



# MARYLAND FOREST STEWARDSHIP DISALIGNMENT REPORT

An analysis of incentives driving forest management decisions by Maryland landowners and the current state of their coordination



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1. Improving policies that allow private sector funding or stewardship to expand or supplant public or charitable conservation work
2. Transforming government policies to focus on what matters—outcomes
3. Eliminating the organizational barriers that prevent public agencies from adapting to 21st century solutions

EPIC is a fiscally sponsored project of Sand County Foundation. Sand County Foundation is a nonprofit conservation organization dedicated to working with private landowners across North America to advance ethical and scientifically sound land management practices that benefit the environment.

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## EXECUTIVE SUMMARY

This report provides a comprehensive analysis of the intricate web of public and private incentives affecting forest management decisions by private landowners in Maryland. Despite concerted state efforts, the health of Maryland's forests is deteriorating due to issues such as fragmentation and invasive species. The current landscape of government programs can be confusing and lacks coordination, sometimes conflicting with emerging market opportunities in ecosystem services and traditional commodities such as timber.

There are a complex mix of factors influencing forest management among private landowners in Maryland that must be understood to provide a starting place for determining the disalignment between them. The state's robust efforts to prevent deforestation and even to plant trees largely do not support improved forest quality. This is evidenced not only by declining forest health but by the significant number of landowners who lack formal stewardship plans. While some incentives for sustainable management exist through commodity and ecosystem service market forces, they are limited and emerging, respectively. As ecosystem service markets mature and commodity markets fluctuate, they should continue to be monitored for their integration with public management incentives.

In addition to describing existing drivers, the report provides some examples of how they currently do not work in sync to improve forest health. Government programs, although numerous, often create confusion due to their varying eligibility criteria and disalignment with other initiatives, adding unnecessary layers of complexity to effective forest management. The immaturity of ecosystem service markets and limited commodity market opportunities add to the confusion, making it difficult to align incentives effectively across Maryland's diverse geographic regions.

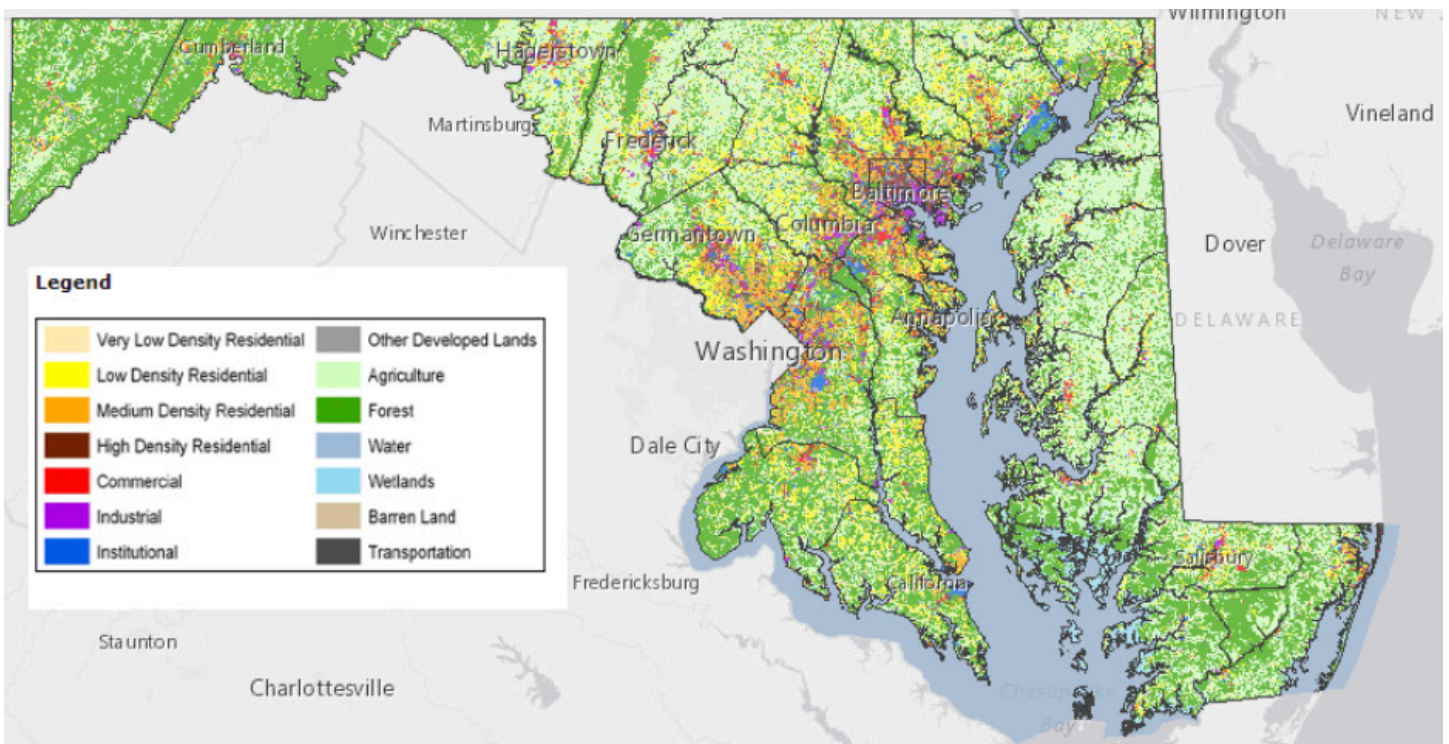
To conclude, the report outlines key areas for future research and actionable steps to better harmonize these disparate incentives. Topics for further investigation include understanding the capacities of primary manufacturing, the role of intangible incentives among landowners, and the potential for leveraging forest stewardship plans. It also calls for a closer look at successful policies in peer states and the further exploration of new ecosystem market opportunities. As forest health advocates and experts continue the work begun here, engaging a large and diverse set of stakeholders will be crucial for developing targeted solutions. This collaborative approach will lay the groundwork for a coalition that can advocate for policies that ensure a more sustainable and economically beneficial future for Maryland's forests.



Swallow Falls Maryland



# INTRODUCTION



Maryland Land Use Map (2010). Credit to [Maryland Department of Planning](#)

While Maryland has made preventing forest loss a priority, [the state continues to lose forest cover](#), and the health of the state's forests is worsening due to fragmentation and invasive species proliferation. To meet the state's environmental goals, a variety of public incentives and regulations exist. But these incentive programs can be confusing for landowners to navigate, frequently do not work well together, and can conflict with opportunities for forest landowners to participate in markets for ecosystems services and traditional commodities (i.e., timber). As a result, current economic and regulatory incentives are not leading to a reduction in forest loss by changing landowner behavior away from economic activities that increase deforestation.

A focus on forest management is essential in Maryland, where the health of existing forests is declining. Significant environmental disparities exist between managed forests, conserved lands, and non-forest land in Maryland. Moreover, managing forests better has shown in some cases to be more cost-effective compared to afforestation or forest conservation, especially concerning outcomes like climate mitigation, biodiversity, and water quality. Substantial investments made so far in forest planting may be approaching an inflection point, necessitating a shift towards more and more effective spending on forest stewardship.

The forestry sector's contribution to Maryland's economy was recently analyzed in a study conducted by BEACON, the Business Economic and Community Outreach Network at Salisbury University, in partnership with the Maryland Agricultural and Resource-Based Industries Development Corporation (MARBIDCO). The findings, based on 2015 data, revealed that nearly \$3.5 billion was contributed to the State's economy by this sector. It supported 15,271 jobs directly and indirectly while generating close to \$133 million in state and local tax revenue. Based on these study results, the economic importance of the forest industry cannot be left out of conversations about improved forest management.

Because forestry is a multifaceted industry with impacts to the economy, environment, and government, individual forest landowners can have many different, sometimes conflicting incentives directing their management behavior. By "alignment," the authors of this report mean for these various drivers to not conflict with each other but to all encourage landowners towards regenerative forest management. If government programs, commodity markets, and ecosystem service markets are in alignment, forests will be able to produce economically valuable products, provide recreational opportunities, and contribute to a healthy climate and Chesapeake Bay.

## FOREST MANAGEMENT DRIVERS: INVENTORY AND PROGRAM DETAILS

Forest management decisions for private forest landowners in Maryland are currently shaped by a combination of tangible (i.e. financial) and intangible interests. Many landowners consider forest stewardship an ethical responsibility and hold deep emotional attachments to their forests. However, most also cannot afford to lose money on managing forests. Economic opportunities provided by government programs, timber market forces, and ecosystem services markets can overlap to support an inherent drive for sustainable management or can serve as the sole drivers. Unfortunately, the complexity of identifying a healthy forest, limited skilled labor, and programmatic conflicts can all hamper alignment of these incentives for effective stewardship and leave significant gaps for future action.

Approximately [70%](#) of Maryland's forests are privately owned, presenting a major impact on the state's overall forest management, but the majority of landowners do not have a formal plan for how to manage their forests. This could be attributed to disinterest or aversion towards governmental programs or possibly due to limited funding and resources for tree management. Moreover, it's been noted that a substantial number of these owners aren't specifically interested

in or knowledgeable about forestry best management practices. This situation creates an issue, as while nearly all cite various ecological services as benefits, they aren't specifically managing forests to maximize those benefits or timber harvest. However, they also do not want to overspend on their maintenance.

Many of the incentives for private landowners are geared towards restoration and planting but relatively few are for maintenance and management. Few programs currently reward landowners for environmentally beneficial management actions such as decreasing invasive species or increasing diversity, nor that contribute to public goods like carbon sequestration or clean water.

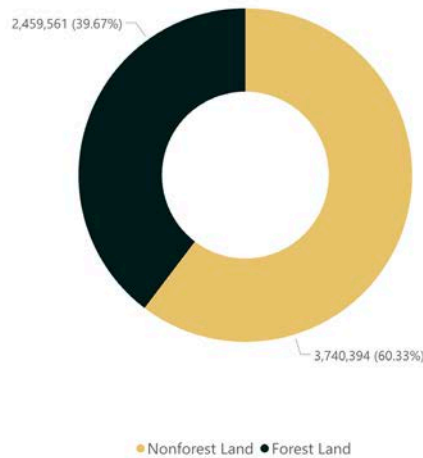
Additionally, interviewees expressed a noticeable shift in the demographic of landowners, with newer owners acquiring land not for revenue opportunities, but for personal connections such as family ties or as a refuge from city life. This has been matched with some degree of adaptability from government technical assistance programs, but financial assistance hasn't been as responsive.

Invasive species are a growing threat in forests and streamside buffers, and diseased or aged trees can pose significant threats to ecosystem health and human safety. Labor limitations have spurred greater mechanization, but the fact remains that tending to and harvesting these trees is arduous, dangerous work that isn't highly lucrative. Management of forests is complex, potentially expensive, and critically important for a plethora of state goals. Better understanding of what tangible drivers currently shape landowners' decisions about how to manage their forests is a crucial first step in ensuring their long-term health.

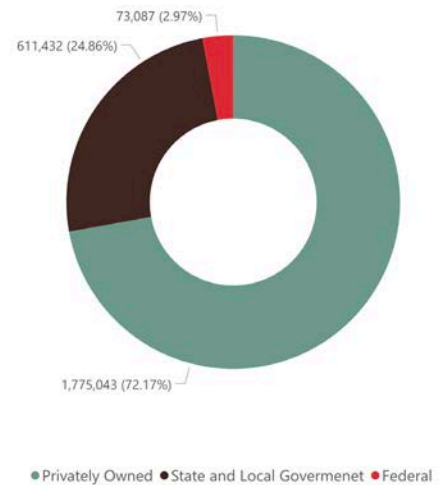
### Government programs

Maryland has some of the strongest protections in the country for preventing deforestation. The state's newly-updated Forest Conservation Act builds on a clear, laudable state goal of no net forest loss and provides strong requirements and new tools to attain that goal. However, its primary focus is not the quality of those forests. In the recent [technical study](#) commissioned by the legislature to examine the state's forest cover, contiguity alone was used as a proxy for forest health.

Maryland Land Area by Land Use Type, 2017



Forest Land by Ownership Group in Maryland, 2017



Source: [Maryland Department of Natural Resources Forest Service](#)

In addition to the mandates of the Forest Conservation Act, the state and federal governments try to prevent deforestation with programs that pay landowners to acquire their land's development rights via easements. [USDA's Agricultural Conservation Easement Program](#) can apply to nonindustrial private forest lands, and its [Regional Conservation Partnership Program](#) uses similar authorities to place easements preventing development on managed forest lands. Maryland's [Rural Legacy Program](#) functions similarly by working with local governments and private land trusts to identify targeted areas in which to preserve sites of ecological significance, farms, and working forests. Notably the Rural legacy Program can fund forestry best management practices (BMPs) by incorporating the increased value of a healthy ecosystem into the property value that determines payment for development rights.

Most existing federal, state, and local programs in Maryland are focused overwhelmingly on tree planting compared to forest management and especially along streams. Examples include the US Department of Agriculture's [Conservation Reserve Enhancement Program](#) and Maryland Department of Natural Resource's [Backyard Buffer Program](#). Numerous localities have their own tree planting programs, such as the City of College Park's [Tree Canopy Enhancement Program](#) and too many others to name. The mechanisms for these vary with some providing financial assistance just for tree planting and others paying a rental rate as well, some providing trees directly to homeowners while another subsidizes trees bought from commercial nurseries. Most—but not all—do not have significant maintenance requirements, much less forest management requirements.

However, the state does provide some incentives for larger landowners to manage forests. The most notable of these are run by the state's Department of Natural Resources and its Forest Service. The [Mel Nolan Woodland Incentive Program](#) provides up to 65% of the cost for landowners to improve their timber stand by adopting a written set of best management practices defined by the federal government and [approved by a Licensed Forester](#). Once approved, landowners pay for and implement the BMP and then provide receipts to the state to be reimbursed for a portion of their costs. This funding model in which government and landowner share in the cost of implementing a best management practice that has positive societal externalities is common in agriculture and called "cost-share." Typically, the Woodland Incentives Program awards approximately \$100,000 per year to 75-100 landowners for management practices on 1,500 - 2,000 acres.

The federal government—mostly through the Department of Agriculture—provides a range of programs to assist in planting and best management practices for forest land, largely through similar cost-share mechanisms. The most wide-reaching and well-funded of these is the [Environmental Quality Incentives Program](#), which doubles as a conservation program for farmland. Examples of these practices can include herbaceous weed control, stream habitat improvement and management, and brush management. Both federal and state cost-share programs require that the forest land be "non-industrial," a technical categorization that can be thought of similarly to "family farm". A non-scientific review of [EQIP practices funded in Maryland](#) between 2017 and 2020 showed that at least \$872,973 of \$35,704,130 in total payments went to forest establishment and management.

The state also uses tax breaks to incentivize landowners to manage their forests. DNR's [Forest Conservation and Management Programs](#) (a Forest Conservation Management Agreement or a Forest Management Plan) can slash property taxes by as much as 95% on highly zoned forest lands (through assessing the property tax on the land at the agricultural rate) where landowners agree to have a state forester or certified consultant develop a forest stewardship plan for them that they will follow for 15 years. The minimum acreage required to participate in these programs is 5 acres. The state currently has around [1,300 agreements](#) in place covering 84,000 acres, approximately 4.7% of [privately owned forest land](#).

The [Income Tax Modification Program](#) permits qualified landowners to take deductions from their Maryland state income tax for twice the expense of reforestation and the enhancement of timber stands, discounted by any cost-share funds received. Only those who own or rent 3 to 1,000 acres of forest land that is capable of cultivating in excess of 20 cubic feet of lumber per acre annually and is designated chiefly for the growth and harvest of trees are eligible. Each year, approximately 30-50 landowners participate in this program.

All told, local, state, and federal governments provide a menagerie of different encouragements from forest planting to planning to management through direct provision of materials and expertise, sharing in the cost of improvements, and tax incentives.



## Commodity markets

Commodity markets for timber and wood pulp served as the main driver of forest management decisions for centuries. Today, Maryland's forest industry has suffered from "[benign neglect](#)." But it still is crucial in determining how landowners controlling thousands of acres choose to harvest and otherwise manage their forests.

For instance, how producers choose to harvest trees can have significant impacts on the ecosystem. While even a layman may recognize that "clearcutting" has negative environmental impacts, it's also not ideal to only harvest select "[high grade](#)" (large, typically more valuable) trees. Harvesting variable sizes of trees at once, such as through strip cutting, can leave diverse habitat and seed sources for wildlife. In addition to benefits for wildlife, this kind of management effort increases the forest's resiliency, particularly crucial for resisting the proliferation of invasive species, such as kudzu. Ensuring forest resiliency is especially important because once invasive species become established, restoring a forest to have significant economic and ecological value is costly and can take decades.

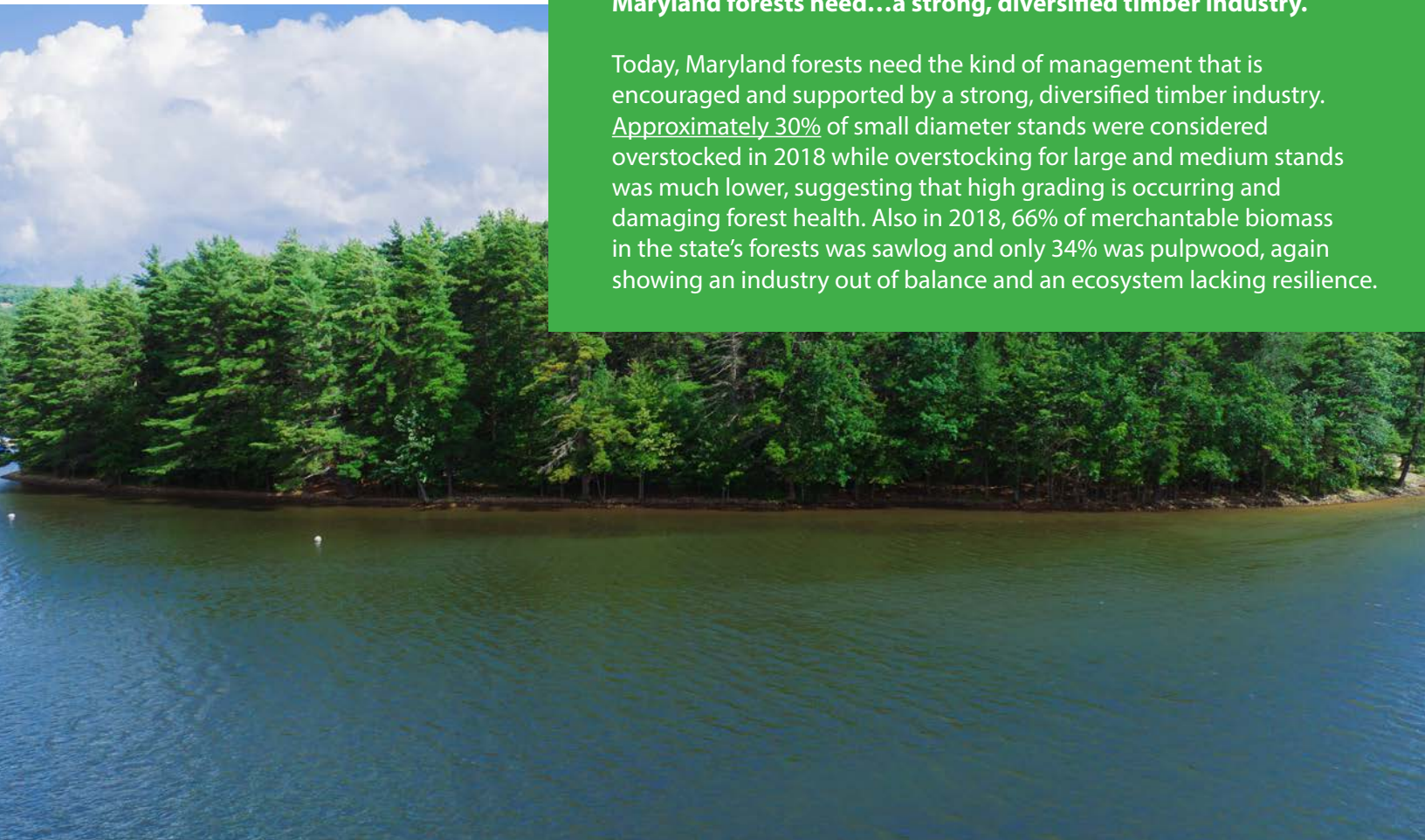
However, this kind of mixed size harvesting is only possible if there exist accessible markets for multiple kinds of forest products. Obviously, smaller diameter trees are likely not as suitable for lumber or cabinetry as mature trees. These smaller trees may be more suited to producing wood pulp for paper, pellets for energy, or emerging uses like [wood-based concrete](#).

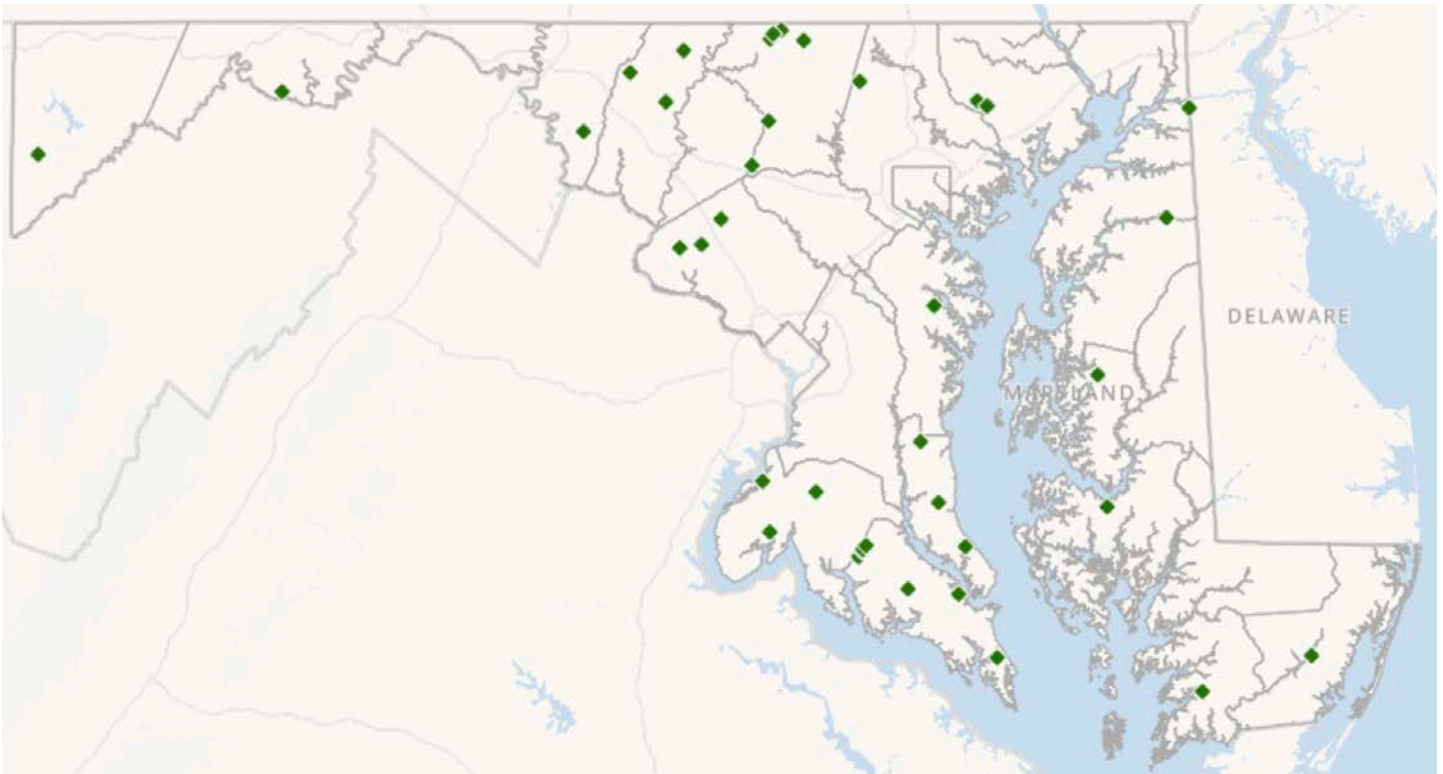
While portions of the industry (particularly secondary manufacturing of products directly for consumer use) can still be profitable, the primary manufacturing (sawmills) components have seen some notable closures in recent years disrupting the balance of products that can be produced from the state's forests. In 2019, the Verso Luke Paper Mill in western Maryland [closed](#) leaving a significant void for the large, commodity-based forest products industry as a whole but specifically for wood pulp. The remaining mills are mostly family-owned and focused on specialty wood products. These mills have also experienced closures, but those were characterized as being due [less to economic factors](#) and more to a disinterest in entering the industry from younger family members.

Deep Creek Lake, Maryland

### Maryland forests need...a strong, diversified timber industry.

Today, Maryland forests need the kind of management that is encouraged and supported by a strong, diversified timber industry. [Approximately 30%](#) of small diameter stands were considered overstocked in 2018 while overstocking for large and medium stands was much lower, suggesting that high grading is occurring and damaging forest health. Also in 2018, 66% of merchantable biomass in the state's forests was sawlog and only 34% was pulpwood, again showing an industry out of balance and an ecosystem lacking resilience.





Map of sawmills in the state. Credit to [Maryland's Forestry Industry Storymap](#)

## Ecosystem service markets

The most emerging driver of forest management decisions is no doubt the market for ecosystem services, particularly carbon sequestration. These pay landowners for generating a net additional benefit to the environment, such as storing carbon or preventing flooding.

In contrast to grant programs, ecosystem service markets are focused on the result and typically make payments later, closer to or after when those results are verified. Unlike cost-share, they do not require landowners to save their receipts to get reimbursed for just a portion of costs expended. Because the payments are based on how much net benefit management decisions generate, ecosystem service markets can serve as a source of long-term net income for forest landowners.

While the concept of ecosystem service markets was originated by the private sector, the role of governments in catalyzing and refereeing these markets continues to expand, especially in Maryland. In many cases governments formally or informally set the standards by which net ecological improvement is determined. This can be done via direct measurement, indirect modeling, or some combination of the two. However, Maryland currently has a conflict in which private, voluntary carbon markets are evaluated completely differently from how the state must model its own carbon emission (and thus sequestration) goals. For instance, the [Regional Greenhouse Gas Initiative](#) does allow crediting for enhanced forest management, but the requirement to conduct intensive on-the-ground monitoring has so far prevented this from being a viable revenue stream for landowners.

As with government programs, many of these are focused more on planting than forest management. Maryland has a relatively active forest mitigation banking market, but because its goal is to avoid net loss of forest cover, this market pays landowners for planting trees, and the [requirements](#) on maintenance are to ensure tree survival not forest health. New changes to the [Forest Conservation Act](#) make the mitigation banking market more focused on planting over preservation—arguably moving even further away from management—but the new changes do make it possible for certain forest management BMPs to generate additional mitigation credits. However, significant additional incentives for the formation of forest banking by landowners were not part of the new law. Another nascent planting-focused market is streamside buffers to meet Municipal Separate Storm Sewer System permit requirements regarding impervious surfaces, which the state has released [a tool](#) to calculate.



In contrast, one of the few active carbon sequestration credit projects in the state is exclusively focused on management of existing forests. The new [Family Forest Carbon Program](#) enrolls owners of at least 30 acres of forest land currently only in Western Maryland to improve the management of their forest, generating verifiable carbon sequestration that is sold as “carbon credits” to voluntary buyers. The program can ensure the veracity of its credits by monitoring comparable forests that aren’t enrolled in the program to generate a dynamic baseline that is compared with the acres that are enrolled. A notable win for this program was its ability to secure a loan guarantee from Maryland Department of the Environment’s [Water Quality Revolving Loan Program](#), which is now strongly encouraged to finance green infrastructure. Other carbon sequestration aggregators operating in the state, such as [Nori](#), are exclusively geared towards carbon sequestration on farmland.

It is possible that there are other ecosystem service markets operating or nascent within the state that indirectly involve forest management. For instance, two interviewees mentioned efforts to create compensatory habitat for the Delmarva Fox Squirrel when it was on the Endangered Species List. The [Clean Water Commerce Program](#) and the [Conowingo Pay for Success Program](#), which pay for verified reductions in nitrogen runoff, could theoretically be used as funding mechanisms for forest management in certain areas where forests are located near water bodies, but at present it would be an unusual scenario.



Forest Nature Trail at Assateague Island



## BARRIERS TO ALIGNMENT

Research conducted to inventory forest management drivers in Maryland has identified numerous funding sources and market opportunities that create the potential for better forest management in the state, albeit more focused on tree planting than management and/or maintenance at the present time. However, as noted in the introduction to this report, deforestation in Maryland continues, and the health and dynamism of forests is jeopardized by development pressures, unsustainable forestry practices, invasive species, and fragmentation, to name a few threats. This suggests that significant barriers to alignment of incentives for more sustainable forest management exist in the state, which this section discusses based on the research conducted.

### Heterogeneity in the forest landscape

Maryland is a diverse state exhibiting very different ecosystems and topography, growing conditions for forests and forest tree species, forest products markets, landowner objectives, population densities, and land values, to name a small but robust list. No one solution for more sustainable forest management will fit the entire state, leading to complexity in the ability of forest landowners to both learn about and take advantage of potential opportunities for incentives for forest management. Forest landowners manage forests in the state for multiple reasons: for forest health, wildlife and recreational opportunities, tax breaks, and timber and other income-generating activities. Above all, the owners cite that a personal connection to the land drives forestland ownership in Maryland, especially in areas lacking a robust forest products market.

The forest landscape can be understood through three primary geographic regions in the state: Western MD, Central MD, and the Eastern Shore of MD. These regional differences in the state are important to understand vis-a-vis forest management and the opportunities and incentives present for forest landowners in each region:

- **Western MD:** Western MD exhibits a combination of forest landowners managing their lands for timber products, wildlife, and privacy. There are some timber product markets in Western MD. Western MD is the initial site of the [Family Forest Carbon Program](#), developed by the Nature Conservancy and the American Forest Foundation. This program facilitates entry of family forest owners to the carbon markets; the Program pays family forest owners upfront to implement climate smart forestry practices on their lands that are additional to common forestry practices. The Program has addressed the transaction costs associated with carbon projects not at scale by aggregating activities across multiple landholdings at the Program level. The Program is also utilizing a method for establishing a baseline that addresses some of the concerns around additionality associated with carbon markets. Interestingly, this program is leveraging the [Water Quality Revolving Loan Fund](#) loan guarantee, made possible by a provision in Maryland's [Conservation Finance Act \(CFA\)](#).
- **Central MD:** In the central areas of the state, where higher population densities and land values exist, parcelization limits the ability to manage for traditional forestry purposes, and markets are difficult to find. It is not surprising therefore that most landowners in this part of the state own forestlands for forest health, tax breaks (through a forest stewardship plan, discussed above and below), wildlife, privacy, and heritage reasons less closely associated with making money from forestry practices. Cost-share programs (e.g., the Woodland Incentive Program, Wildlife Habitat Incentive Program, and EQIP) can be utilized to manage for forest health, but some people in this geography may be too high-income to qualify for certain programs.
- **Eastern shore:** Forest landowners on the eastern shore prioritize wildlife habitat as a primary objective given the popularity of hunting. Forest management and timber harvests are used to fund keeping forests as forests for these recreational purposes that rely on quality wildlife habitat for target species.

These differences in the drivers for forest land ownership and management across regions mean that some regions are going to pay more attention to certain opportunities and resources for forest management than others. Policy, economic, and other interventions to alter the incentives available will affect different regions in different ways.



## Programmatic differences in eligibility

The multitude of government programs, emerging ecosystem service market opportunities, and potential for better forest-related commodity markets is exciting in terms of potential benefits for sustainable forest management in Maryland, but the sheer number and criteria of programs creates confusion on the people, practices, and areas that are eligible; the requirements and costs associated with each; and whether and how participation in one of these programs may preclude participation in another. In addition, forest landowners have choices associated with different programs, such as conserving forest lands through mitigation activities under the Forest Conservation Act that involve easements or participating in cost-share programs for implementing certain practices in their forests. The attractiveness of different options will vary depending on where in the landscape the forest land is located (see section above). The table below summarizes some of the more predominant programs in the state that fund forest management activities, eligibility requirements for these programs, and notes on potential disalignment areas across programs.

Program	Eligibility	Potential Disalignment
<b>Forest Conservation and Management Program</b>	Tax incentive for highly zoned forest lands that have a forest stewardship plan associated with them.  15-year agreement to follow forest stewardship plan.	Depending on contents of the stewardship plan, requirements may preclude participation in commodity markets, in cost-share programs for certain forestry activities, and participation in ecosystem service markets.
<b>Income Tax Modification Program</b>	Landowner must own or rent 3 to 1,000 acres of forestland capable of cultivating more than 20 cubic feet of lumber per acre annually and is designated primarily for the growth and harvest of trees.	Focus on harvest may preclude landowner from participating in conservation-focused programs and/or ecosystem service markets.
<b>Conservation Reserve Enhancement Program</b>	Cropland or pastureland that can be planted with trees.	10-15 year contract; trees need maintenance after this time but program/funding has ended.  Landowners may not be eligible for selling outcomes to ecosystem service markets.
<b>Environmental Quality Incentives Program</b>	Forestry management practices on non-industrial private forestland (NIPF) - privately-held forest lands in rural areas that do not have mills/forest products processing facilities associated with them. Cost-share up to 50%.	Landowners may not be eligible for selling outcomes to ecosystem service markets.

<p><b>Woodland Incentives Program (WIP)</b></p>	<p>Pays up to 65% of eligible practices and is available to owners of at least 5 forest acres but not more than 1,000 acres could be harvested for forest products. Eligible land cannot have received federal cost-share in any of the 5 years preceding application for the same practice; eligible land cannot have received a WIP payment in any of the 15 years preceding application for the same practice.</p>	<p>Program is first-come, first-served and funding runs out.</p> <p>Eligibility is nullified if landowner has used federal cost-share.</p> <p>The 15-year barrier for WIP funding prohibits the program from effectively funding tree maintenance and/or management that will arise in and after this period.</p>
<p><b>Family Forest Carbon Program</b></p>	<p>Specific counties (Allegany, Carroll, Frederick, Garrett, Washington) in Western MD are eligible.</p> <p>Need to own 30 or more acres of non-plated, naturally regenerating trees and have the legal right to harvest on the land.</p> <p>Commitment to a 20-year agreement.</p>	<p>Working in Western MD in counties mostly exempt from FCA and likely limited to that geography.</p> <p>Management of existing forests not new planting.</p> <p>May be in conflict with forest stewardship plans and other management requirements flowing from state and/or commodity markets.</p>
<p><b>Program Open Space</b></p>	<p>Easement and acquisition program for outdoor open/recreation space.</p> <p>Works through local governments.</p> <p>Rural Legacy Easements must be in identified Rural Legacy Areas (identified through partnership between local governments and land trusts).</p>	<p>Easements have conditions that may be in conflict with other opportunities, however, the CFA provides that Rural Legacy Easements cannot prohibit landowners from ecosystem service markets as long as the market activity doesn't impact underlying easement requirements.</p>

Landowner awareness of the opportunities that exist is also a significant barrier. Despite efforts to increase communication with landowners, especially post-Covid, the high turnover of land has led to a rapidly shifting ownership environment that is difficult for entities working on forest landowner education and communication to stay ahead of. This is particularly the case for ecosystem service markets, as discussed below.



## Limited forest stewardship planning

One of the clear gateways to greater accessibility to state government sources of funding for better forest management is the development of a forest stewardship plan. As noted above, through DNR's [Forest Conservation and Management Program](#), landowners can reduce their tax burden by as much as 95% on zoned forest lands where landowners agree to have a state forester or certified consultant develop a forest stewardship plan. In order to be eligible for a MD DNR Forest Service Forester to write the forest stewardship plan, the forest landowner must own between 10 and 500 acres of forestland in one of the state's Priority Areas (see eligibility requirements [here](#)).

Developing these plans, however, comes with a cost, and there may be waiting lists for state foresters through the DNR that may be more cost-effective than private or industrial foresters (state foresters [may cost between \\$200 and \\$300](#) for developing a forest stewardship plan). Cost and the commitment required to enter into a 15-year plan may be drivers to low uptake of these stewardship plans: less than 40% of private forest landowners have such a state forest stewardship plan.

Once forest landowners are committed to a forest stewardship plan, misalignment with other potential opportunities may exist. Harvest allowances built into the plan may preclude forest landowners from participating in certain ecosystem services markets, especially carbon markets, where harvest allowances may be lower. There is also the possibility that these plans could do much more to benefit the environment through more sustainable forest management, which could open other opportunities for forest landowners to participate in other ecosystem service markets in addition to realizing the potential future benefits of commodity markets through harvests on their forest lands. We touch on this area of opportunity in the Future Research section below.

## Lack of clear and accessible ecosystem service market opportunities

Overall, lack of widely shared forest landowner understanding of ecosystem services as a concept is a barrier to update of ecosystem service market opportunities, where these opportunities exist. A [2013 survey](#) (distributed to over 800 tree farmers and 1,000 agricultural landowners in Maryland with an overall response rate of 30% and tree farmers representing around half of the responses). The survey showed that knowledge of ecosystem services among tree farmers was moderate and was low—with half of respondents not familiar at all and only 10% very familiar. Knowledge of water quality and wildlife habitat services was higher than those for carbon and forest mitigation. Despite this, over 60% of tree farmers indicated their willingness to participate in a “Payment for Ecosystem” program.

While ecosystem service markets are much applauded for their focus on allocating resources towards positive environmental outcomes, they have been slow to mature in the forestry sector and are somewhat plagued by controversies around additionality, leakage, and substitution, particularly within the carbon markets. In addition, measurement of carbon stocks and sequestration rates, baselines, and additional contributions based on changed management practices from the baseline are expensive and can be confusing even to the well informed. Protocols for improved forest management vary. As mentioned above, in Maryland private, voluntary carbon markets exhibit different methods for evaluating carbon than the methods used by the state to model its carbon emissions and sequestration goals, creating confusion for potential private forest landowner participants. The cost of meeting eligibility requirements is also a barrier to landowner participation: again, the Regional Greenhouse Gas Initiative (RGGI) does allow for crediting of enhanced forest management but requirements for on-the-ground monitoring have negated the financial viability of this type of credit. This is a clear case where an opportunity exists for landowners to theoretically be paid for better land management, but landowners are unable or unwilling to access it.

Another case for a potential opportunity involves plugging into water quality markets and programs in the state, but our research suggests that many Maryland forest landowners do not perceive a strong link between their forests and water quality, except perhaps where aquatic habitat is important for certain species important to the fishing and hunting sectors. The driver for forest management for water quality appears to come more from public entities, such as counties, who are incentivized to manage forests at a watershed scale for watershed-scale objectives such as source water protection and overall pollutant load reductions.

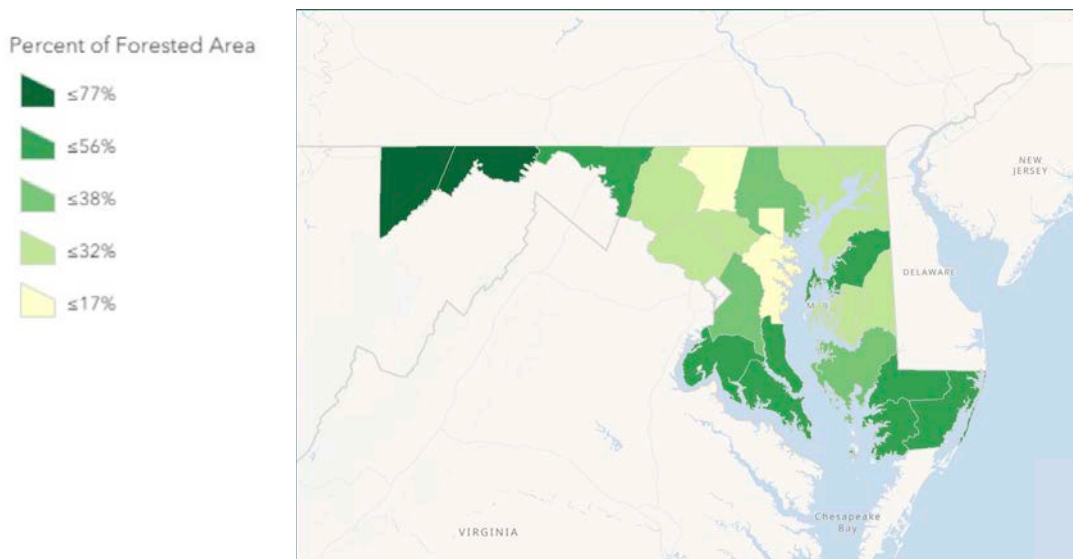
A barrier to potential access to ecosystem service markets concerns the ability to generate credits based on the funding source utilized to pay for a particular practice, e.g., planting and maintaining a riparian forest buffer or

changing forestry regimes to move from a practice such a clear-cutting to a more sustainable harvesting technique that better preserves the age and species diversity of forest stands. For example, some public sources of funding may limit the ability of a private landowner to sell credits. If funding sources are blended across public and private sources, this limitation may impact other pools of money as well.

Perhaps one of the most significant barriers to greater landowner participation in ecosystem service markets involves demographics: private forestland in Maryland exists in small parcel sizes that do not scale to the level required to make ecosystem service market deals financially viable given the high transaction costs involved in getting projects completed and documented. A [strategic assessment of Maryland's forest resource](#) by the state DNR estimated that around 75% of private forest landowners in Maryland own less than 10 acres, while the state's [2020 Forest Action Plan](#) estimated a significant increase in the number of forestland owners owning less than 10 acres, showing continued forest parcellation. These small parcel sizes make taking advantage of ecosystem service markets extremely difficult for landowners.

Another economic barrier to the uptake of ecosystem service markets in Maryland is the relative cost of land. Maryland is a diverse state in terms of socioeconomic status and land values, but land values are overall relatively high, especially in developing suburban areas experiencing high population growth (e.g., Frederick County and in and around the urban areas of Washington, DC and Baltimore). In these areas, the price a landowner might receive from an ecosystem service market transaction may pale in comparison to what a residential or commercial real estate developer would offer. The impact to forests here is mitigated somewhat by the development-driven mitigation requirements of MD's Forest Conservation Act but nevertheless this does not significantly change the pressure on landowners to move towards conversion over forest management in certain areas of the state. We heard from an interviewee that the development value of land is the loudest voice in a forest landowner's ear and from another interviewee that it is important for ecosystem service markets, such as for carbon sequestration, to pay more where there is more risk of a landowner considering a terminal harvest. Some landowners may receive only a potentially small sum that will not incentivize them to participate, because they don't meet additionality criteria or their existing practices are already incorporated into a baseline.

As the state implements the new Conservation Finance Act, which authorizes direct contracting for "environmental outcomes," there will likely be even more opportunities for it to pay directly for ecosystem services and catalyze these markets by developing the necessary standards. For instance, a state program could pay directly for acres of threatened species habitat restored or even buy tons of carbon sequestered in landowners forests via better management. The law also requires DNR and Maryland's Department of Agriculture to work with non-governmental organizations to aggregate small landowners so that they can participate in carbon sequestration markets and requires DNR to execute a carbon project on state lands. For these reasons, the law provides important enabling conditions that could potentially tackle some of the barriers to greater uptake of ecosystem service markets in that state.



Source: [Maryland Department of Natural Resources Forest Service](#)



## Limited commodity market opportunities

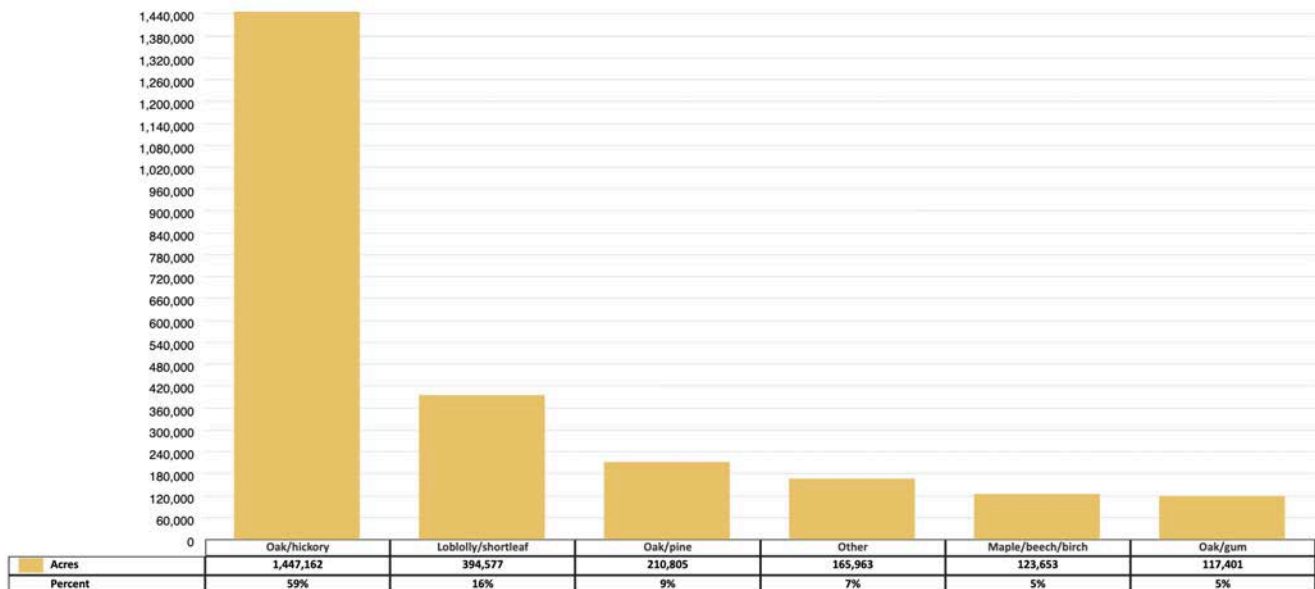
Barriers to accessing and benefiting from forest-based commodity markets result from limited market opportunities for certain timber products (e.g., low-grade wood products) and capacity limitations. Overall, there is a low market signal in the state to incentivize forest landowners to implement different harvest practices, and most forest landowners are not managing their forests to maximize timber revenues but rather are doing what they need to hold onto the land.

A lack of markets for low-grade wood products leads to an economic incentive on the part of the forest landowner to engage in high-grading. Harvest capacity in the state has been remarked on by an interviewee as only enough people, machines and markets to harvest 1-2% of the landscape per year, leading effectively to a 100-year rotation. In addition, forest harvesting is an inherently dangerous job and there is a lack of people wanting to enter the profession.

We present aspects of forest commodity market opportunities in Maryland regionally given the differences in forest species and market opportunities:

- **Western MD:** Tree species in Western MD include hardwoods, and the forest products economy has historically been focused on sawmills. However, with the [closing of the Verso Luke Mill](#) in Allegany County, there are fewer opportunities for landowners to sell lower-value timber products, critical to thinning forest lands by removing lower value tree species. The state has responded by directing resources towards an [Economic Adjustment Strategy](#) to help determine how forestry markets can be redeveloped. The incentive to manage longer hardwood rotations on forest lands in this part of the state has become more difficult given the lack of financial incentives for lower grade products. The threat of high grading is present, which could degrade forest health, including the quantity and diversity of older trees across the landscape.
- **Central MD:** As noted above, Central MD has smaller forest parcel sizes and is not typically an area of forest commodity market activity. Opportunities here for alignment of commodity market activities based on current programs therefore appear limited.
- **Eastern Shore:** This region exhibits softwood tree species and has more robust market conditions supporting forest management for timber harvest, as more mills have been able to survive. Loblolly pine in this area are fairly easy to grow and regrow as compared to the hardwood forests of the Western region, so it is easier for landowners to manage rotations and receive income streams from traditional forestry activities.

Top Five Commercial Species Grown in Maryland



Source: [Maryland Department of Natural Resources Forest Service](#)

## AREAS FOR FUTURE RESEARCH AND PROPOSED NEXT STEPS

### Future Research

During this research on alignment of forest management incentives, EPIC staff have identified several areas for future research that did not fit within this scope of work and which have not fully been covered by other reports.

**Primary manufacturing capacities:** Updated, detailed information on mill capacities for various commodities in and near the state would do much to inform how individual forest landowners make decisions about commodity production and thus forest management. In addition, more research could be conducted on emerging markets for forest products and the kinds of primary manufacturing capacity needed for these industries.

**Intangible incentives:** As stated earlier, many forest landowners, especially smaller ones, are motivated particularly by intangible incentives, like a desire for a feeling of stewardship not necessarily tied to actual best management practices. Much more could be done to understand how these landowners conceptualize forest management and how their goals might be supported. The Yale National Woodland Owner Survey could be one tool for this research but is not entirely sufficient by itself.

**Leveraging the forest stewardship plan:** Understanding the contents of typical forest stewardship plans in Maryland was beyond the scope of this report, but it is possible that incorporating more or new environmentally-positive practices into these plans could open additional opportunities for forest landowners to access other sources of funding, e.g., for ecosystem service markets, that could further entice landowners to develop these plans in a positive feedback loop. A more detailed dive into the contents of a sample of forest stewardship plans could identify additions that might better align forest management with ecosystem service markets and also government grant programs.

**Incentives in peer states:** As with other policy solutions, it's important to consult policy already developed in peer and aspirational states to improve forest management. An organization like the National Caucus of Environmental Legislators could be enlisted to share what kinds of programs support sustainable forest management in peer states.

**Identifying new ecosystem market opportunities:** Habitat protection, especially where there is a nexus with federally listed species, could have important alignment with better forest protection and management. Additional research could detail the nexus between species protection markets and forest management, for example in the area of mitigation and critical habitat designations to support forest interior dependent species.

**Models for valuing ecosystem services:** As more and improved methods of accounting for ecosystem services emerge, it would be prudent to conduct a full study of how these models operate to identify how they may not be working, ideally in a way that could be communicated to decision-makers and improve management opportunities for landowners. Some of these models and accounting methods include:

- Models used to calculate carbon credits by private, typically voluntary aggregators.
- The [Accounting for Maryland's Ecosystem Services](#) framework
- Requirements for forest management carbon offsets under the [Regional Greenhouse Gas Initiative](#) (RGGI)
- The plethora of tools for measuring nutrient and sediment runoff reductions, such as
  - The [Chesapeake Assessment Scenario Tool](#)
  - NFWF's [Field Doc](#)
  - USDA's [Nutrient Tracking Tool](#)
- The Government Accounting Standards Board Statement No. 62, which helps governments account for the value of natural capital.



## **Other Potential Next Steps**

Based on this initial report and after additional research is completed or simultaneously, policy experts can develop solutions to align the incentives EPIC and others have identified to increase sustainable forest management in the state. As new solutions are created, a broad range of expert and non-expert stakeholders should be consulted to screen for any adverse impacts and potentially strengthen specific policy and program recommendations. These conversations can also help identify legislative champions who could work to craft laws based on the alignment opportunities identified. The process initiated by this report and described directly above will lay a strong foundation to build a coalition of environmental, industry, and good governance groups that can support an innovative legislative proposal to address the gaps identified and better align the landowner incentives for forest protection, forest health, and sustainable forest stewardship for Maryland.