61
Firms

279
Employees

$31.6 MM
Revenue

914.0 MMCF
Timber

303,678 ac.
Timberland

1,158
Private Forest Landowners

Table 21. Forest Products Industry Overview (4-Digit NAICS)

Industry	Firms	Employees	Revenues
Timber tract operations	3	5	$173,200
Logging	7	17	$2,194,200
Forest nurseries and gathering of forest products	0	0	$0
Sawmills and wood preservation	4	51	$3,458,600
Veneer, plywood, and engineered wood product manufacturing	4	91	$13,093,600
Other wood product manufacturing	26	78	$10,160,900
Pulp, paper, and paperboard mills	1	1	$92,400
Converted paper product manufacturing	1	5	$352,500
Wood furniture manufacturing	15	31	$2,124,500

SOURCE: D&B HOOVERS, 2020

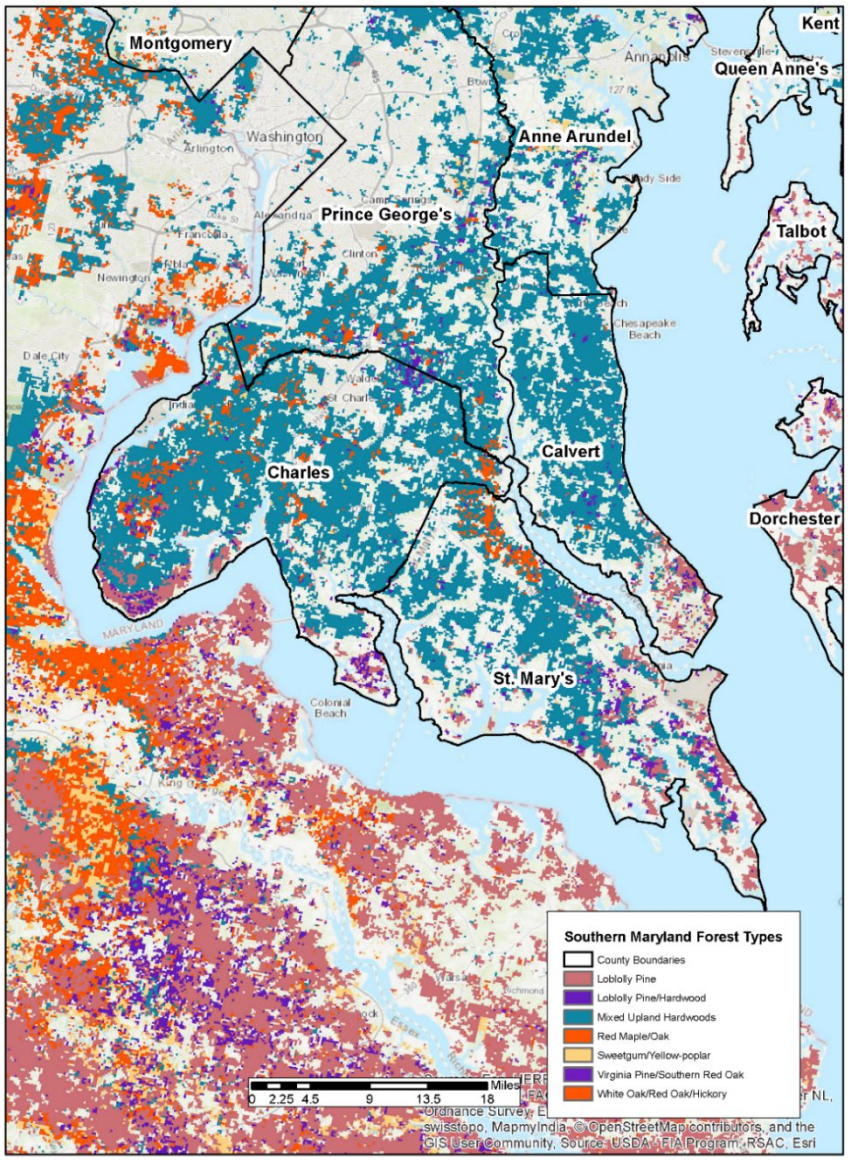
Timber Resource

The timber resource in Southern Maryland is 89 percent hardwood species. Yellow poplar, sweetgum, and white oaks represent 66 percent of the hardwoods in the region. There are also about 101 million cubic feet of softwoods, most of which is loblolly and shortleaf pine.

Table 22. Top 5 Species by Volume of Growing Stock on Timberland, Southern Maryland

Species	Cubic Feet
Yellow poplar	275,137,143
Sweetgum	122,285,069
White oaks	136,481,383
Loblolly and shortleaf pine	83,390,847
Beech	83,193,246

Source FIA, 2018



Timberland Ownership

Most of the timberland is under private ownership. Timberland under private ownership has declined 26 percent, while timberland under county and municipal ownership has increased 335 percent over the same period. This has significant implications for access to timberland. As development has increased in the area, many private landowners have sold their timberland. Meanwhile, most of public ownership is represented by growth in county and municipal ownership. This reflects the desire for communities to have public parks and green spaces. Meanwhile, there are four state forests that represent about 6,376 acres of forestland.

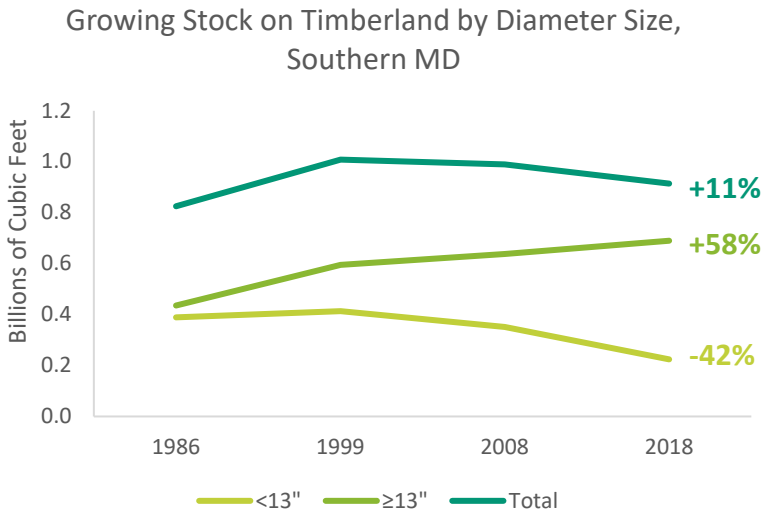


Table 23. Timberland Acres, Southern Maryland

Ownership	1986	1999	2008	%	% Change
County/Municipal	3,309	5,005	10,730	14,393	335%
Private	356,020	325,100	324,266	264,611	-26%

SOURCE: FIA

Timber Availability

Like Central Maryland, timber availability is diminishing as a result of development. Currently, there are about 162,785 acres of harvestable forestland. However, unlike Central Maryland, the average property has 42.7 acres of harvestable forest. It is more economically feasible to harvest timber from larger properties.

Declining Inventory and Larger Trees

Although the timber inventory has increased eleven percent since 1986, inventory growth appears to be declining or stagnating. Since 1999, timber inventory has declined 9 percent. This is largely driven by a decline in smaller diameter trees. Meanwhile, the volume of larger diameter timber is getting larger over time. Similarly, data on stand size shows that poletimber stand size has declined 27 percent since 1986 while sawtimber sized trees have increased 15 percent.

Table 24. Volume of Growing Stock by Stand Size in Cubic Feet, Southern Maryland

Stand Size Class	1986	1999	2008	2018	% Change
Sawtimber	748,831,647	902,109,435	949,752,754	864,168,988	15%
Poletimber	60,021,976	95,091,339	34,473,714	43,891,290	-27%
Seedling-sapling	16,328,447	11,137,237	5,245,757	5,983,534	-63%
Total	825,182,070	1,008,338,011	989,472,225	914,043,812	11%

SOURCE: FIA

Increase in Higher-Value Timber

In 2018, 61 percent of the sawtimber volume was Grade 1 or Grade 2, and 39 percent was Grade 3 or other. Since 1986, there has been consistent growth in the inventory of higher grade sawtimber. This suggests that there is a growing inventory of larger and higher-value timber.

Table 25. Net Sawlog Volume of Sawtimber by Grade in Cubic Feet, Southern Maryland

Tree Grade	1986	1999	2008	2018	% Change
Grade 1 & 2	150,690,981	362,286,786	386,761,843	412,922,884	174%
Grade 3 & Other	489,902,712	281,930,696	287,660,208	259,191,917	-47%
Total	640,593,693	644,217,482	674,422,051	672,114,801	5%

SOURCE: FIA

Growth and Harvest Removals

Unlike the other timbersheds, Southern Maryland has experienced a decline in the GRR for all timber, although the rate is still positive, indicating more volume growth than loss. This is driven by declines in GRR for larger diameter trees (>13 inches d.b.h.), where declines in harvests (-4 percent) are much slower than the declines in growth (-42 percent). Meanwhile, the timbershed follows the same GRR growth trends for smaller diameter trees as that of the other regions. The GRR data for sawtimber shows that there are opportunities to harvest both higher-grade and lower-grade timber sustainably.

Ultimately, this data suggests that there is more harvesting activity in this area than in the other timbersheds. This is likely a result of growing residential and commercial development as well as a reflection of the Amish and Mennonite communities that engage in niche wood product manufacturing.

Table 26. Growth-to-Removal Ratio (GRR) of Growing Stock by Diameter Class in Cubic Feet, Southern Maryland

	Diameter Class	2012	2018	% Change
Growth	<13"	4,643,519	3,131,629	-33%
	≥13"	12,250,183	7,094,109	-42%
	Total	**16,893,702**	**10,225,738**	**-39%**
Harvest	<13"	922,757	471,279	-49%
	≥13"	4,880,980	4,686,364	-4%
	Total	**5,803,737**	**5,157,643**	**-11%**
GRR	<13"	5.03	6.64	32%
	≥13"	2.51	1.51	-40%
	Total	**2.91**	**1.98**	**-32%**

SOURCE: FIA

Table 27. Growth-to-Removal Ratio (GRR) of Sawtimber by Grade in Cubic Feet, Southern Maryland

	Grade	2012	2018	% Change
Growth	Grade 1 & 2	16,178,332	15,837,710	-2%
	Grade 3 & Other	5,729,672	8,098,723	41%
	Total	**21,908,004**	**23,936,433**	**9%**
Harvest	Grade 1 & 2	13,794,135	2,460,440	-82%
	Grade 3 & Other	2,602,527	1,543,970	-41%
	Total	**16,396,662**	**4,004,410**	**-76%**
GRR	Grade 1 & 2	1.17	6.44	449%
	Grade 3 & Other	2.20	5.25	138%
	Total	**1.34**	**5.98**	**347%**

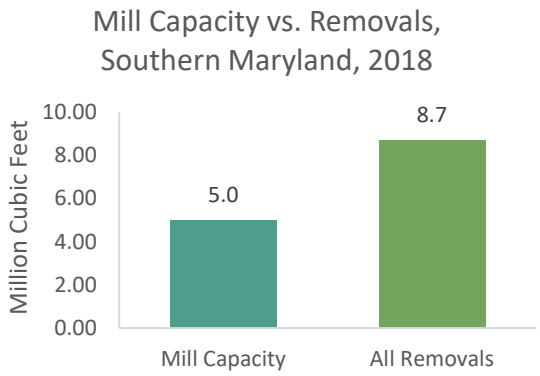
SOURCE: FIA

Industry Conditions

Manufacturing Capacity

Southern Maryland sawmills are small, each producing less than 5 million board feet of lumber each year. Many are located on farm properties, perhaps only running part-time.

Many are also owned by Amish and Mennonite families, with earnings largely flowing to the church through the individual owner/operator. Little is known about mill throughput and end product use within this segment of the industry. It is believed that much of the output is sold directly to the end-user or used for final product manufacturing and as building supplies within the communities themselves.



SOURCE: MARYLAND DNR; FIA, 2018

The local mills have developed a specialized clientele for mill products. They produce a variety of largely hardwood products, ranging from boards for fencing or local construction to higher quality components for furniture finish lumber that is used in cabinets or other residential or commercial construction. Others are exporting logs and intermediate products to Virginia, Pennsylvania, and New York to be used in finished product manufacturing, such as piano sound boards.

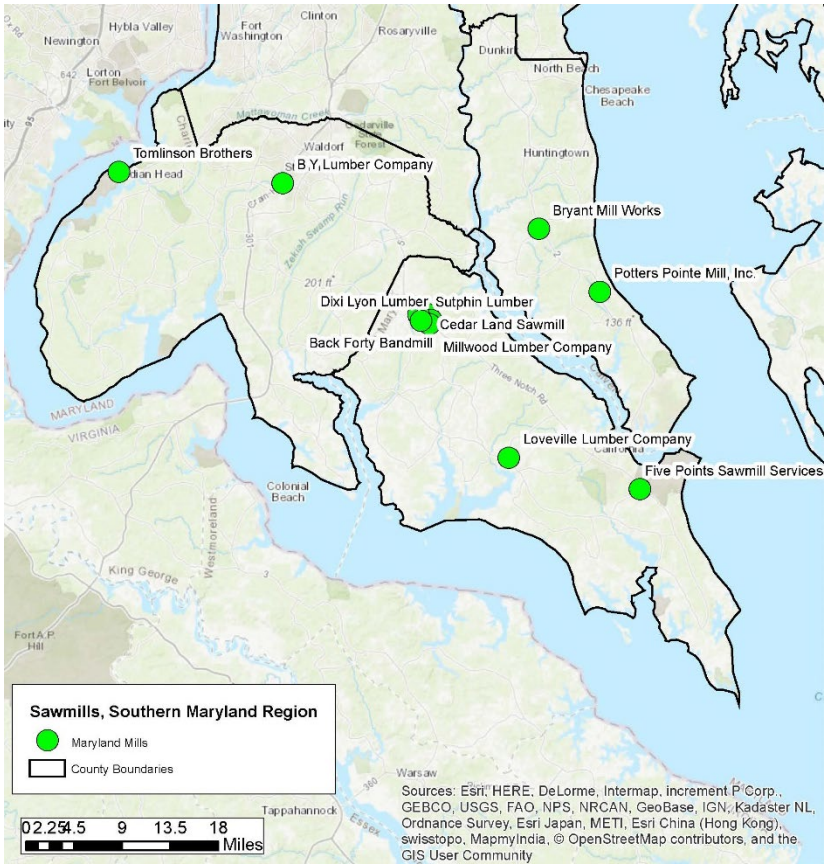
Exports out of the Region

Mill capacity and removal data suggest that Southern Maryland exports wood to other regions. The proximity of Southern Maryland to larger mills in the Northern Neck or eastern Virginia means that much timber is exported from the region. Before its closure, the Verso Mill in Luke acquired significant volumes of pine pulpwood from Southern Maryland.

Key Opportunities

Urban Wood Aggregation

Rapid urbanization in the region means that Southern Maryland should consider joining Central Maryland in creating a linked system of urban wood aggregation facilities tied together by shared software systems. Such systems would enable traceability, transaction, and certification for clients ranging from DIY woodworkers to wood energy projects and could document sustainable sourcing of wood supplies.



Unique Building Product Promotion

Southern Maryland could benefit from promoting the manufacturing and sale of mass timber, thermally modified wood, hardwood cross-laminated timber (CLT), and panel veneers using its abundance of yellow poplar. In addition, these materials can serve niche markets for decking, outdoor panels, bridges, acoustic walls, and small building kits. Building or expanding mills for this purpose may require the adaptation of local zoning ordinances.

Develop Wood Product Branding

The strong regional identity, combined with small vertically integrated mills and a large consumer market, makes the development of a branding and marketing campaign a logical next step in supporting sales growth. Furnishings, cabinets, and small wares are the most likely markets to respond to such activities. As these markets expand, small manufacturers indicate that more advanced workforce skills will be necessary.

Wood Energy at the Community Scale

With abundant low-value species and an increasing supply of urban wood waste, the region should support the adoption of community-scale wood energy projects associated with new commercial, industrial, and residential building projects. These systems could supply heating, refrigeration, and electricity to micro-grids while supporting regenerative forest uses. Local sourcing of affordable fuel, use of modern clean and efficient technology, and contributions to funding forest health practices mean wood energy brings a range of environmental benefits along with the economic value.

Summary

With the wide diversity of forest types, accessibility issues, and primary manufacturing industry structure, Maryland's timbersheds function independently of one another with little interaction or connection across the timbershed regions. The industry lacks a cohesive approach to policy and market development, which is also reflected in declining participation in statewide programs. Clear changes in policies and investments are needed in forest industry growth to counteract negative reinforcement of declines in harvests and loss of economic opportunities; this was seen in the loss of the fumigation operations in the Port of Baltimore, which influenced revenue in all four timbersheds.

Section IV: Statewide Opportunity Analysis

Wood Products Branding

Maryland consumers are highly motivated by their psychographic characteristics to make purchases based on strongly held values. As evidenced in Section II, more than one-in-three Maryland consumers have a preference for domestically made products, twenty percent want to help the environment, fourteen percent will pay more to purchase products that have an environmental benefit, and eleven percent value green products more than convenience.

Marylanders are large consumers of wood products, using more than 278 million cubic feet of wood products each year. The volume and diversity of these products lead to an enormous opportunity for building greater trade between makers of wood products and values-driven consumers. However, the mechanisms for linking consumers to certified products are missing even though there is ample evidence that the demand exists. Local companies such as Wood Products Inc., Sandtown Furniture, and OE Custom and national companies like Room & Board have all proven that Maryland customers have quantifiable demand for local wood products.

Linking wood products to the achievement of environmental goals such as clean water, carbon sequestration, habitat protection, and soil protection are means to add value to wood products by monetizing the positive externalities of well-managed, healthy forests. There is currently no branding or market certification program to help Maryland wood product producers trace and track these benefits, which leaves them at a disadvantage relative to competitive products that are certified by organizations such as the International Living Future Institute.

Given the disparate products and interest areas covered by Maryland's forest product operators, the best way to bridge the gap between consumers and producers is through a certified branding program. Branding is a business process that builds a values-based relationship between products, corporations, and customers based on highlighting the different and unique characteristics of the products, marketing systems, and businesses involved. Ultimately, brands build customer loyalty through trust in underlying value promises.

Although it may be self-evident, Maryland's forest product industries cannot currently satisfy the full wood product demand. It is important to acknowledge that the branding program must focus on those product categories where real value exists.

Relationship to Resources

According to the Chesapeake Bay Program, well-managed forests are essential to Bay health and strong rural economies.

"Forests are critical to the health of the Chesapeake Bay. Large stands of trees protect clean water and air, provide habitat to wildlife and support the region's economy... Conserving and expanding forest cover is a critical, cost-effective way to reduce pollution and restore the Bay." Source: www.chesapeakebay.net

While it is unreasonable to assume that all, or even a significant portion, of the 278 million board feet of demand can be supplied by local industry, minor increases in local purchasing can improve the industry outlook. It may even create demand for species that are invasive or too dominant, such as ornamental pears and soft maple. Moreover, supporting sustainable harvests and wood product manufacturing can align with consumer interests for sustainable and environmentally friendly products and bolster the ability to maintain rural landscapes critical to healthy watersheds.

For any branding program to function properly, it must certify the relationship between the extracted resource and the end product. Among the most essential elements of certification is the renewability of the timber. By example, timber harvested from a forest under best management practices would be more desirable in the certification system than timber harvested as part of a land clearing process. Similarly, repurposed urban wood and wood diverted from waste streams would be more desirable than wood harvested as part of building a housing development. To meet both industry objectives and Bay health objectives, any certification system should also promote the creation of forested acres through afforestation and reforestation, as well as an accretion of forest biomass.

Regions and Industries Impacted

This recommendation affects the entire forest products value chain and all timber areas of the state, including urban market areas with active wood reclamation and urban forestry programs.

Supporting the Opportunity

Supporting this opportunity will require coordination between the private and public sectors as well as vertical coordination within the forest products value chain.

- Build and strengthen relationships between Chesapeake Bay advocates and the forest products industry.
- Create a buy-local purchasing preference with branded products that meet Bay health certification standards.
- Create incentives for secondary manufacturers to expand operations and product offerings to include branded items.
- Improve supply chain coordination with track and trace capability and common certification standards that allow supply chain visibility from timber source to end product.
- Support primary and secondary mill expansion to meet program demand.
- Develop media and public outreach strategies to develop consumer understanding of the link between forest products and positive environmental externalities.
- Manage state forests to support positive branding program outcomes.
- Improve urban aggregation and source tracking.

Biomass Energy

There are two woody biomass energy opportunities in Maryland, both of which impact different regions within the state. The first involves local bioenergy generation through woody biomass, which is mostly applicable to urban areas in central Maryland. Combined heat-and-power (CHP) and other bioenergy uses, such as thermal energy, allow cities to reduce greenhouse gas emissions and increase renewable energy production. In 2006, the State of Maryland identified 3,700 possible sites for CHP plants.

The second is the development of wood pellet manufacturing capacity in Maryland as a fuel for thermal energy and bioenergy. Existing manufacturers in Western Maryland and on the Eastern Shore can expand or develop the capacity to process wood harvested in the region. Also, the Verso Mill in Luke can be converted to make advanced pellets, which are hydrophobic and do not require covered storage or specialized handling.

The successful multi-year operation of the Verso Mill shows it is possible to economically source pulpwood, even if it produced wood pellets rather than paper. However, Maryland is one of the only eastern states without a biomass densification plant, leaving it out of a regional industry that produces nearly $385 million in output[14]. That market is driven by renewable fuel standards that allow biomass, the cost of pulpwood and fuel alternatives, and residential and commercial growth. A clear role for biomass in the Maryland renewable energy portfolio standards will be important in realizing a biomass market that can compete with surrounding states. Particularly important is the role of thermal renewable energy credits (Thermal RECS) since wood is particularly well-suited for heating applications while offsetting fossil fuel use and making forest health practices like thinning affordable to all landowners.

Relationship to Forest Resources

Maryland has a strong supply of trees suited for wood pellet production. About 25 percent of the standing woody biomass is pulpwood. Another 16 percent, or 27 million dry tons, is non-merchantable biomass (treetops and limbs; small or cull trees). These forest residues and thinnings are also ideal for pellet production.

In particular, Western Maryland has access to a regional timber supply and has manufacturing capacity that could produce wood pellets at a competitive scale. This table lists growth-to-removal ratios for several species within 100-miles of the Luke Mill and suggests the opportunities to harvest low-grade wood are

SPECIES	TOTAL	GRADE 1 & 2	GRADE 3 & OTHER
Softwoods	8.73	6.67	4.12
Eastern white/red pine	351.042 [15]	--	--
Hardwoods	3.50	1.85	2.63
Soft Hardwoods	3.22	1.74	2.54
Yellow poplar	3.19	1.89	4.86
Hard Hardwoods	3.22	1.93	2.70
White Oaks	3.64	2.17	4.80
Red Oaks	2.96	2.40	2.02
Hard maple	3.80	0.82	7.03

[14] [14] State level pellet output information can be found at the US Energy Information Administration https://www.eia.gov/biofuels/biomass/

[15] The growth-to-removal ratio for this species is extraordinarily high since very little is currently being harvested. Total harvests in the region are 48,654 cubic feet, whereas net growth is 17,079,379 cubic feet.

generally greater than that of high-grade wood.

Conversely, central Maryland has few commercial timber tracts but can use urban tree waste as a source. Urban tree cover is managed by cities and under significantly different regulatory structures. Most trees are taken down and mulched but could be put into use as a local energy source. There is a potential for 880,000 dry tons of urban-derived biomass fuel wood chips annually.

Ultimately, the challenge in Maryland is a lack of energy facilities to use this product. Woody biomass will be a modest component of a renewable energy future, but one that is critical for forest health. Where it fits with the heat and power demands of a facility and access to low-cost local wood supply, it helps build the resilience, sustainability, and local jobs that many communities now desire.

Regions Impacted

- Western Maryland: manufacturing capacity
- Central Maryland: CHP uses, fuel sources, reduced greenhouse gas production

Supporting the Opportunity

Using both urban wood waste and pulpwood, Maryland is well-positioned to sustainably support one or more biomass densification plants with nearly 2 million tons of output and $372 million in sales. Support will positively impact sawmills, timber tract operations, and logging.

- Improve Tier 1 Renewable Portfolio Standard to allow greater merchantable timber use.
- Allow Thermal Renewable Energy Credits to incentivize new clean and efficient woody biomass technology, building on wood energy strengths for providing heat or combined heat and power.
- State and local governments should coordinate with a State Wood Energy Team to enable biomass as a desired clean energy alternative in conjunction with other renewable sources.
    - Expand technical assistance for adoption of clean, efficient wood energy systems tailored to local energy needs and wood supply.
    - Improve permitting process.
    - Allow CHP as a community-use asset to allow efficient energy solutions.
    - Improve understanding and acceptance of biomass energy among consumers, corporations, agencies, and institutions.
        - Coordinate with the Renewable Thermal Collaborative, Biomass Thermal Energy Council, and the Mid-Atlantic Biomass Energy Council.
        - Identify community and economic contributions of wood energy projects to prioritize those with the greatest benefits.
        - Work with community Green Teams and corporate sustainability interests across Maryland to promote biomass energy.
        - Conduct outreach with engineers and architects to support use of biomass energy in project planning and design.
    - Incentivize the transition to biomass heat and combined heat and power.
    - Support greater conventional financing of biomass energy projects.

Building Product Exports

The US exported more than $39 billion worth of wood building products in 2018. Rapidly expanding wealth in key export markets is creating demand for new construction. Urbanization is also spawning demand for products associated with redevelopment and adaptive reuse, such as converting old industrial facilities into housing and new construction. This trend has opened opportunities for both commodity producers of building products and custom manufacturers of specialty products like the large wooden beams required for the renovation of 19th-century buildings.

In particular, Maryland can take advantage of the growing demand through niche building products. Perhaps the most important factor is the strong base of entrepreneurs and workforce with both the cultural and business flexibility to produce high-end niche products for international specialty markets.

Ultimately, Maryland building products are likely to be exported to Europe. Europe now receives most of Maryland's wood product exports. In 2019, Maryland exported about $12.9 million worth of products to Europe. Most of this went to the UK, Italy, and Belgium. Since the European construction market is expected to grow at 4.4 percent CAGR through 2023, there is an opportunity for secondary manufacturers in Maryland to increase the production of wooden windows, doors, pallets, crates, prefabricated building components, and other millwork that will be used in a variety of buildings.

Relationship to Forest Resources

The state has the timber resources to access export markets. Among the many positive characteristics of Maryland's wood supply is a growing inventory of large diameter logs that can be used for structural beams in adaptive reuse projects, custom architectural millwork, three-dimensional veneers, custom flooring, and similar products. The wide range of species available in Maryland forests adds to the diversity and custom nature of its specialty product potential.

Regions Impacted

- Central: wood building product manufacturers and workforce; exports through the Port of Baltimore.
- Southern: niche building product manufacturers.

Supporting the Opportunity

Supporting these efforts will positively impact industries that manufacture wood windows and doors, millwork, flooring, wood containers and pallets, manufactured homes, prefabricated wood buildings, and other wood building products.

- Encourage participation in green certifications.
- Implement supply chain transparency through a traceability program.
- Encourage collaborative product development within the state's forest products industry.
- Provide up-to-date market intelligence.
- Build strong supply chain relationships through networking and coordination efforts.

Furniture Exports

The global wooden furniture market was valued at around $395 billion in 2018 and is projected to grow at 5.5 percent CAGR between 2019 and 2025. Wooden furniture represents about 60% of the global furniture market. The share of wooden furniture sales is expected to continue to grow due to key demand drivers such as residential construction, tourism, and consumer demand for green products.

An increase in spending on household furnishings by high-wealth and high-income households in both the domestic and international markets will be favorable for Maryland manufacturers. These households drive a market for unique, high-end products that may favor small job shops such as those found in Maryland and around the Appalachian hardwood production area.

Maryland furniture makers are expected to continue export to Canada. Furniture exports to Canada have increased by 13% over the last four years. In 2019, Maryland exported a total of $92.8 million worth of furniture in 2019.

Relationship to Forest Resources

Different types of furniture products will require different wood inputs. Generally, the two main categories of wooden furniture are solid wood furniture and wood panel-based furniture. The former often requires large diameter wood of higher grade. Much high-end furniture is made from popular hardwood species such as oak, birch, walnut, and mahogany. This trend presents opportunities for Maryland firms since 83 percent of the timber resources in the state are hardwood. Additionally, the data shows that the trees are growing larger in diameter, and little is harvested.

Meanwhile, wood panel-based furniture is usually constructed from plywood, laminated plywood, or reconstituted wood products (e.g., particleboard, oriented strand board, fiberboard). Plywood requires a veneer, which comes from large-diameter trees. Reconstituted wood products are typically made by combining wood chips, shaving, and sawdust with resins. These products are generally cheaper and use lower quality wood.

Regions Impacted

- Central: furniture manufacturers and workforce; exports through the Port of Baltimore.
- Southern: niche furniture manufacturers.

Supporting the Opportunity

Supporting efforts will primarily impact industries that manufacture wood cabinets, countertops, upholstered and non-upholstered household furniture, and office furniture.

- Create workforce development programs that improve access to skilled labor.
- Fund research and development to understand market needs and to create competitive advantages in design or manufacturing.
- Develop strong international partnerships through an active trade development program and broker network.
- Encourage collaborative product development.
- Encourage participation in green certifications.
- Implement supply chain transparency through a traceability program.

High-Value Log Exports

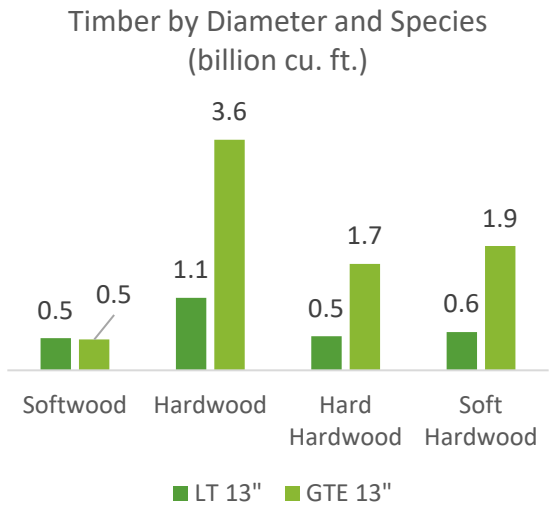
The trade of high-value, non-commodity logs is a viable market for Maryland loggers who wish to find alternatives to the diminishing market for pulpwood. High-value logs are used for a range of products, including beams for restoration projects such as the Cathedral of Notre Dame, oak staves for wine casks, and specialty hardwood veneer for furniture.

According to the International Trade Commission, the global market in the log trade is large and growing, with more than 2 million cubic board feet of logs moving between nations in 2019. Most of these logs are bound for processing as a fiber source for paper processing, lumber, or biomass energy. However, a small portion is reserved for specialty market applications and escapes the low-value commodity trade patterns associated with the aforementioned uses.

Relationship to Forest Resources

Maryland is a known producer of high-value logs in both hardwood and softwoods. The state's log exports are driven by the favorable production climates and suitable soils that produce the grain, color, physical and chemical characteristics that many buyers seek. The timber resource is also matched to niche log export markets.

In particular, the growing number of large-diameter hardwood trees offers significant options for cutting butt sections of varying lengths with grade and the interior and exterior characteristics sought after by the buyer.



Regions Impacted

- Western: large diameter hardwood for industrial roundwood exports
- Central: high-value exports through the Port of Baltimore
- Eastern: large diameter hardwood for industrial roundwood exports.

Supporting the Opportunity

Supporting these efforts will primarily have positive impacts on timber harvesting industries as well as sawmills.

- Encourage participation in green certifications.
- Implement supply chain transparency through a traceability program.
- Help firms acquire sustainable forest management certifications.
- Attract or develop phytosanitary services.
- Develop strong international partnerships through an active trade development program and broker network.

Mass Timber

Mass timber is a rapidly emerging opportunity in the building products industry in the US that has seen nearly 20 percent annual growth over the last decade. Demand is driven by new residential and commercial building starts, adoption of high-density development, and an increased interest in renewable building products. Mass timber and other durable wood building components represent long-term carbon sequestration as well as attractive building materials.

These are engineered wood products that are manufactured into structural components or wood panels by binding fibers, strands, or boards in layers to form a composite material. Specific product characteristics, combined with relatively low cost of deployment, are driving its use in both commercial and residential construction. Key benefits include increased construction speed, fire resistance, stability, and thermal performance. Environmental impacts and structural weight are also reduced.

Areas in the Pacific Northwest, Upper Midwest, and Southeastern US have been quickest to adapt to this marketplace and are leading product delivery in a $300 million (2019) market. With the three-story mass timber overbuild now underway at 80 M Street, SE in Washington DC, this may soon change. Currently, limited adoption of the 2021 Building Code is the biggest limiting factor.

Softwoods are traditionally the source component for mass timber, especially CLT and Glulam. However, research is being conducted to determine the efficacy in these applications of yellow poplar, a prevalent tree species in Maryland. If successful, this could lead to Maryland supporting the first mass timber fabrication site in the Mid Atlantic.

Relationship to Forest Resources

Maryland is unlikely to use its own timber resources for manufacturing mass timber. The first reason is that most mass timber products use softwoods. Most of the softwood is on the Eastern Shore, but that supply is already dedicated to other products, and Southeastern supply is both readily available and competitively priced. Maryland is a large potential demand generator for mass timber. However, it seems likely that the building products industry or homebuilding industry will construct a fabrication plant in the near future to produce CLT and architectural products.

As noted above, there is research at West Virginia University and Virginia Tech using soft hardwood for CLT. Yellow poplar is the most promising species since it is strong, abundant, inexpensive, and has good mechanical properties compared to softwoods. Luckily, about 24 percent of Maryland's hardwood inventory is yellow poplar. (1.13 billion cubic feet). Western Maryland has 86.4 million cubic feet, Central Maryland has 503.0 million cubic feet, and Southern Maryland has 406.5 million cubic feet. However, issues such as small timber tract sizes, shifting ownership of objectives of public and private forest landowners, and other regulatory obstacles make it economically infeasible to harvest and transport.

Because Appalachian hardwoods are currently the amplest supply of inputs for mass timber, the opportunities to link the timber harvest sector to mass timber production may be limited until hardwood CLT and Glulam are approved for structural use. The two likely scenarios are using hardwood for architectural and design products such as machined hardwood CLT and thermally modified wood countertops. Using hardwood veneer to add design features and contrast to mass timber products is also an option.

Regions Impacted

- Western Maryland: Manufacturing capacity
- Central Maryland: Residential, commercial, and institutional construction; product development and product testing support.

Supporting the Opportunity

This is a rapidly growing industry, particularly in the high-density residential sector. Supporting this opportunity will have positive impacts on the wood panel manufacturing, sawmill, manufactured home manufacturing, prefabricated wood building, residential construction, and non-residential construction sectors.

- Most capital-intensive opportunity, requiring a high-volume sawmill and CLT plant.
- Supply chain sustainability and visibility must be supported.
    - Sustainable forest products (e.g., Living Building)
    - Supply chain certifications (e.g., LEED)
- Building codes must be updated to 2021 Code.
    - Supports CLT.
    - Introduces new fire code standards.
- Increased investment in hardwood CLT building product research to go beyond yellow poplar.
- Better introduction of the benefits of CLT in residential and commercial construction.
- Enhanced innovation and product testing support through the National Building Products Laboratory.
- Improve market support demonstration project.

Large Diameter Log Processing

As the Maryland timber industry has shifted, harvesting patterns have changed. The slowing of harvests has led to more, larger diameter trees becoming available for harvest. These logs can be processed into several products that feed into the construction and furniture markets, some of which can be manufactured within existing capacity throughout the state.

Manufacturing of poles and pilings, architectural beams, and wood panel products are the most feasible expansion opportunities within the existing industry structure in the state, given their equipment and asset structure. This expansion would require changes such as the adoption of timber bridge and guardrail standards on minor arterial roads. Production of construction lumber, veneer, and CLT is also possible. Currently, the high level of investment required at the primary mill level makes these less likely.

Opportunities (probability):

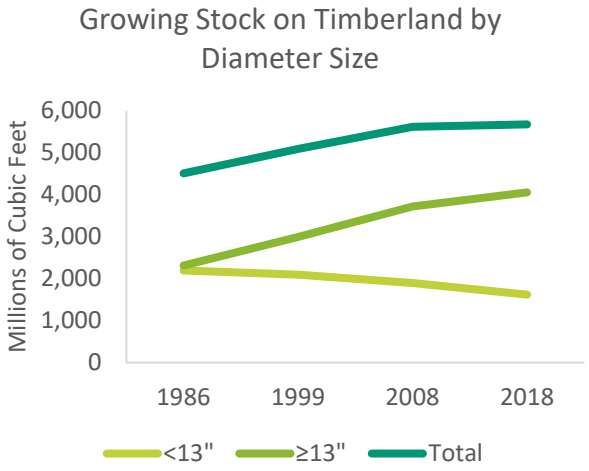
- Poles/Pilings (very high)
- Architectural beams (very high)
- Barrel Staves (high)
- Construction timber (medium)
- Wood panel products (medium)
- Veneer (low)
- CLT/Glulam (very low)

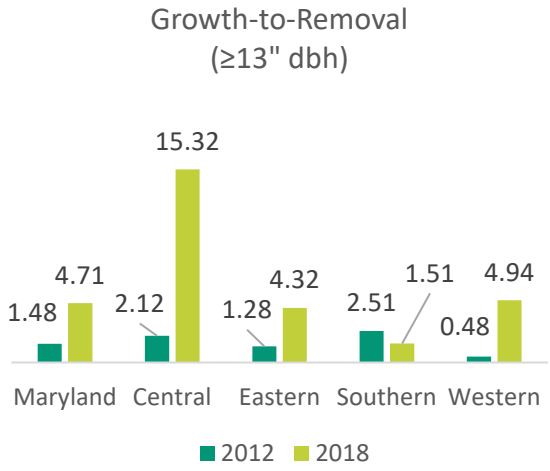
A number of factors drive the markets for these products. They are affected by the level of construction demand, export regulations, state forest management policies, and the capital costs for mills.

Relationship to Resources

The total volume of timber resources has increased by 26 percent over 32 years from 1986 to 2018. This growth comes despite an 11 percent decline in timberland area over the same period, so forest stands are becoming denser, overstocked, and contain larger trees. This change is a key reason for the decline in harvesting across the state and changing land management goals, including expanded public land acquisition for recreation and habitat priorities, particularly on the Eastern Shore. Current data suggests that harvest activity across the state declined 56 percent during this period.

More importantly, there is a growing opportunity to harvest large diameter trees. There is a stark divergence in the volume of trees that are at least 13 inches in diameter and that of trees less than 13 inches in diameter. Larger diameter trees increased by 75 percent, while smaller diameter trees declined by 26 percent. Additionally, the growth-to-removal data shows opportunities for additional harvests.





Regions Impacted:

- Western Maryland: hardwoods for wood panels, veneer, mass timber, construction timber
- Eastern Shore: softwoods for poles/pilings, architectural beams.

Industries Impacted

- Logging
- Timber Tract Operations
- Sawmills and Wood Preservation
- Veneer, plywood, and engineered wood product manufacturing.

Supporting the Opportunity

Markets for large diameter trees are varied and diverse, allowing for all elements of the vertical supply chain to participate in market development activities on both domestic and international markets. Industries positively impacted by the support include timber tract operations, logging, sawmills, wood preservation, and veneer, plywood, and engineered wood product manufacturing.

- Improve permitting for the use of wood energy to fuel dry kilns and boilers.
- Provide for consistent forest harvest regulations across the state that support efficient, sustainable timber management.
- Develop fumigation alternatives, such as steam pressure fumigation and debarking.
- Explore market opportunities in adjoining states.
- Encourage the use of timber bridges and wooden road barriers.

Support Urban Wood Processing Businesses

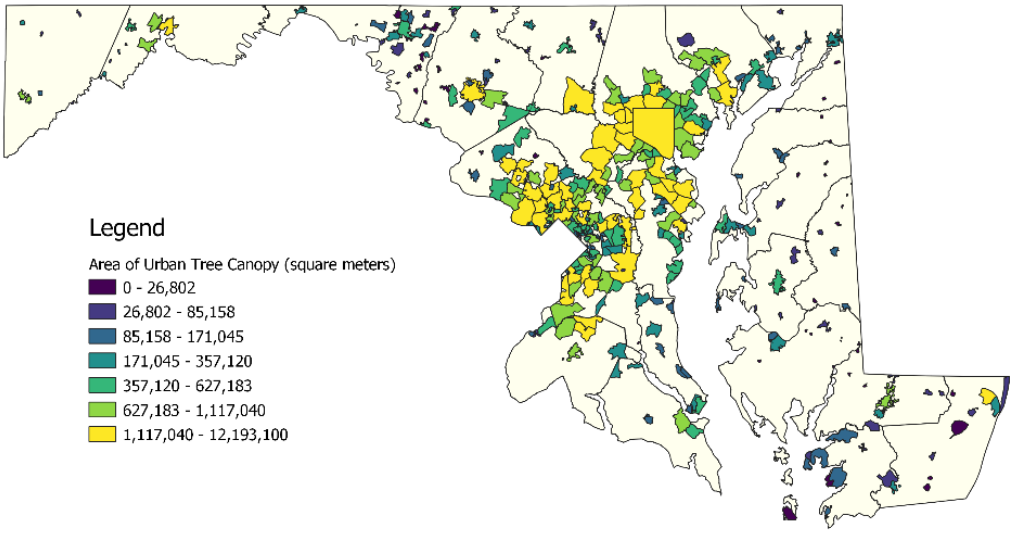
Research suggests that urban tree waste is underutilized in the United States. Maximizing the value of urban wood depends on the quality of the tree and its potential markets. Most urban tree removals involve tree debris, wood waste, and diseased trees. This wood tends to be more suitable for lower-value products such as wood chips, firewood, compost, or biochar. However, there are opportunities to convert urban wood into lumber, secondary products, or niche products that garner higher prices driven by the demand for local and eco-friendly products.

Much of the natural wood waste (NWW) in Maryland is currently redirected to make compost and mulch. NWW includes tree stumps, brush and limbs, root mats, logs, and other natural vegetative materials. While most of these materials are not suitable for wood products, logs from land clearing or fallen trees due to weather can be used for a higher value product.

Similarly, other urban wood wastes such as pallets, crates, lumber, wood chips, firewood, or products made from NWW is often sent to landfills and is not considered. This presents an opportunity for wood sorting and processing facilities that can upcycle salvaged wood for its best use. Initiatives such as the Baltimore Wood Project, which brings partners together find thoughtful solutions to urban wood "waste" in Baltimore City, demonstrate this mechanism and should be encouraged across the state.

Relationship to Forest Resources

Tree canopy covers about 28.0 percent of Maryland's urban land, most of which is located in Central Maryland. This translates to a total of 33.1 million tons of above-ground dry-weight biomass from urban forests. However, not all of this will be removed, and not all removals are merchantable. The USDA Forest Service estimates that there are about 0.8 million tons available annually, which converts into 1.1 million tons of fresh-weight merchantable urban wood in Maryland.



Generally, urban wood waste is created through land clearing for new development, residential landscaping activity, demolition and construction, municipal maintenance of streets and parks, and trees that fall from weather events. Some of these materials are categorized as yard trimmings, which end up as compost or mulch. However, the more relevant category of urban wood waste is natural wood waste

(NWW). In 2016, 46 facilities accepted 484,079 tons of NWW and recycled 429,121 tons. Unfortunately, MDE does not have data on the total quantity of NWW generated. Additionally, other wood waste is either unaccounted for or ended up in the landfill. Nonetheless, the data suggests that there remains ample opportunity to utilize urban wood waste better to reduce waste streams and capitalize on a renewable and biodegradable resource.

Table 28. Potential Biomass Products and Values from Urban Wood Waste Assuming 2% Mortality Rate

Merchantable Value ($ Million)					Non-Merchantable Value ($ Million)
Logs (tons)	Logs (bf)	Pallets	Firewood	Chips	Chips
18.1	18.8	15.1	8.3	1.4	0.8

SOURCE: NOWAK ET AL., 2019

When examining urban areas such as Baltimore, it becomes clear that there is a large supply of urban wood waste. In fact, about 17% of the country's urban wood waste is generated within a 225-mile radius (a five-hour drive time) of Baltimore City. The 8.3 million tons of urban wood waste includes reclaimed lumber from construction and demolition activity as well as "fresh-cut" wood generated through arborists, landscapers, and utility tree trimming.

Chart 1. Baltimore Region Urban Wood Supply

SOURCE: INNOVATION WORKS, 2021

Regions Impacted

- Central Maryland: boutique manufacturing, CHP, stormwater remediation, sorting/processing
- Eastern Shore: mill purchases of timber and waste wood exchange

Supporting the Opportunity

The success of the Baltimore Wood Project points to significant opportunities to build new relationships among forest product operators that leverage the unique industry strengths within Central Maryland.

- Support development of a circular economy consistent with sustainable materials management.
- Include woody biomass in a waste reduction and resource recovery strategy.
- Create awareness and demand from consumers and industry.
    - Educate consumers on the benefits of using locally sourced wood.
    - Work with the US Green Building Council (USGBC) to include urban wood products as part of the LEED certification program.
- Integrate with existing policies:
    - Renewable Portfolio Standard: Urban wood waste and low-value trees can be used to power bioenergy facilities such as combined heat and power (CHP) plants.

- Chesapeake Bay Watershed Implementation Plan: Urban wood waste can be converted into biochar for stormwater remediation, which reduces urban runoff into the Chesapeake Bay

Section V: Strategies, Initiatives, and Actions

The success of the Maryland Forest Products Economic Adjustment Strategy depends on two things. The first is the strength of the proposed strategies, initiatives, and actions. The second is the determination of institutions and businesses to coordinate the actions with the necessary authority, responsibility, and resources to affect change.

This section of the EAS report establishes the context and describes the initiatives required to foster growth and rejuvenate the industry with both internally and externally focused actions. Each of these actions is in support of at least one of the EAS's overarching goals. These goals, as described in the Section I of the report and summarized in the section below, seek to make fundamental changes in the industry with specific target outcomes in mind.

Overarching Goals

Why is it important to align our Initiatives and Actions with overarching goals? Though the statewide wood products industry is large in terms of its overall economic impact, its component businesses and industrial activities are disaggregated. Because of this the industry lacks either vertical or horizontal support structures and lacks a common future vision that directs public and private activities for the overall good of the industry. Yet EAS research clearly showed that there are commonly shared goals, as well as shared interests, opportunities, and needs that span the industry.

By memorializing these goals, a structure for action can be developed that is acceptable across the wide range of industry stakeholders. These goals are summarized in the table below.

	***Support the existing entrepreneurs*** who anchor the industry and keep liquidity in local markets.
	***Raise awareness of the wood products industry*** by building more supportive relationships within and outside the industry and focusing on the resource's renewable nature.
	***Encourage innovation in emerging sectors*** through entrepreneurial support and a renewed focus on technology commercialization.
	***Enhance local and international market opportunities*** by building a brand linked to the industry's stewardship of natural resources and local economies.

Initiatives and Actions

Successfully achieving the four overarching goals will occur through a cohesive approach to industry development that looks to the future for growth while supporting the entrepreneurs and communities. This approach should be led by the industry itself. Below is a summary of the initiatives and the overarching goals they materially influence.

Initiatives				
A. Increase knowledge of the public and policymakers about the forest products industry.	✓	✓		✓
B. Foster a more supportive state and local policy environment.	✓	✓	✓	✓
C. Improve supply chain coordination.	✓	✓	✓	✓
D. Expand the use of renewable biomass energy.	✓	✓		✓
E. Enhance Maryland forest product industry's export competitiveness.	✓	✓	✓	✓
F. Support entrepreneurial success for wood products businesses.	✓		✓	
G. Improve the adoption of technology and innovative practices.	✓	✓	✓	
H. Expand domestic marketing opportunities.	✓	✓	✓	✓
I. Create a workforce for the future.	✓		✓	

Initiative A: Increase knowledge of the public and policymakers about the forest industry.	
1. Develop concise cost/return information for standard forest management options in Maryland.	
2. Develop summaries of all applicable cost-share and other public programs that benefit forest landowners.	
3. Develop information on compatibility of conservation, wildlife management, and recreation programs with forest management.	
4. Host annual-tours of local forest and wood product businesses for opinion leaders through county forestry boards and MFA.	
5. Arrange for media coverage of favorable forest management stories or industry advancements.	
6. Develop educational materials and activities such as interpretive signs, experiential learning modules, and exhibits for state forests.	

7. Partner with Chesapeake Bay advocacy groups to highlight the importance of forest management in recovering the health of the Bay.	
8. Work with other states and national organizations to raise awareness of carbon trading programs for small acreage landowners.	
9. Educate local officials on the benefits of wood energy and its importance to Bay health and local economies.	

Initiative B: Foster a more supportive state and local policy environment.	
1. Expand communications to build stronger relationships between the forest product industry and local economic development.	
2. Expand incentive programs targeting industry growth.	
3. Allow wood and wood residues as qualifying biomass to support the achievement of Maryland's Renewable Energy Portfolio Standard.	
4. Establish an informal "timber caucus" within the legislature to provide expertise and leadership on forestry issues.	
5. Create a buy-local purchasing preference for forest products.	
6. Establish regular communication with state forest managers' local timber needs and planned sustainable harvest volumes.	
7. Maintain regular updates on costs and benefits of timber sales on state forest lands.	
8. Recognize forest markets and industry needs for fiber supply through land acquisition.	
9. Coordinate and unify the activities of forestry organizations.	
10. Build coalitions with agriculture groups and supportive environmental interests.	
11. Review all current statutory authorities for forestry to clean up outdated language, resolve conflicts, and eliminate obsolete provisions.	
12. Improve demand or local, sustainable forest products.	
13. Develop consistency in local forest management regulations.	
14. Establish *Models and Guidelines* for inclusion of working forests and timber land in local comprehensive plans.	

Initiative C: Improve supply chain coordination.	
1. Create a program or responsibility area that improves value chain integration.	
2. Pilot a traceability platform that increases supply chain coordination and transparency.	

3. Encourage adoption of common certification standards compliant with European Union standards.	

Initiative D: Expand the use of renewable biomass energy.	
1. Educate policymakers and the public regarding woody biomass as renewable energy fuel, working with a State Wood Energy Team.	
2. Utilize pilot projects to demonstrate efficacy of both CHP and thermal projects.	
3. Encourage greater utilization of urban wood waste as a fuel source.	
4. Encourage the development of a sustainable and reliable on-demand supply of wood fuels.	
5. Improve renewable energy policies and incentives to support woody biomass energy.	

Initiative E: Enhance Maryland forest product industry's export competitiveness.	
1. Develop an industry support program targeting business readiness and export promotion.	
2. Attract or develop phytosanitary services.	
3. Create a Sustainable Forestry Risk Assessment to identify reliability of Maryland as a supply for sustainably sourced wood.	
4. Pilot a trace and track program.	
5. Coordinate certifications and traceability.	
6. Develop focused support in international marketing.	

Initiative F: Support entrepreneurial success for wood products businesses.	
1. Encourage the next generation of forest product business owners.	
2. Enhance virtual business development services for fast growth companies.	
3. Improve entrepreneurial finance opportunities.	

Initiative G: Improve the adoption of technology and innovative practices.	
1. Create a wood products innovation team.	
2. Prepare a technology-capable workforce.	
3. Develop funding to support innovation and technology adoption.	
4. Support the growth of innovative secondary manufacturing businesses.	

Initiative H: Expand domestic marketing opportunities.	
1. Pilot a traceability platform to meet consumer demand.	
2. Create a resource hub for the Maryland forest industry.	
3. Create a branding program for local wood that supports the health of the Chesapeake Bay.	
4. Encourage expansion of urban wood sorting facilities.	

Initiative I: Create a workforce for the future.	
1. Identify critical labor force skill gaps by timbershed.	
2. Support access to and development of enhanced management capability.	
3. Work with regional partners to create Centers of Workforce Excellence.	
4. Develop Career and Technical Education (CTE) modules for youth and adult learning.	

Initiative A: Increase Knowledge of the Public and Policymakers about the Forest Products Industry

While many recognize that forests are regenerative and crucial to the health of Maryland's soil, air, and water resources, there is a need to inform the public and policymakers about the importance of maintaining and expanding timber markets to finance the continued maintenance and management of forests. Vibrant markets ensure that landowners can be rewarded for keeping land forested rather than converting the land to an alternative use. Indeed, a healthy forestry industry results in a balancing of economic and ecological returns through long-term management practices that allow for timber harvests. Forest cover has been maintained and expanded in areas of the country with strong forest product markets.

The forest products industry in Maryland is often misunderstood. Frequently, regular timber harvests are conflated with permanent tree removals associated with development. Too often, the state's Forest Conservation Act and local conservation rules limit the public's understanding of forestry to urban and suburban activity. There is room for improvement in the public's knowledge of the role and importance of an active forest products industry.

This initiative intends to create programmatic responses to information gaps by building stronger relationships between the forest and local markets and supporting better policy outcomes for the industry and the state's natural resource base.

Action A.1: Develop concise cost/return information for standard forest management options in Maryland.

Landowners would be more inclined to invest in their forestlands if they had access to better, standardized information on the costs and returns associated with these investments. Landowners often do not know or understand the economic implications of forest management decisions, or lack thereof. They may also have a wide variety of questions, including:

- How much should they expect from an investment in a silvicultural practice?
- What is the term for the ultimate return on investments like planting trees?
- When is the proper time for such practices as herbicide control or thinning?
- What might landowners expect from hunting lease revenue?

All such questions generally have well-documented answers, and there are several computer applications to aid in the proper calculations. This action is meant to get that information to landowners in an easy-to-understand format.

Action A.2: Develop summaries of all applicable cost-share and other public programs that benefit forest landowners.

Several state and federal cost-share, loans, and technical assistance programs are of value to forest landowners. It is a complex array that changes over time. A web-based, well-maintained summary of these programs would be valuable to both landowners and such service providers as consulting foresters.

Action A.3: Develop information on compatibility of conservation, wildlife management, and recreation programs with forest management.

Professional surveys repeatedly reveal that the majority of landowners are generally interested in the wildlife found on their lands. They are concerned about the potential impacts of various land management practices on wildlife habitat and recreational opportunities on forest lands. This concern is likely broadened among the public to include the impacts of timber harvesting on old-growth forests, water quality, and scenic beauty. Information that demonstrates forest management practices' enhancement of and compatibility with wildlife habitat, recreational values, and ecosystem services can encourage forest management investments and dispel concerns over their impact.

Action A.4: Host annual-tours of local forest and wood product businesses for opinion leaders through county forestry boards and MFA.

Local understanding and support for forest products industry companies and the management of the forests they depend on are crucial to building broader statewide political support. Currently, influencers of public opinion, such as local government, elected officials, the media, business, and civic leaders, do not seem to know the industry within their jurisdictions or forest management. There is an immense need to build relationships and understand that other, perhaps more visible industries, have within their local communities. A meaningful way to do this is through local tours and building personal relationships between local opinion influencers, industry leaders, and forestry community members.

Action A.5: Arrange for media coverage of favorable forest management stories or industry advancements.

Press releases and local media coverage are needed to increase public awareness and generate a positive impression of the forest products industry. Favorable events such as a mill expansion, new "master loggers," employee promotions, new product development, and others deserve greater recognition. The Maryland Forests Association (MFA) should provide this service to the industry and its members.

Action A.6: Develop educational materials and activities such as interpretive signs, experiential learning modules, and exhibits for state forests.

Visitors to state forestlands inevitably encounter forest management's visual aspect as a recent clear-cut or thinning, or perhaps as active logging. Often, the public is left to arrive at its own conclusions on why an activity was conducted and its potential impact on environmental values.

Interpretive signs or exhibits can inform or calm fears. For example, near the town of Snow Hill and just across from Furnace Town (a local tourist attraction), a highly visible clear-cut was conducted solely to enhance habitat for a rare butterfly and pollinator species. Nothing has been done to explain these reasons for the logging, leaving the public to draw its own conclusions. Potentially unfavorable views could put the community at odds with the forest products industry.

Action A.7: Partner with Chesapeake Bay advocacy groups to highlight the importance of forest management in recovering the health of the Bay.

Forestlands' protection is a vital part of the overall strategy to restore water quality in the Chesapeake Bay. Healthy, well-managed forests improve water quality and protect aquatic ecosystems from runoff and soil erosion. Despite this common ground, there is little formal contact and collaboration between

Bay advocates and forestry community members. As a result, opportunities are missed, and there are inevitable suspicions over motivations and actions. This can be addressed by establishing partnerships with Bay advocacy groups to promote and raise awareness on mutually supportive efforts.

Action A.8: Work with other states and national organizations to raise awareness of carbon trading programs for small acreage landowners.

There is encouraging work in Pennsylvania and other areas that allow small forest landowners to market the contributions of their lands for carbon sequestration. Such funding is a potential additional revenue source for forest landowners and should be encouraged through supportive policy and program development. The first phase of this effort will include education and training aimed at landowners, policymakers, purchasers of carbon offsets, and environmental organizations.

Action A.9: Educate local officials on the benefits of wood energy and its importance to Bay health and local economies.

There seems to be a lost opportunity in Maryland as it relates to wood energy using regenerative and recovered wood. This is manifested in a paucity of supportive state policies and regulations as well as in a patchwork of local zoning and permitting requirements that make it difficult to even consider this energy source in new construction or as adaptive re-use.

It is important to understand that the source of the opposition to wood energy is often based on misconceptions that wood energy cannot meet stringent air quality standards, that the sustainability of its supply is questionable, and that its life cycle costs exceed those of more commonly used combustion energy sources. A long history of wood energy use in Europe and New England provides evidence to the contrary. Wood energy and forest management are clearly and strongly supported in major public policy documents generated by the Intergovernmental Panel on Climate Change and the U.S. Environmental Protection Agency, building on life cycle and landscape-scale analyses that recognize the climate, water quality, and renewable resource benefits of forestry. This action recommends developing an education and training program for local officials that reviews best case practices in community-level wood energy projects to help reduce the barriers to growth.

Initiative B: Foster a More Supportive State and Local Policy Environment

Although the forest products industry is one of the largest contributors to Maryland's rural economy, it lacks substantive state and local policy support. With the decline in the number of industry players over the last three decades, knowledge of how the industry works and its significance has dwindled at the state and local levels.

The industry is also dispersed at the county level, and its long crop rotations of 20 or more years make it less visible than other land-intensive uses. In counties with high development pressure, land clearing is often confused with forestry activity. The result is regulations that have often become more restrictive and costly for forest operators, leading to less forest industry in a pattern of negative reinforcement that contributes to trends of forest land loss.

This initiative focuses on addressing critical gaps in policies and regulations to provide relief to an industry struggling to grow.

Action B.1: Expand communications to build stronger relationships between the forest product industry and local economic development.

Economic and business development activities affecting forest industries are managed on an ad hoc basis among various agencies. The lack of consistency adds complexity to the response to changing conditions that affect the entire value chain. This action item anticipates creating a formal industry-led committee, managed by the MFA, with regional representation from industry, local governments, regional development agencies, the Maryland Forest Service, and the Commerce Subcabinet. The committee's activities will be driven by Maryland's Economic Development Commission Strategic Plan, with its activities jointly supported by MFA and the Maryland Department of Commerce.

Action B.2: Expand incentive programs to encourage industry growth.

Economic and business development support targeted at the distinct needs of the forest product industry may be necessary to push business expansion, technology adoption, and modernization within the existing industry. Expanded programming may also help Maryland when competing with other jurisdictions for the types of innovative projects that will make Maryland a leader in wood-based materials and technology.

The primary means to support this action is to make MARBIDCO's *"Maryland Wood Products Industry Equity Incentive Fund"* a fully funded program supported by an annual funding allocation. This fund was created as a one-off opportunity to support the equity needs of existing businesses in timber harvesting as well as the primary and secondary manufacturing sectors by adopting technology, reaching new markets, expanding business capacity, and creating new products. Early response to this fund has been positive, with the pilot round of funds well oversubscribed.

Interviews with potential applicants indicate a strong interest among start-up operators and firms in related fields, such as product research, service, supply, and logistics. Because many of these firms are prohibited by the rules of the program from participation, it is recommended that any expansion of the fund include broader eligibility and program funding increased to $1,000,000 per annum.

In addition to making the *"Maryland Wood Products Industry Equity Incentive Fund"* a permanent program of MARBICO, this action recommends adopting a Wineries and Vineyards Tax Credit (WVTC) style tax credit program for application to primary and secondary wood product manufacturing investments. All such investments should be linked to greater utilization of Maryland timber resources as documented through a track and trace protocol. Following the example of the WVTC, manufacturers could qualify for an income tax credit equal to 25 percent of qualified capital expenses. Total credits granted would not exceed $1,000,000 in any single year, with credits prorated across qualifying applicants if requests exceed the annual allocation. The project would be managed by the Department of Commerce and funded through new sources of revenue as described below.

Funding the above programs will require new budget line items or dedicated revenue sources. The project team recommends two sources. The first comes through the creation of a new commercial trailer tag. The second involves an expansion of the existing Mel Noland Woodland Incentives Fund.

Many commercial and utility trailers are currently licensed in Maine, even though their owners and operators are in Maryland. Nearly all logging trailers, chip vans, and equipment carriers used by Maryland's forest products industry are registered this way. Maryland's laws should be modified to make in-state registration as easy and as economical as it appears to be in Maine. This change would enable an additional revenue stream for the state, half of which should be used to fund forestry-oriented development programs.

Statute allows for significant expansion of the Mel Noland Woodland Incentives Fund. Expansion of the fund can be used to increase support for industry development and education initiatives that advance Chesapeake Bay health. Chapter 121 of the Acts of 2008 created the *Chesapeake and Atlantic Coastal Bays 2010 Trust Fund and Nonpoint Source Fund,* also known as the 2010 Trust Fund. "The purpose of the Fund is to provide financial assistance necessary to advance Maryland's progress in meeting the goals established in the Chesapeake Bay Watershed Agreement for the restoration of the Chesapeake Bay and its tributaries, including the Patuxent River, and to restore the health of the Atlantic Coastal Bays and their tributaries, by focusing limited financial resources on nonpoint source pollution control projects in all regions of the State."

This action recommends expanding the funding available to the Mel Noland WIF from the Chesapeake and Atlantic Coastal Bays Trust Fund for Nonpoint Source Fund at levels sufficient to competitively support the economic development and environmental stewardship actions in this strategic plan.

Action B.3: Allow wood and wood residues as qualifying biomass to support the achievement of Maryland's Renewable Energy Portfolio Standard.

Maryland's Renewable Energy Portfolio Standard uses a limiting definition of qualifying biomass that makes it difficult for wood to compete against other forms of renewable energy. The actions suggested updating Section 7-701 of the Public Utilities Article of the Annotated Code of Maryland to allow **all wood and wood residues** as qualifying biomass and without any requirement for blending with other fuels.

Action B.4: Establish an informal "timber caucus" within the legislature to provide expertise and leadership on forestry issues.

It is essential to build a dedicated group of legislators with an elevated interest and understanding of forest management and the forest products industry. While the most likely candidates would come from

the state's most active timber areas, anyone with a genuine interest in the forest community should be included. Once identified, the industry and others in the forest community should make a special effort for regular contact, tours, meetings, fundraisers, and all else necessary to make sure they become advocates for forest management and the "go-to" members of the legislature for forestry issues.

Action B.5: Create a state purchasing preference for forest products.

During the 2020 legislative session, H.B. 1488/SB0985 passed both houses unanimously. The bill established a Certified Local Farm Enterprise Program to assign purchasing credits to locally produced agricultural commodities at state-funded institutions. This action item recommends that a similar bill be advanced for Maryland Forest Products using similar environmental standards as the key benchmarking tools. The action is supported by Actions C.1, C.2, and C.3.

Action B.6: Establish regular communication with each state forest manager on local timber needs and planned sustainable harvest volumes.

A strong knowledge of local markets informs forest managers, including those managing state lands, so they can maximize the timber's marketability. These markets can change rapidly, and forest managers can stay informed through regular communications with the customers for their timber sales and inventory. For example, a firm entering the pellet or firewood market may opportunities for low-value hardwood, thereby expanding access to affordable forest health practices by state forest managers and those who advise private forest landowners. State forest harvests are governed by Sustainable Forest Management Plans and publicly reviewed Annual Work Plans, which guide expected harvest volumes over a year, even prior to timber being put out for bid. Any perceived communication issues can be easily corrected through increased and regular interaction between the two groups.

Action B.7: Maintain regular updates on costs and benefits of timber sales on state forest lands.

For state-owned lands, the management goals, accomplishments, or the costs and benefits associated with state forest management and historical trends are not readily accessible to the public. The administration should develop a standardized protocol for collecting and reporting this information to communicate better the value of public land timber harvests in providing a diverse and adaptable mosaic of forest habitats in combination with support for a local rural economy that generates demand for more forests.

Action B.8: Recognize forest markets and industry needs for future wood supply during land acquisitions.

When the state purchases forest land in fee simple, it is added to the state land system and managed according to plans for each ownership unit. These plans reflect a range of public interests in the lands, often including old-growth preservation, wildlife, scenic values, and recreation.

While reflecting these values in the management of public lands is certainly appropriate and can reduce the regulatory burden on private lands to provide these functions, it is important to recognize that it can mean less timber is available from these lands. DNR data indicates that in the state forests in Western Maryland, only 46 percent of the land is available for timber harvests. On the Eastern Shore, 61 percent of the Pocomoke State Forests and 81 percent the Chesapeake Forest Lands are available for timber harvests. Some of those harvests can have lower volumes to meet priorities for habitat goals, such as the

46 percent identified as core habitat for Delmarva fox squirrel. This ownership transition occurs as the inventory of private timberland continues to become increasingly fragmented, making the comparatively large tracts of public timberland that much more important for industry sourcing of wood.

Large, consolidated landholding of the state within certain timbersheds can significantly impact private investment and industry growth by calling into question the resource's future availability. This concern is shared unanimously by current industry operators. There are also the ancillary concerns that there have been no additions in DNR resources to manage these newly acquired lands. Communication on this concern should be increased, and options developed to address future wood supply meaningfully. This could involve a range of options, such as potential fiber supply agreements consistent with sustainable timber harvest levels, a greater role for conservation easements explicitly protecting sustainable timber harvesting on private creating a point system to measure the potential economic output from forest lands on new state acquisitions. Conservation easements could maintain a higher level of timber production from these lands, but it is also accomplished at about half the cost of outright fee acquisition while keeping the property on the local tax rolls.

Action B.9: Coordinate and unify the activities of forestry organizations.

Forestry organizations in the state tend to operate independently and without any coordination toward achieving mutually desired goals. While legal considerations may make it infeasible to merge these organizations into a group, it is possible to harmonize their activities through new, coordinated leadership. This organization should also form a lobbying arm that will become the industry's political voice and forestry interests.

Currently, at least six organizations have a hand in shaping forest policy in Maryland. They generally have good relationships among them, but for legislative action, often act independently of the other. The lack of frequent coordination has led to missed opportunities for advancing better policies for sustainable forestry. Organizations include:

- **Maryland Department of Natural Resources (DNR), Forest Service**—An executive branch agency, DNR is responsible for helping craft and implement the governor's policies, either through executive or legislation, assuming they are given the opportunity for input during the development of legislative proposals. The agency’s responsibilities also include funding and direction for assistance to private landowners and the operations of the state forests.
- **Maryland Forests Association**—A 501(c)(3) membership organization, MFA represents forest landowners, forest product operators (including mills and loggers), along with those who have a general interest in forestry. While MFA does take positions on policy proposals, including legislation, its lobbying activities are currently limited to educational efforts.
- **Maryland Forest Foundation**—This organization represents the individual county forestry boards and receives some funding through grants from state and federal funds and the Woodland Incentive Fund. Outside of grant-funded activities, it can and occasionally does promote policy initiatives and legislation.
- **Association of Forest Industries**—This entity performs as an industry advocate in areas related to regulation, policy, and legislation. Its clients are primarily mills or other forest product operators.

- **University of Maryland Cooperative Extension Service**—Although not a proponent for legislation, the Extension Service plays an essential role in providing information to policymakers and others in the forestry community. Ideally, information from the Extension Service should be based upon credible science.
- **Sustainable Forestry Council**—This organization is both chartered in law and charged with advising DNR on "existing regulatory and statutory policies that are perceived as economic barriers to a viable forest products industry," "new markets to enhance forest health, including renewable energy development through biomass energy, to offset fossil fuel consumption and reduce greenhouse gas emissions," and "the means to promote forest-based economies and processing capability that contribute to economic and employment growth." The Council contributed significantly to the Forest Preservation Act of 2013 and recent efforts to promote woody biomass through a webinar series with MFF and MD Clean Energy Center in 2020, but members hold that much more progress is possible and that greater coordination is needed other organizations.

Each of these organizations largely works independently. While there may be a general understanding of what each does among the others, there is no forum through which to meet, debate, set priorities, or coordinate strategies toward goals upon which all can agree.

At present, it appears that no single organization has the capacity to fill the roles of leadership, coordination, and voice for the industry and that a new organization will be necessary to motivate action and change. Without central leadership, coordination, and effective staff work, it does not seem possible that the existing organizations can represent a sustainable, significant effort on behalf of forestry interests in Maryland.

Action B.10: Build coalitions with agriculture groups and supportive environmental interests.

Nearly 16 percent of statewide farm acreage is held in woodland, making farmers a direct beneficiary of healthy forest product markets. Therefore, the forestry industry must expand its influence by building coalitions with agricultural organizations and, for mutually agreeable economic and environmental goals, environmental. Without such relationships, forestry interests are too small to be genuinely constructive in Maryland's political arena. Thus, it is suggested that organizations, such as MFA and the Maryland Farm Bureau, have a formal, board-level relationship.

Action B.11: Review all current statutory authorities for forestry to clean up outdated language, resolve conflicts, and eliminate obsolete provisions.

Forest management programs and regulations in Maryland emanate from multiple statutes. These should be reviewed and refined to increase efficiencies, update relevancy, eliminate ambiguities, and provide a clearer, more concise statutory basis for the management of state lands, forest regulations, and programs designed to reach private landowners.

No fewer than seven separate subtitles of the Maryland Code define how forests are to be managed along with the administration of forestry-related programs. They were each enacted at different times and within differing legislative contexts. Inevitably, there are duplications and inconsistencies within the individual statutory language and the practice of implementing these laws. For example, the section states, "5-102.1, (ii) To express the General Assembly's intent that local planning and zoning restrictions

that impact silvicultural practices may not be more stringent than restrictions imposed by State law and regulation."

While this language would indicate that counties do not regulate forestry in ways that contravene the rules promulgated by the DNR, it falls short of this goal. First, "intent" is not the same as a statutory mandate; it merely suggests. Second, this language, as it appears in the Sustainable Forestry Act of 2009, is contradicted by additional language in the same act:

> "This section does not: (i) Prohibit a federal, State, or local government from enforcing health, environmental, zoning, or any other applicable law; (ii) Relieve any agricultural OR SILVICULTURAL operation from the responsibility of complying with the terms of any applicable federal, State, and local permit required for the operation; (iii) Relieve any agricultural OR SILVICULTURAL operator from the responsibility to comply with any federal, State, or local health, environmental, and zoning requirement."

So, there is no mandate that state forestry regulations supersede those of an individual county, and each county is free to develop and implement those they may find useful or supportable.

The Natural Resource Article (NRA) and COMAR should be updated to reflect current understanding of sustainable forestry principles and practices that support diversity in age classes and opening sizes critical for some declining wildlife populations. Discrepancies in the code should be addressed, clarified, and, where possible, simplified.

Action B.12: Adopt green building policies to increase demand for local, sustainable forest products.

The State of Maryland influences the design standards of many public buildings, and this in turn influences building practices in the private sector. The State could substantially impact the wood products industry by modifying green design standards to include those that sustainably use the state's resources. These standards apply to a wide range of products and systems to include materials, finishes, and even energy systems.

A review of how the state determines green building decision-making in the planning, design, and construction of public facilities affords the Maryland Green Building Council – consisting of almost every cabinet secretary – a governing role. This action recommends executive agency support to give Maryland wood products equal footing with other building products and systems.

In particular, expanding the use of green energy to include woody biomass within the development footprint using ASHRAE/USGBC/IES Standard 189.1 Standard for the Design of High Performance Green Buildings is also highly recommended. The precedent for such actions was set in 2019 with Executive Order 01.01.2019.08, which calls for a 10 percent energy usage reduction in state buildings.

Action B.13: Develop consistency in local forest management regulations.

Presently, every Maryland county can regulate logging within its borders with its own set of fees, waiting periods, enforcement authorities, and permit requirements. There is a confusing patchwork of regulatory requirements across the state, generating uncertainty, inefficiency, and discouragement within the forestry community. In cooperation with the Maryland Department of Environment and the Soil Conservation Districts, the Maryland Forest Service should develop a harvest planning and notification

approach similar to surrounding states to achieve a predictable and efficient means of permitting for forest harvesting operations.

Action B.14: Establish *Models and Guidelines* for inclusion of Working Forests and Timber Land in local Comprehensive Plans.

The full authority for implementing rules and regulations for land use falls on individual counties. Each county in the state of Maryland is required to develop a Comprehensive Plan to create the legal framework for managing growth and land use. While home rule gives counties the sole responsibility for developing these plans, the state has influence over the creation of such plans through a review and comment as well as financial incentives.

County plans must address specific natural resources issues in these plans, such as protection of agricultural lands, wildlife corridors, seafood harvesting, protection of marine habitats, and mineral access according to the Maryland Economic Growth, Resource Protection, and Planning Act of 1992. Guidance for incorporating protection of resources is provided through the *Managing Maryland's Growth, Models and Guidelines, Sensitive Areas, Volume I and Volume II*. These documents are published and supported jointly by the Maryland Department of Planning and the Maryland Department of Natural Resources.

Neither document includes guidance on the preservation of working forests as a land-based economic activity despite providing similar guidance and protection for the agricultural, seafood, and mineral extraction industries. Therefore, adding language to *Managing Maryland's Growth, Models and Guidelines, Sensitive Areas, Volume II* to match the guidance and protection offered to agricultural lands is a critical action to changing the local dialogue regarding forests from one of conservation as a means to manage development to one of management for long-term ecological and economic health.

Initiative C: Improve Supply Chain Coordination

The Maryland forestry sector is an essential driver of the state's rural economy, but the industry lacks coordination across the supply chain and value chain to bolster sustainable growth. The sector is currently composed primarily of small and medium-sized enterprises that do not have sufficient resources to solve industry-wide problems or pursue innovative efforts to catalyze the industry. Additionally, the lack of communication and asymmetric information access across the supply chain limits market opportunities. Taking a coordinated approach can foster more collaboration between each timbershed within the state, mitigate challenges, and create economic growth opportunities.

Action C.1: Create a program or responsibility area that improves value chain integration.

There is a need for an entity to coordinate with other service providers to improve value chain integration. Value chains are improved when businesses are able to create more value for buyers through their products and services. Industry-level support can help businesses add value through technical, marketing, research, regulatory, and technology services. The key is that a lead entity coordinates among services providers and industry groups to minimize redundant efforts and increase awareness of resources. The roles of this entity would include the following.

- Provide advisory services.
- Provide market research and market intelligence services.
- Promote and advocate for Maryland's forestry sector.
- Facilitate communication within the supply chain.
- Coordinate efforts in workforce development, transportation logistics, and material handling.
- Generate funding for research and development.
- Coordinate a sustainable forestry management system.
- Help businesses obtain and maintain sustainable forest management certifications.
- Pilot, coordinate, and manage a traceability platform.
- Facilitate a carbon trading platform such as CORE Carbon.

Action C.2: Pilot a traceability platform that increases supply chain coordination and transparency.

Supply chain coordination and transparency can be achieved through traceability platforms. This technology is used to track the chain of custody of commodities such as forest and wood products. It is often implemented because the industry requires data for validation and efficient communication. It can track and verify products move from the forest through the entire supply chain by tracking the products alongside their sustainability certifications, transactions, and other information.

Since many of the landowners and loggers are unlikely to invest in the technology independently, state agencies or industry associations will need to encourage early adoption. This process may include:

1. Identifying and onboarding project partners and businesses to participate in a multi-year pilot
2. Aligning the data collection methodology with one or more of the following standards:
    a. Forest Stewardship Council® (FSC®) Chain of Custody Standard
    b. Programme for the Endorsement of Forest Certification Chain of Custody Standard
    c. SFI Chain of Custody Standard

    d. Other local environmental standards.
3. Identifying and helping businesses to pilot existing or emerging technologies and platforms:
    a. Traceability systems that use barcodes, Q.R. codes, or RFID.
    b. Stardust: a dust-like material that can be sprayed onto wood and detected through a handheld device.
    c. Earth PBC's Forest+: a smartphone and satellite-based forest management system.
    d. Global Traceability Systems' Radix Tree.
    e. BVRio's Responsible Timber Exchange.
4. Developing a supply chain traceability system in collaboration with the American Forest Foundation that:
    a. Centralizes and digitizes paper-based documentation and audits.
    b. Uses big data to assess whether sellers are meeting regulatory requirements.
    c. Collects data on volumes, species, products through mobile and web-based platforms.
    d. Uses remote sensing data to monitor forest management.
    e. Links with carbon trading platform.

Action C.3: Encourage adoption of common certification standards compliant with European Union standards.

The European Union provides one of the largest export markets for Maryland forestry and wood products. Entry requirements are strict, requiring sustainability certification, supply chain transparency, and full product visibility. Implementation of these standards is often expensive and biased toward large forest landowners and large wood product operators. This preference puts Maryland operators at a distinct disadvantage.

The European Timber Trade Association (ETTA) has a strong influence over these regulatory and industry-driven requirements. The ETTA and the E.U. have developed a set of standards for the hardwood industries in less developed nations that fit well with Maryland's conditions. This action will require assistance from the United States Trade Representative in applying these same exception standards to the US, thereby expanding market access for local forest product operators.

Successful implementation of this action would require significant progress on Actions C.1 and C.2.

Initiative D: Expand the Use of Renewable Biomass in Energy Production

Maryland forests are filling quickly with biomass in the form of low-grade trees, shrubs in the lower stories of woods and forests, and other residues. Currently, about 49 percent of the 188 million dry tons of standing woody biomass is pulpwood. Another 25 percent is non-merchantable biomass (treetops and limbs; small or cull trees). This woody biomass is ideal for pellet production, and there is a growing supply of this resource. The following recommended actions suggest ways to expand the use of woody biomass for energy production.

Action D.1: Educate policymakers and the public regarding woody biomass as renewable energy fuel.

There is confusion and contention regarding woody biomass as a renewable fuel. While some local and state policymakers see it as environmentally friendly, others view it as carbon negative. The results of studies boost the former group. A webinar series was held in June 2020 to review issues and evidence around woody biomass and can be found at https://www.mdcleanenergy.org/biomass.

Evidence from the International Energy Agency, International Panel on Climate Change (IPCC) and other researchers indicate that biomass from sustainably managed forests is carbon neutral or low-carbon has significant benefits over fossil fuels and has the largest sustained mitigation benefit.[16] The IPCC's 2007 report states:

> "In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fiber, or energy from the forest, will generate the largest sustained mitigation benefit."[17]

Additionally, other research shows having strong wood product markets and active forest management leads to increased forest cover.[18] Countries such as Austria also use complex forest management strategies to ensure a zero net loss of forest cover.[19] Thus, the right mix of policies, incentives, and forest management strategies can support a sustainable woody biomass fuel market. Maryland has guidance available for sustainable forest biomass policies for the state's resource and policy conditions.

Bringing this data and research to policymakers and the public's attention becomes critical for creating opportunities that integrate and expand woody biomass's role in renewable energy. Potential strategies include:

- Efforts to educate policymakers on woody biomass energy, its lifecycle analysis, and carbon impact.
- Educating the public through a video series that promotes Maryland forestry and wood products.

[16] IPCC, "Climate Change 2007: Working Group III: Mitigation of Climate Change"; Schlamadinger and Marland, "The Role of Forest and Bioenergy Strategies in the Global Carbon Cycle"; Marland and Schlamadinger, "Forests for Carbon Sequestration or Fossil Fuel Substitution?"
[17] IPCC, p. 543
[18] Forest2Market, "Wood Supply Trends in the US South 1995-2015."
[19] Duck, "Why Assumptions About Wood Biomass Could Be Going Up in Smoke."

- Developing pilot projects that demonstrate the benefits of using woody biomass for energy production.

Action D.2: Utilize pilot projects to demonstrate efficacy of both CHP and thermal projects.

Develop a woody biomass CHP and thermal pilot projects of various scales to demonstrate technologies and to serve as case studies and training facilities. These projects should, to the extent possible, be developed as part of boiler and building system upgrades at state facilities and be thoroughly documented throughout planning, design, and operations. System dashboards, such as those utilized by the living building challenge, should be adopted to demonstrate both long-term and short-term performance characteristics

The first significant task involves working with the Maryland Clean Energy Center, Maryland Energy Administration (MEA), and the Department of General Services to identify appropriate wood energy development sites. These will be determined through a suitability analysis based on resource availability, community acceptance, economic feasibility, site parameters, and accessibility. As a note, MEA identified 3,700 potential locations for CHP plants, both public and private. The next steps would include:

1. Recruiting developer and engineering firms as partners and establishing solid technical assistance resources for clean, efficient designs tied to local wood supply.
2. Developing fuel source guidelines, including urban wood waste.
3. Recruiting a public research institution (e.g., UMD) to manage M&E and reporting.
4. Partnering with a wood pellet facility (Action D.4) to develop energy-efficient, easily stored pellets.

Action D.3: Encourage greater utilization of urban wood waste as a fuel source.

There is a potential supply of 880,000 dry tons of biomass fuel wood chips generated from urban wood waste annually in Maryland. Urban wood waste includes everything from reclaimed wood from construction and demolition, mill residues, forest residues, natural wood waste, and other low-grade wood. Currently, much of this resource is being mulched or sent to the landfill.

Expanding renewable biomass usage includes updating regulations and policies such as the Renewable Energy Portfolio Standard (RPS) to expand the use of both merchantable and non-merchantable urban wood waste for energy production as a tier 1 input. Additionally, there should be a push for reduced-waste initiatives that redirect urban wood waste to optimal uses. This requires urban wood sorting and identifying wood waste that is most suitable for biomass energy. The following examples demonstrate the scale of woody biomass energy operations, financial benefits, and the role of incentives.

- **Gunderson Hospital:** Biomass energy represents the largest portion of the Gunderson Hospital system's renewable energy portfolio and has allowed it to be energy independent. The hospital system, which is in Wisconsin, uses a biomass boiler that turns local wood waste such as milling and forest residues into steam energy. This system saves Gunderson about $500,000 each year in energy costs. By including other renewables in their portfolio, this strategy has also allowed the hospital system to generate money and to cap energy costs despite increasing operations.

- **District Energy St. Paul (DESP):** The DESP is a public-private partnership and was St. Paul, Minnesota's response to the energy crisis in 1970. In 2003, Ever-Green developed the St. Paul Cogeneration operation to provide renewable and reliable energy to the city. This facility is a biomass-fired combined-heat-and-power (CHP) plant that uses 260,000 tons of urban wood waste per year. The tree waste includes storm-damaged or compromised trees, tree trimming, residential waste, habitat restoration, and other processing that leaves behind low-grade wood. Incentives were critical for catalyzing this project since other renewables have been cheaper than wood waste due in part to subsidies.

Action D.4: Encourage the development of a sustainable and reliable on-demand supply of wood fuels.

The development of large-scale wood energy projects is limited by the current supply of wood from timber harvesting activities. Put simply, companies will not incorporate thermal or CHP components into site design if the fuel source is less certain than competitive fuel sources such as petroleum and gas.

The state should work with the industry to develop a system to match potential suppliers of woody biomass with prospective buyers who are exploring wood as a fuel option. This action should include the development of standards that are consistent with the state's biomass harvesting regulations and that do not degrade forest health. This action can be linked to Actions C.1, C.2, and C.3.

Action D.5: Improve renewable energy policies and incentives to support woody biomass energy.

Maryland's Renewable Energy Portfolio Standard (RPS) was established in 2004 and has since been revised several times. Currently, the RPS calls for 50% renewable energy usage by 2030 with an emphasis on solar and wind. The RPS includes allocations for various renewable fuel sources. Renewable fuels include solar, wind, qualifying biomass, methane from a landfill or wastewater treatment plant, geothermal, ocean, fuel cells, hydroelectric, poultry litter-to-energy, waste-to-energy, and refuse-derived fuel.

Biomass is one of the few renewables that is on demand, able to add energy at times of peak demand. Currently, qualifying biomass includes mill residue (except sawdust and wood shavings), precommercial softwood thinning, slash, brush, yard waste, pallet, crate, and dunnage.[20] While there appears to be an opportunity for using wood waste and low-value trees to power bioenergy facilities, the RPS is unclear about wood fuel made from qualifying biomass and other merchantable or non-merchantable biomass.

Thus, there is a need to improve or create new policies and incentives that:

- Explicitly classify wood biomass as a renewable energy resource.
- Creates Thermal Renewable Energy Credits (TREC).
- Encourages the use of on demand renewable fuels.
- Reinforce sustainable forestry management practices through audits, certifications, and traceability technology.
- Include and increase RPS requirements for qualifying biomass and woody biomass.

[20] https://www.psc.state.md.us/electricity/maryland-renewable-energy-portfolio-standard-program-frequently-asked-questions/

- Reinforce carbon trading efforts and capitalizes on advancing the goals of the Greenhouse Gas Reduction Act.
- Reinforce building design that incorporates woody biomass energy following the updated IES Standard 189.1 for the Design of High Performance Green Buildings.
- Dovetail and complement policy efforts towards Sustainable Materials Management goals

Initiative E: Enhance Maryland Forest Product Industry's Export Competitiveness

Maryland was historically a substantial exporter of wood products to international markets and a supplier for domestic needs. This initiative is an effort to make Maryland an attractive location for export and local development. The focus would be on both energy and high-value wood products by supporting compliance with supply chain certifications and raising awareness of local products. The following specific actions are suggested to achieve these goals.

Action E.1: Develop an industry support program targeting business readiness and export promotion.

Organizing broader support around the state's many small mills' varied interests will require concerted industry attention on an ongoing basis. Therefore, building collaboration around an existing entity such as the Maryland Forests Association or the Associated Forest Industries is recommended. In partnership with state and federal export development support, this organization would build a generalized marketing and branding program to represent all Maryland wood products. It would also create a system to consult for individual businesses to increase export volumes of biomass, roundwood, lumber, and manufactured wood products.

Outside of advisory services, a primary function of the organization will be the provision of market research and market intelligence services. This role is crucial to support firms with limited experience and necessary to capitalize on international opportunities. At a minimum, these services should include global market condition reports, tariff and fee information, trade barrier information, and currency exchange rates. If the organization is adequately capitalized, it is recommended that it pilot an artificial intelligence-based market data service to improve the data's pertinence and timeliness.

Action E.2: Attract or develop phytosanitary services.

Regardless of the destination market, it will be difficult for Maryland products to be successful without a local fumigation option that meets the markets' phytosanitary requirements. More detail is included in the International Opportunity Appendix. The loss of methyl bromide treatment in the Port of Baltimore abruptly ended $20 million in annual trade, and an alternative has not been found. It is recommended that a replacement fumigation service be immediately reinstalled at, or near, port facilities in the state using a suitable environmental and economical option such as high-pressure steam.

Maryland should encourage rapid commercialization of emerging technologies such as high-pressure or vacuum steam and any other environmentally favorable phytosanitation options. Public-private partnerships with local, state, and federal agencies should be sought to speed adoption and development of trade acceptance of the new methods, working with Maryland forest product operators with export capability. To augment access to phytosanitation and the export markets for smaller forest product operators, partnership with forestry trade organizations is encouraged.

In areas or product streams not well-served by commercial phytosanitation services, an organization is encouraged to undertake a project using a cooperative business model like the one employed by the Northern Neck Vegetable Growers Association. Under this model, member businesses would run product through the fumigation process to support operations and organizational overhead costs. Nonmembers

have access in varying ways to the facilities but pay a higher service price that supports the not-for-profit educational mission, market research, trade development, and other programming of the association.

Because high-pressure steam fumigation is an emerging technology, operation of the system itself offers the chance for creating training and certification programs that will add value to both the fumigation system and the association. It also opens opportunities for innovative funding and grant support.

Action E.3: Create a sustainable forestry risk assessment.

Active forest management and sustainable harvesting can improve forest health and increase standing timber resources. However, policies should be realigned to encourage a proactive management strategy rather than a passive one. Doing so requires recognizing market trends and promoting sustainable growth within Maryland's forest products industry. In the case of biomass, there should be coordination across the entire supply chain to ensure a zero net-loss approach towards forest management. Industry and government should also work together to educate the public about the benefits of sustainable timber harvests.

Accomplishing this requires creating a management system that can meet the following objectives:

1. Implement a proactive forest management strategy.
2. Work with landowners, loggers, and mills to ensure a zero net-loss approach to forest inventory.
3. Coordinate with industry to help businesses obtain and maintain sustainable forest management certifications.
4. Develop Maryland-specific risk assessment guidelines that build upon existing certifications and program requirements.
5. Create a system to document and report the above.

All these objectives help the industry meet sustainability requirements demanded by certain primary markets. In particular, sustainability certifications are important in Europe and can help consumers verify that products are green or environmentally friendly. A program should be developed by a cohort from state government, industry groups, landowners, and loggers to ensure that products are certified.

A popular certification for fiber sourcing is the Sustainable Forestry Initiative® (SFI®) Fiber Sourcing Standard. It accounts for various issues, including sustainable forestry, forest productivity and health, water resources protection, protection of biodiversity, aesthetics and recreation, protection of unique sites, responsible fiber sourcing practices, legal compliance, community involvement, social responsibility, transparency, and others.

Certification of sustainable forestry production practices opens exports to European biomass users, low or no-emission wood furnishings and building products, and in markets such as Asia, South America, and Africa who are dealing with illegally harvested timber or "greenwashed" certifications.

Action E.4: Pilot a Trace-and-Track Program

Maintaining a chain of custody and providing records on timber sourcing is a requirement for accessing the E.U. market. In particular, the E.U. evaluates feedstock and chain of custody through its Sustainable Biomass Program. Given this requirement, Maryland operations will need to obtain certifications for one of the following standards: Forest Stewardship Council® (FSC®) Chain of Custody Standard, Programme for the Endorsement of Forest Certification Chain of Custody Standard, or SFI Chain of Custody Standard.

Maryland participates in the American Forest Foundation's Tree Farm system and has opted in to have landowners in the program be part of the Sustainable Forest Certification for Tree Farm, endorsed by the Programme for Forest Certification. This allows affordable access to even smaller forest landowners to sustainable certification.

Maryland agencies should lead efforts to pilot trace-and-track technology. Since many landowners and loggers are unlikely to adopt the necessary technology, the state will need to encourage early adoption. These program activities are referenced explicitly in Action C.2.

Action E.5: Coordinate certifications and traceability.

Given the high costs for small landowners and loggers of certification and trace-and-track technology integration, private industry and the state must work together to lower the financial and technical barriers. In some cases, manufacturers take the lead to help their suppliers obtain the necessary certifications. For example, Enviva created an Independently Managed Group under the American Tree Farm System (ATFS) certification program and an FSC Forest Management Group to assist landowners in obtaining forest management certifications. However, Maryland currently lacks a major manufacturer to lead such an initiative, outside of the existing Tree Farm certification or to address certification standards for mills and wood supply. Thus, the state should work closely with the Maryland Forests Association, Sustainable Forestry Council, philanthropies, and private industry to build a management group that can help more businesses become certified at a lower cost.

Similarly, the state could work with private industry to develop a blockchain-type system that will ensure traceability and interoperability across data systems that can be used in firms of varying capacities and within differing supply chains. Here, coordination is critical for identifying the appropriate physical and digital technologies required to make trace-and-track work. It also means ensuring that solutions are easy to use and that businesses that find certification to be economically beneficial will adopt them.

Action E.6: Develop Focused Support in International Marketing.

Given the nature of Maryland's many small mills and wood product operators, it is difficult for any single business to identify, assess, and capture an offshore opportunity without significant support. Doing so must start with collaborative marketing efforts across various regions and sectors to develop a brand around goods manufactured with regional forest products. This program may be run as a statewide initiative or as a multi-state regional initiative.

Vermont's successful branding and tradeshow programs offer an excellent model for building export markets for a large number of small, often boutique, small manufacturers. The following activities can be undertaken by a newly created organization or may be supported by any number of existing public sector agencies.

Promote existing export development programs to the industry

High-quality state and federal resources are available to support exporters. However, few wood product businesses understand what resources are available to them. Many of these resources are a part of the Maryland Department of Commerce's international trade programs. Additional support is available from the U.S. Department of Commerce trade desks and through foreign embassy personnel.

These agencies collectively provide effective support to small firms that wish to export products and have actionable intelligence to identify market opportunities. They can assist in assessing sales channels, help build in-market partnerships, assist with market selection, identify trade show opportunities, help register to conduct business, identify necessary "green" certifications, and support a better understanding of export requirements and in-country regulatory hurdles.

For example, they could provide more information about markets in Europe, Canada, and China for high-value logs. European demand for veneer is rising as manufacturers, such as Decospan, are nearly doubling production. This increase is contemporaneous with market changes in key producing countries that have created an opening for log exports from the east coast of the US. To capture market share, the agencies could support local sellers' introduction to international buyers and solve critical supply chain limits.

Reaching the industry is best accomplished through the existing trade associations, including the Maryland Forests Association and the Associated Forest Industries. The most logical starting point is introducing the capability of existing programs using existing meetings and conferences as well as the association newsletters. If sufficient interest exists, it would be advisable to create direct training for wood product operators focusing on roundwood exports, sawn lumber, biomass, and manufactured finished and intermediate products.

Establish an international tradeshow program

Success in this marketplace is based on relationships, and Maryland producers largely lost those relationships when the Port of Baltimore stopped log fumigation activities. Re-establishing relationships with buyers, particularly in Europe, is paramount to market recovery and should begin with attendance at targeted tradeshows related to the industry in cooperation with the Maryland Department of Commerce's Office of International Investment and Trade.

The tradeshow target would be the forestry and wood products sector to generate the broadest interest in Maryland products ranging from furnishings to biomass. An initial target list may include:

- Furniture
    - IMM Cologne.
    - International Furniture Fair.
- Lumber and Timber
    - International Hardwood Conference and Tradeshow.
    - International Softwood Conference and Tradeshow.
    - International Wood Working Fair.
- Biomass Energy
    - International Biomass Expo.
    - Biomass Engineering and Equipment Show.
    - Greenea.
    - Rome Biomass and Bioenergy Conference and Trade Show.

Identify a broker network

Keeping the industry in the eye of buyers at all times is crucial. Therefore, it is recommended that a broker network be developed in critical markets to serve as representatives of individual

products or businesses. This same network could serve as ambassadors for the branding program. Identifying and employing this network, while important, is likely a mid-term implementation item, as prerequisite actions (Actions E.1 through E.5) must be undertaken first.

Initiative F: Support Entrepreneurial Success in Wood Products

Maryland's secondary wood product manufacturers are highly diverse and have thrived because of skillful adaptation to unique market opportunities. These entrepreneurial traits have been critical to supporting the industry in Maryland's rural and urban areas.

For instance, the Central Maryland urban core has produced entrepreneurs focused on developing unique products for the consumer market, creating innovative high-technology materials from wood, and creating income opportunities for wood products formerly considered waste. These entrepreneurs have been able to blend strong technological and product development skills with a desire to promote sustainability to build their businesses. Rural entrepreneurs have been largely focused on building defensible markets for timber and primary manufactured goods that build on the natural resource's strength and Maryland's unique rural market opportunities.

If the industry is to grow beyond its current operator base, it must support a wide range of specialized technical and dedicated professional resources specific to the industry's current and future needs. A clear focus on recruiting and developing a new host of entrepreneurs, particularly within emerging secondary manufacturing markets, must be a central component of this strategic plan. The following actions are most likely to contribute to a vibrant community of wood product entrepreneurs across the state of Maryland.

Action F.1: Encourage the next generation of forest product business owners.

Many forest product operators in the state of Maryland recognize that they may be the last generation in their business operations, even in the presence of sound markets. The traditional methods of developing entrepreneurial talent through the business has largely faded, as is the case in many industries.

This recommendation focuses on creating a networked approach to building the core entry-level competencies of forest product operators while creating pathways for the next generation to access the specialized business management and technical skills development that progress with the entrepreneur's growth needs. This network should be embedded within existing economic and regional development entities that provide individual business counseling and financial services such as the Tri-County Councils, MARBIDCO, SMADC, SCORE, SBDC's, and others.

The state should explore partnerships with industry to create an industry boot camp and a mentor-protégé program to help increase the success rate of new entrants. Because the design and oversight of such programs are critical, they should follow the format of known best practices such as the pilot New Farmer Development program at the American Farm Bureau Federation and the U.S. Department of Defense. This action is based on an analysis of key success factors that correlates success to conveniently delivered, high-quality training with long-term support by existing operators. Special issues of concern are asset management, personnel management, regulatory compliance, finance, and safety.

Recommended activities are listed below.

- Develop an online pilot program to package a professional and technical service network built on innovation principles modeled after the European Union's Rural Innovation Boot Camps.
    - Taught by entrepreneurs
    - Uses business canvas format
- Implement the Kaufman Foundation rural entrepreneurship curriculum or similar program.
- Develop a service corps of mentors and counselors with specific professional or technical expertise to provide direct support to all elements of the industry with a particular focus on enhanced manufacturing extension-styled services.
- Facilitate the development of formal "masterminding" roundtables of forest product operators and other related industries that may benefit from periodic meetings to discuss business and management issues, market development, and other relevant topics. These sessions should target the "introverted" entrepreneurs that are commonplace to the industry to encourage more relational development and industry integration.
- Conduct quarterly brown bag lunches for CEOs, owners of forest product operations, and representatives of supply-chain-related industries. The meetings should focus on networking and the topical discussion of important issues such as business management, transition planning, marketing, timber management, real estate, policy developments, regulations, and other relevant topics.
- Build a contract-based mentor-protégé program that juries both mentor and protégé participants and develops long-term (3-year to 8-year) goal and deliverable-based relationships

Action F.2: Enhance virtual business development services for fast-growth companies.

Additional development support using private and public resources should be made available to those entrepreneurs that exhibit high growth characteristics or demonstrate the capability to significantly impact overall industry growth as a catalyst for cluster development. Because these services are difficult to predict and may replicate or overlay existing programs, it is advised that they initially be little more than a networking and quality control procedure until full-time services may be needed. A more formal structure with focused support programs (e.g., financing, mentoring [See Action G.1.], market intelligence, resource networks, etc.) must be developed as described below.

- Expand the programs, budgets, staffing, and collaboration within the economic development, business incubation, and technology commercialization offices to attract or build small (i.e., 5 to 10 employee) firms in the manufacturing sector at both the local and regional level.
- Create programming for traditional industry support professionals in economic development offices, Small Business Development Centers, Extension Services, and SCORE. Doing so will increase the quality of service and support and minimize the interindustry and interjurisdictional conflicts.
- Increase the level of collaboration with surrounding states and outside resources (e.g., West Virginia University, Appalachian Hardwood Council, Pennsylvania Hardwood Council) to address local and regional issues, related industry development, entrepreneurial support, applied research, workforce development, and business retention.
- Create an industry-specific incubation program as entrepreneurial activity grows.
- Develop an ombudsman's office to assist with permitting and regulatory compliance.

- Monitor the level and quality of small business activity by evaluating the progress of entrepreneurial development and other business development activities in the wood products and related sectors, particularly in demand-generating industries such as secondary manufacturing. Should an adequate number of qualified clients emerge from this process, the region should reconsider the opportunity for either the independent or networked facility-based incubator program.
- Develop an educational and public relations packet to highlight the benefits of taking a regional economic development approach to entrepreneurial development that focuses on the market advantages and assets present in each of the state's timber sheds.
- Establish a virtual incubation or business support program to support existing and future businesses in the manufacturing, tourism, recreation, and business services sectors. Such a program should be developed through a collaborative regional effort.

Action F.3: Improve entrepreneurial finance opportunities.

Maryland has been unable to attract new secondary wood product manufacturing businesses, mainly losing to competitive regions. This has the effect of dampening demand for timber and primary manufactured goods. Additionally, existing manufacturers have relocated out of Maryland into neighboring states to take advantage of favorable financing and grant programs. Virginia's Agriculture and Forest Industry Development Fund, which offers a direct incentive grant of up to 5% of the project cost (not to exceed $500,000, with a local government match), to forest products business ventures as long as they buy at least 30% of their timber from Virginia timberlands is an example of the type of incentives that pulling these businesses out of Maryland.

This initiative suggests the creation of an industry-specific angel funding organization in collaboration with groups such as the Appalachian Hardwood Council, regional economic development entities, and private investors to enhance investments in the wood supply chain. The organization should use time-proven models developed conjointly by the Economic Development Administration (EDA), Appalachian Regional Commission (ARC), and private sector entities.

Initiative G: Improve Industry Adoption of Innovative Practices, New Technology, and Emerging Product Segments

Maryland is a well-known center of basic and applied research and development activities. The state is home to many federal laboratories, two of the nation's largest research universities, and several corporate research centers. At one point, Howard County was home to the Westvaco corporate research and development facility that focused on wood product utilization and related exploration.

While many of the research activities are related to fields outside of wood products, the project team found significant crossover areas. These areas can be found within clusters related to material science, packaging, building products, energy, chemicals and reagents, nanoscale manufacturing, environmental products, and many others. Despite the overlapping nature of the opportunities and the enormous market potential, the project team found no connection between basic or applied research and the timber harvest, management, or primary industry segments.

Where connections do exist, the linkages between basic and applied research are weak, as are the links between applied research and technology commercialization. Through this project's progress, it became clear that any emerging technology, new product, improved process, or pilot scale manufacturing component would likely leave the state to advance from bench scale to batch production. Opportunities that may have been viable for development in Maryland relocated to other parts of the region or beyond, but greater support within the state could build value-added processing to capture additional contributions to the local economy.

The following actions highlight means to improve these conditions.

Action G.1: Create a wood products innovation team.

A committee should be formed as a collaboration of MFA and Innovation Works to identify early-stage industry innovations whose adoption could benefit Maryland-based users (wholesale or consumer) while providing a value-added incentive that accrues benefits throughout the industry supply chain. This action's specific intent is to formalize the relationship between the forest products industry and the research and development assets in Maryland.

This committee would work with the industry's primary innovators inside and outside of the state to create an innovation and technology strategy. It will direct applied research, improve technology commercialization from federal and university laboratories, and increase the level of technology and innovation adoption in the supply chain's primary and secondary manufacturing sectors. Some of the possible outcomes are described below.

- Identify and profile key assets and resources that will be of value to the forest products industry.
- Investigate pricing options for uses of regional laboratories for applied research to include intellectual and physical assets.
- Conduct a pilot program to facilitate interaction between private companies and existing applied research facilities within the U.S. Forest Service, West Virginia University, and Virginia Polytechnic Institute and State University.

- Conduct regional forest products technology and innovation conferences in collaboration with ThinkWood, the Wood Innovation Research Lab, and regional technology and research partners.
- Propose committee appointments to various technology and economic development boards.
- Develop relationships with state and regional technology and innovation financing sources (both equity and debt).
- Develop relationships with regional equity forums.
- Develop and maintain a web-based information clearinghouse for local and regional technology development resources and services.
- Collaborate with the Technology Councils to host periodic networking events to bring together various industry sectors such as robotics, telematics, materials science, and wood products.
- Host periodic roundtables/lunches for CEOs in related sectors.
- Develop an industry-driven R&D program.
- Develop relationships with private, federal, and university labs.
    - Manage basic and applied research projects.
    - Identify technology and process innovations within existing research structures that may be beneficial for development in Maryland.
    - Improve commercialization and testing capacity for the wood products industry, specifically within building, energy, and industrial products environments.

Action G.2: Prepare a technology-capable workforce.

As technology advances in robotics, telematics, nanoscale manufacturing, autonomous vehicles, and blockchain, the workforce within the forest products sector must also adapt. This issue was raised in numerous interviews as a significant potential challenge to future growth. The workforce development issues identified affect both current and future workforce needs. Addressing these issues will require a dedicated effort at the company, industry, workforce development, and educational institution levels.

Some of the critical steps to improving technology readiness include:

- Develop career opportunity modules to train secondary and post-secondary guidance and career counselors in technology-related careers in the forest products supply chain.
- Expand and improve contract education services and specialized technology industry training programs specific to industry needs in the primary and secondary manufacturing industries.
- Improve technology-specific certificate programs related to specific platform applications.
- Establish a scholarship program for STEM degree-seeking employees in emerging technology fields who wish to remain in the forest products industry or seek to enter the industry.
- Create an executive training program to introduce forest product operators to emerging technology adoption opportunities.
- Educate forest product businesses about existing training incentives and assist these businesses in securing grants or credits.
- Collaborate with community colleges such as Allegany College to develop curriculum meeting national training certifications for Forest Machine Operations and Wood Processing and Machining.

Action G.3: Develop funding to support innovation and technology adoption.

Given the rapid change in technology adoption across the industry worldwide, local forest product businesses will be forced to increase their competitiveness through modernization. This change will force companies to increase investments in new systems and may alter the capital structure.

- Train a business counseling network, using existing programs, to help forest product operators and secondary manufacturers evaluate the financial and operating implications of technology adoption.
- Work with resource-based investment funds and public funding agencies to create a self-sustaining wood products technology innovation fund.
- Adapt and expand Maryland's existing technology incentive programs such as TEDCO to include wood products and related technology fields.
- Develop a Cooperative Research and Development Agreement (CRADA) between Innovation Works and the U.S. Forest Service to enhance relationships between Maryland's wood product innovators and federal laboratories.

Action G.4: Support the growth of innovative secondary manufacturing businesses.

This action is intended to support growth in innovative secondary manufacturing businesses by providing direct entrepreneurial support to owners and operators. The intent is to build a robust manufacturing sector that is collectively responsive to local consumers, utilizes local forest products, and pushes innovation in product development, design, supply chain transparency, and material science. Innovation Works and the Baltimore Wood Project have a track record of success in accomplishing such goals using urban wood supplies. These models serve as best practice examples for developing the industry statewide.

Initiative H: Expand Domestic Marketing Opportunities

These actions are aimed at supporting and strengthening local economies. Many rural communities depend on forest resources, and the industry needs viable markets to maintain these resources. Doing so requires a suite of policies, incentives, technologies, and initiatives to identify and foster opportunities. At the same time, supporting rural economies and communities benefits the Chesapeake Bay watershed. Although counterintuitive to some, a vibrant and active forestry industry prevents the conversion of woods to development, which is critical for supporting cleaner water, healthier soils, and a vibrant ecosystem.

Action H.1: Pilot a traceability platform to meet consumer demand.

Consumers and businesses in Maryland have a demonstrated interest in purchasing products with known provenance. There is, however, no system currently in place that allows the type of transparency and supply chain visibility to follow wood from its source to its end-use outside of the dual certification programs employed on state timberland. Therefore, this action supports the creation of such a system. Please see Action C.2.

Action H.2: Create a resource hub for the Maryland forest products industry.

Industry associations and the private sector should work together to create and host a website that serves as a clearinghouse for resources related to marketing, education, data analysis, research business contacts, strategic plans, and other relevant information. This resource hub's aim is to educate the public, promote the industry, and foster collaboration. This platform should:

- Create a portal to simplify logging applications
- Promote forest products industry, wood products, and local firms.
- Provide updated business listings and contact information.
- Provide marketing materials (brochures, social media kits, infographics, etc.).
- Link to traceability platform.
- Link to a carbon trading platform.
- Help buyers and sellers to facilitate transactions.
- Provide access to relevant industry data, statistics, and analysis.

Action H.3: Create a branding program for Maryland wood that supports the health of the Chesapeake Bay.

Residents in Maryland care about the Chesapeake Bay, and many are supportive of buying environmentally friendly and sustainable products. Given that timber resources are renewable and sustainable forest management can yield healthy and growing forests, it is essential to market Maryland's wood products as such. Such marketing can be done through sustainable forestry certifications or a branding program that promotes the purchase of products made with Maryland wood.

This action would involve creating a brand and marketing campaign that promotes the purchase of forest and wood products made with Maryland trees that support the Chesapeake Bay's health. A logo will be used to help consumers identify products made with wood harvested from sustainably managed forests that do not negatively impact the Bay ecosystem. Use of such a logo can add value to Maryland-sourced products and improve consumer confidence. It can also be used in conjunction with a QR code that helps consumers identify product sourcing through the traceability platform.

Simultaneously, there would be a “buy local” campaign. Signage and digital content will be developed to bring awareness and drive consumer interest. Social media and video content will be a critical component for engaging consumers. In addition, institutions should be encouraged to purchase local wood, paper, or pulp products. Strategies used in Farm to School programs could be adapted for these products.

Action H.4: Encourage expansion of urban wood sorting facilities.

This action involves working with Central Maryland counties to identify facilities or businesses that can divert more urban wood for various uses, including furniture, sawlogs, pallets, firewood, and wood pellets. This action should be done in conjunction with efforts to develop CHP and wood pellet facilities.

Initiative I: Create the Workforce of the Future

Entrepreneurial leadership will create a dynamic industry. This dynamism will affect the labor force in unpredictable ways. Traditional labor force positions such as truck drivers, equipment operators, and general labor will have similar developmental needs as today. New skills in emerging job sectors such as coding and programming are likely to develop as the industry expands into advanced materials, autonomous vehicles, and robotics. Creating programs to help this disaggregated industry cope with such workforce development issues will require a nuanced, multifaceted approach.

Action I.1: Identify critical labor force skill gaps by timbershed.

Because of Maryland's various timbersheds, labor force development needs are likely to be similarly varied. Therefore, the first step in addressing those needs is to conduct a more detailed study of labor force requirements.

This step will begin with a labor survey of the entire supply chain beginning with landowners and foresters and moving through loggers, primary manufacturers, secondary manufacturers, and support industries (hereafter, industry cluster). The survey will be used to determine the most significant gaps in skills and the most critical future labor skills for:

- Core occupations – Skills essential to the existence of the industry cluster.
- Supportive occupations – Leveraging skills to maximize cluster returns.
- Transformative occupations – future skills required to meet changing nature of the clusters.

Once these needs are understood, the industry will work in collaboration with local and regional workforce development boards, community colleges, Cooperative Extension, primary schools, secondary schools, and others to develop a WorkKeys approach to create pilot programs that offer:

- Training programs for most demanded and/or critical skills.
- Certification program for basic life skills.
- Labor screening system to evaluate the effectiveness of the WorkKeys program.

Action I.2: Support access to and development of enhanced management capability.

The industry operators are challenged in attracting qualified technical and management personnel of the type required to support growth and modernization. Regional competition for the best talent is robust, and many of the most talented technical and management staff are unaware of the industry's opportunities. The sector also suffers from the stigma that begins early in the career advising process.

With these challenges in mind, the industry should work within the traditional career development pathways beginning in secondary school to focus on opportunities within its technical and professional fields. As part of this effort, the industry should create a widely available, cluster-based jobs clearinghouse for management and skilled technical labor pool. It could also work with local school districts to promote the forest products industry as a career option for Science, Technology, Engineering, and Math (STEM) students.

Finally, the industry should work with the State of Maryland and develop at-place management training programs for key professional and technical skills using vocational training models that link students and corporate management in a combination of internship, classroom, and in-situ learning. Models such as

Google's internship program and Tanglewood Conservatories employee development programs provide templates for such developments. These models are also adaptable by position and portable across regions and industries.

Action I.3: Work with regional partners to create centers of workforce excellence.

If sufficient economic activity is evident following the workforce development activities initiated in Actions I.1 and I.2, there should be a focused effort to build specific curricula that support the growth and attraction of the secondary manufacturing industry. These programs should be regionally focused and revolve around industry clusters that constitute the main economic contributors and the most rapidly growing clusters driven by technology changes. Venues can be selected with attention to address interest in recruiting a diverse workforce and addressing environmental justice challenges.

These "Centers of Excellence" will be created to build core cluster competencies and help the public and private sectors direct scarce resources where they will be most effectively employed. They may be affiliated with community colleges or universities and managed collectively with an industry affiliated board to:

- Set regional workforce and management training objectives.
- Focus on future skills (e.g., coding, programming, CNC machining, robotics).
- Establish regional benchmarks.
- Achieve economies of scale in delivering highly technical workforce training.
- Establish applied research capability.
- Share intellectual property and human capital resources.

There are many models for the implementation of Centers of Excellence that are operated as private-public partnerships. The Cuyahoga Community College offers an example of a multi-industry approach to labor force training that supports both classroom certifications, internships, apprenticeships, pilot manufacturing, and engineering. Centers of Excellence should be integrated with actions found in Initiative G (Actions G.1, G.2, G.3) and Initiative H (Actions H.2, H.3, H.4).

Action I.4: Develop Career and Technical Education (CTE) modules for youth and adult learning.

This action seeks to ensure that the skills required within the labor force are taught within each county's technical and vocational training programs and embedded within degree and non-degree programs. Courses should follow career path training objectives and be supported by internship opportunities. Specific CTE training identified the positions listed below.

- Heavy equipment operators.
- Automation and robotics technicians.
- Stationary engineers.
- Process equipment operators (e.g., programmable logic controller operations).
- Quality control and grading technicians.
- Field technicians.

To ensure that instruction remains relevant to the industry, an industry representative should be actively engaged with the various school systems on core curriculum development.

Section VI: The Need for Immediate Action

These strategies and associated initiatives and actions represent a seminal question for Maryland. Is it in the best interests of the state to encourage investments in expanding a forest products industry within its borders?

This question has been raised before. Previous studies and reports have highlighted the decline of the industry, changes in the structure of the state's forests, and opportunities to support the industry as a key component of the state's economy and culture. Unfortunately, these efforts have produced few results. This Economic Adjustment Strategy (EAS) represents the first time that an action plan has been developed to guide future decision making.

Implementation of the strategies, initiatives, and actions will require the time, expertise, and sufficient funding to ensure an effective effort. No single agency or organization has responsibility across the technical, financial, workforce, land use planning, and economic development tasks identified in this plan. Traditional and existing governmental and industry structures are not organized to address the broad range of policy changes needed to improve the business environment for the forest industry and guide progress towards its potential to support sustainable living and climate resilience. However, these organizations, and individual leaders, should play key roles in the implementation process. Therefore, it will be key to create a framework of leadership and resources that can guide these efforts.

Two alternatives seem possible, both of which would involve a public/private consortium. The first alternative would be a traditional "task force," likely named by the governor, with dedicated staff along with a specific charge and deadline. Such efforts are a staple of government, and the model for them is well established.

The second alternative would be to create a nongovernmental organization (NGO) that would operate independently of but in collaboration with State agencies, businesses, and economic development organizations to accomplish the goals of the EAS. Examples of such organizations in agriculture and forestry that have been truly effective with their mission to include WineAmerica and the World Agroforestry Centre. The advantage of this model is that once common goals and priorities are set, a private organization has the advantage of setting its own priorities and having the nimbleness to access the funding and talent needed to succeed. Funding sources could be multi-faceted, from dues and income from member services to grants or investments from institutional, private, public, or other sources.

Creating a Council for Coordinating Forestry Progress

The project team favors the second alternative of an independent NGO. Extensive discussions with industry representatives, both inside and outside of the state, led the project team to conclude that creating a new organization is necessary and more effective than a task force with a limited time frame.

The organization, hereafter called the Maryland Forestry Council, would act as the independent entity that supports the initiatives and actions of this Economic Adjustment Strategy. It includes the following components.

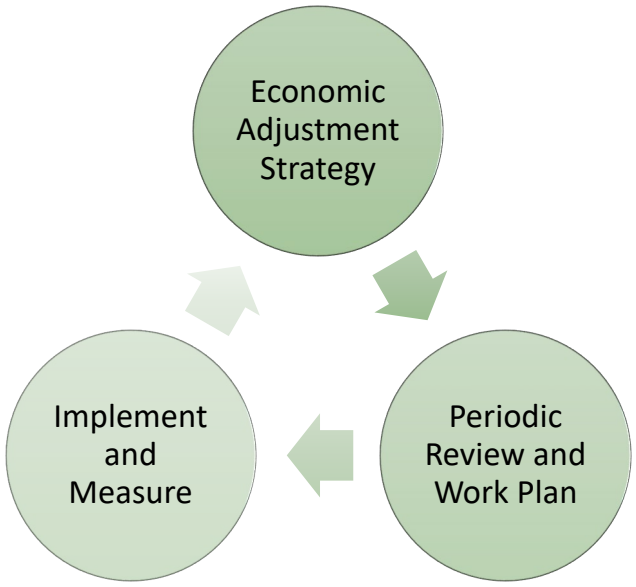
1. **Appropriate charter** to provide the governance, leadership, and sustained staff talent required to support the industry.
2. **Expertise** from agencies, state and local legislatures, and forest industry.
3. **Reliable revenues** from private and public sources.
4. **Ability to take political action** to influence policymaking and maintain an active lobbying presence.

Creating the Maryland Forestry Council necessarily becomes "Job One" in the implementation process for the project funders. It will require the development of a charter, creation of bylaws, identification of leadership, the establishment of a funding stream, and the development of industry support. The effort needed for this key step reflects the work necessary to implement the entire strategy and cannot be minimized.

Once created and properly authorized, the new Maryland Forestry Council would be able to address an issue that has plagued the Maryland forestry industry for decades: a lack of communication and collaboration of ongoing efforts. The project team discovered several projects addressing similar issues. Below is a short discussion regarding the relationships that should be established.

Ongoing Review

The EAS provides a guiding vision for the future of forestry in the State of Maryland as well as a strategic direction and recommended actions. To maintain momentum, developing a process to track progress and adjust the plan to changing conditions will be necessary. The project team recommends that the EAS steering committee report progress annually to the funders that supported the project until such time as the Maryland Forestry Council is formed. Additionally, they will report a 5-year summary report on priority needs to the legislature.



Relationship with Other Efforts

Coordination between the Economic Adjustment Strategy and the Maryland Forest Action Plan

The EAS has been progressing concurrently with Maryland's Forest Action Plan, including the Statewide Forest Assessment and its five-year strategy. The two efforts have similarities but were developed to support separate needs. According to DNR:

> "The Draft 2020 Maryland Statewide Forest Action Plan has three components: Statewide Forest Assessment, 5-Year Strategy, and Maryland's Assessment of Need for its Forest Legacy Program for conserving working forests. The Action Plan documents outline major issues and areas of activity for the Maryland Forest Service and a wide variety of partners. The Plan is used to inform decisions about current state investments and activities, and guides priorities for pursuing additional funding needed for many of the proposed actions. State Forest Action Plans are required by the federal Farm Bill, and USDA Forest Service grants require references to Forest Action Plan priorities.
>
> The Maryland Forest Assessment provides current data on forest conditions, background on major threats facing the state's forests. It identifies priority areas across the rural to urban spectrum, including important multi-state priority areas. The Strategy is informed by the conditions and priority areas in the Assessment and identifies existing and potential action items to meet major issues facing the state's forests. The time frame is focused on actions in the next five to ten years, with an eye towards outcomes that may take multiple decades to achieve at the scales needed." (DNR website)

While the Forest Action Plan must look at a wide variety of economic, social, and environmental aspects of forest management in Maryland, the EAS is much narrower in focus. The EAS is designed to take a hard look at the business climate for forest products industry investments in Maryland and what might be done to improve it.

That said, many of the strategies and tactics in the Forest Action Plan either mirror or support some of the strategies, initiatives, and actions of the EAS. While there is some overlap, there are also a few areas where the EAS engages broader business interests and communities. Ultimately, both the Forest Action Plan and the EAS represent significant bodies of work, and it is incumbent upon those involved in each to build useful correlations between the two and reconcile any differences toward the successful implementation of both.

It is important to recognize that implementation of the EAS will support the goals of previous efforts, such as the Report of the Sustainable Forests Committee of the Maryland Sustainable Growth Commission and the recommendations from "A Prospectus for Advancing Bio-thermal Energy in Maryland." As is the case with the Forest Action Plan, each of these efforts include recommendations designed to guide future policy with respect to forest resources. Although each was developed independently by different teams of experts, the compatibility, in some cases, even the identical nature of the individual recommendations, is noteworthy. The common nature of most of the recommendations is an endorsement of their importance. When combined with the action items identified it this plan, it is also an acknowledgement

that the Maryland forestry industry is important to Maryland's economy and environment, both now and in the future and that by working together, we can secure that future through our common goals.