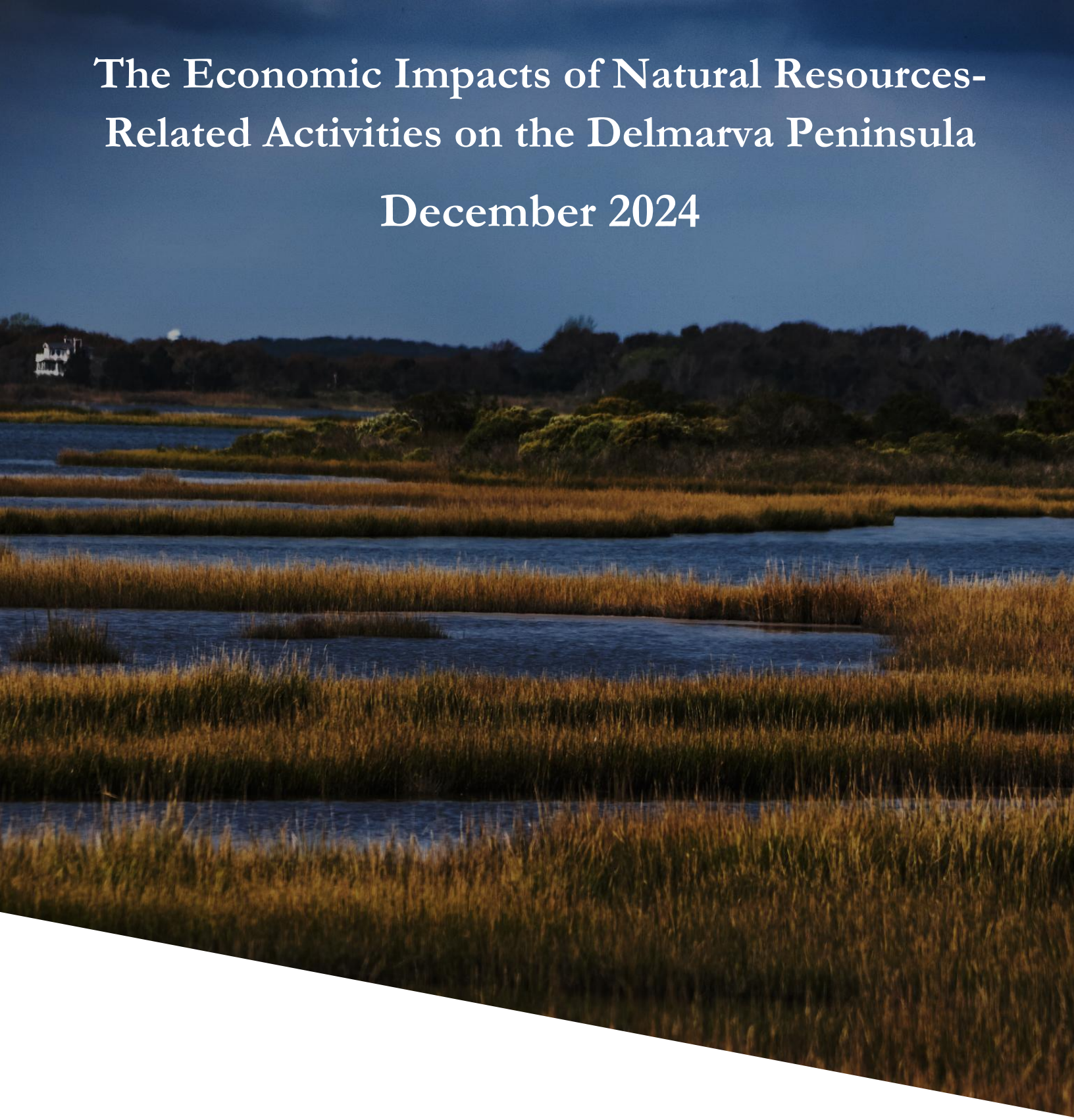
The Economic Impacts of Natural Resources-Related Activities on the Delmarva Peninsula

December 2024



Eastern Shore Land Conservancy

SAGE policy group

Executive Summary

This report quantifies the economic and fiscal impacts generated by the Delmarva Peninsula's expansive natural resources. Natural resources support several core regional industries including forestry, hunting, fishing, wildlife watching, boating, camping, as well as ecological restoration and conservation among others. Additionally, the Peninsula's natural beauty and biodiversity drive a robust tourism and recreation sector, attracting both residents and visitors year-round.

The Sage Policy Group study team used IMPLAN economic modeling software and input data from the U.S. Bureau of Labor Statistics, the U.S. Census Bureau, and state and local government financial documents to model the relevant impacts. Importantly, there are certain economically beneficial aspects of the Peninsula's natural resources that could not be captured in this report because of a lack of data or measurement infeasibility. For instance, natural resources provide water filtration, carbon sequestration, flood mitigation, and other ecosystem services, the economic value of which is real but difficult to quantify at scale. Natural resources can also significantly bolster property values, but augmented tax revenue collections attributable to those hedonic pricing effects are not captured in this analysis. Because of these additional sources of impact, the economic and fiscal impact estimates included in this report should be viewed as conservative.

ECONOMIC IMPACTS

The Delmarva Peninsula resources-based economy supports more than 74,000 jobs across the region, and those jobs are associated with more than $2.6 billion in annual labor income, which includes all forms of compensation. About 57,000 of those jobs are directly associated with natural resources or supported by natural resources-related tourism spending, while the remainder are supported by multiplier effects. In total, natural resources generate about $8.1 billion in annual economic activity across the thirteen-county region.

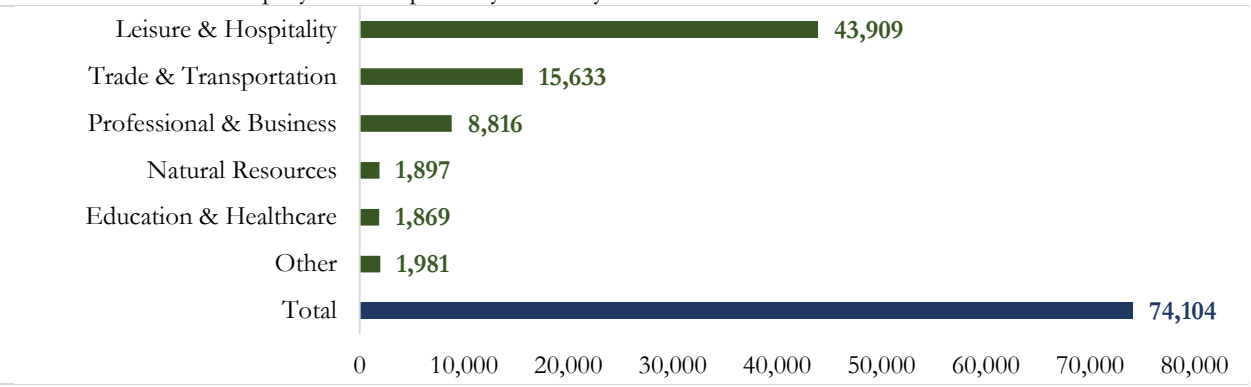
Exhibit ES1: Economic Impacts of Natural Resources-Related Activities

Annual, Ongoing	Jobs	Labor Income (Millions $2024)	Economic Output (Millions $2024)
Delaware			
Direct effects	24,974	$829.1	$2,139.5
Secondary effects	7,860	$356.0	$1,363.8
Total	**32,834**	**$1,185.1**	**$3,503.3**
Maryland			
Direct effects	29,832	$960.2	$2,832.8
Secondary effects	8,830	$415.0	$1,520.6
Total	**38,662**	**$1,375.1**	**$4,353.4**
Virginia			
Direct effects	2,045	$57.6	$189.9
Secondary effects	562	$20.5	$89.5
Total	**2,608**	**$78.2**	**$279.5**
Total Delmarva Peninsula			
Direct effects	56,852	$1,846.9	$5,162.2
Secondary effects	17,253	$791.4	$2,973.9
Total	**74,104**	**$2,638.4**	**$8,136.1**

Source: Sage, IMPLAN *Totals may not add due to rounding

The 74,000+ jobs supported by Delmarva Peninsula natural resources are disaggregated by industry in Exhibit ES2. As indicated, the majority of jobs supported by natural resources are in the leisure and hospitality segment, though there are also significant employment opportunities supported in the trade and transportation and professional business services sectors.

Exhibit ES2: Total Employment Impacts by Industry



Source: Sage, IMPLAN *Totals may not add due to rounding

FISCAL IMPACTS

State and local government tax revenues in Maryland are augmented by more than $455 million each year due to the Peninsula's natural resources. State of Delaware revenues and local government collections are bolstered by more than $230 million/annum. Commonwealth of Virginia revenue augmentation exceeds $22 million/annum.

Exhibit ES3: Fiscal Impacts of Natural Resources-Related Activities

Revenues (Millions $2024)	Delaware	Maryland	Virginia
State Government			
Income Tax	$37.6	$29.7	$2.3
Sales Tax	-	$230.5	$8.3
Property Tax	-	$13.3	-
Corporate Profits	$139.4	$8.5	$0.5
Other	$1.8	$18.2	$1.1
Total	**$178.8**	**$300.2**	**$12.3**
Local Governments			
Income Tax	-	$15.2	-
Property Tax	$38.5	$125.5	$7.2
Other	$14.2	$14.9	$3.0
Total	**$52.7**	**$155.7**	**$10.2**

Source: Sage, IMPLAN. Note: 1. Effective tax rates calculated using public financial information. 2. Totals may not add due to rounding.

CONCLUSION

Natural resources-related activities on the Delmarva Peninsula support approximately 75,000 jobs on an ongoing basis, more than $2.6 billion in annual labor income, and more than $8.1 billion in annual economic activity. That economic activity supports more than $700 million in annual tax revenues for State/Commonwealth governments in Delaware, Maryland, and Virginia, and their local governments. These impacts are in addition to the invaluable (but unmeasured) ecological benefits of the Peninsula's natural environment.

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This report was funded by

Eastern Shore Land Conservancy

Delmarva Restoration & Conservation Network

INTRODUCTION

The Eastern Shore Land Conservancy (ESLC) commissioned Sage Policy Group, Inc. (Sage) to quantify the economic and fiscal impact of natural resources-related activities on the Delmarva Peninsula, a region comprised of thirteen counties.

Delaware	Maryland	Virginia
Kent	Caroline	Accomack
Sussex	Cecil	Northampton
	Dorchester	
	Kent	
	Queen Anne's	
	Somerset	
	Talbot	
	Wicomico	
	Worcester	

This analysis captures the impacts of a broad assortment of natural resources-related activities, including those within the following industries: forestry, hunting, fishing, the operation of nature parks, wildlife watching, boating, conservation, and ecological restoration, among others. According to 2022 Census Bureau estimates, the combined population of these thirteen counties is approximately 950,000, with 443,000 residents in Delaware, 463,000 in Maryland, and 43,000 in Virginia.

The Delmarva Peninsula's natural resources—from Rehoboth Beach to Ocean City to Chincoteague Island—attract visitors year-round. Attendant visitor expenditures that would not occur in the regional economy but for the draw of the natural resources are also captured in this analysis.

Certain contributions of the natural resources-related economy are not captured in this analysis for the simple reason that they are difficult to accurately measure. For instance, waterfront properties typically command a substantial premium compared to non-waterfront properties. That premium translates into higher assessed values and greater property tax revenues for state and local governments. The same appeal that bolsters property values also renders the region a more enticing place in which to live, strengthening population dynamics across the region.

There are also economic benefits from the ecosystem services provided by natural resources, including water filtration, carbon sequestration, and flood mitigation. These difficult to quantify benefits (lack of associated transactions) are also beyond the scope of this analysis, but the value they provide for the region is nonetheless real and significant. In part because these drivers of economic and fiscal impact are not captured in this report, estimates provided in this analysis should be viewed as conservative.

METHODOLOGY

This analysis uses data from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) to estimate the jobs and labor income supported by natural resources-related industries across the study area. The study team determined visitor spending attributable to natural resources using existing economic impact studies of tourism pertaining the respective areas and information from the Delaware Tourism Office, the Maryland Office of Tourism, and the Virginia Tourism Corporation.[1]

This analysis uses IMPLAN economic modeling software, an industry standard platform for input-output analysis, to estimate the economic impacts supported by the natural-resources economy. Data from sources listed above serve as inputs to the model, which supplies multipliers and purchasing coefficients specific to the Delmarva region. Economic impacts are presented on an annual, ongoing basis and pertain to three distinct indicators:

- Jobs: one full or part-time position;
- Labor income: all forms of employee compensation (wages, benefits, etc.) and proprietor income; and
- Output: the sum of goods and services sold.

Those measures are presented at three different levels of impact:

- Direct: impacts occurring at establishments dependent on direct access to natural resources;
- Indirect: secondary activity occurring due to increased business-to-business spending; and
- Induced: secondary activity occurring due to increased household income.

Importantly, this analysis uses a modeling technique called multi-regional input-output analysis, a technique that allows direct impacts to be confined to a certain geography (the specific county) while also capturing secondary impacts that occur within a broader geography (the Delmarva Peninsula). More information regarding how to interpret economic impact findings can be found in Appendix A on page 12. Fiscal impacts, tax revenues supported by this economic activity, are estimated using a combination of implicitly generated IMPLAN parameters and proprietary techniques involving effective tax rates calculated using publicly available government financial data.

[1] Studies used to formulate the inputs to the model in this analysis include "The Value of Tourism 2022" by Rockport Analytics and Longwoods International as well as "The Economic Impact of Tourism in Maryland-2022" and "The Economic Impact of Visitors in Virginia 2023" by Tourism Economics, An Oxford Economics Company.

ECONOMIC IMPACTS

The natural resources-based economy supports more than 74,000 jobs across the Delmarva Peninsula once multiplier effects are considered. Those jobs are associated with more than $2.6 billion in annual worker compensation. Approximately 57,000 of those jobs are direct—either directly involved with natural resources or supported by natural resources-related tourism spending. Another 17,000 jobs are supported through secondary effects (i.e., augmented consumer and business-to-business spending attributable to the direct effects). In total, natural resources generate $8.1 billion in annual economic activity across the thirteen-county region per year.

Exhibit 1: The Economic Impact of Natural Resources, Delmarva Peninsula

Annual, Ongoing	Jobs	Labor Income (Millions $2024)	Economic Output (Millions $2024)
Delmarva Peninsula			
Direct effects	56,852	$1,846.9	$5,162.2
Indirect effects	9,624	$428.9	$1,696.5
Induced effects	7,629	$362.5	$1,277.40
Total	**74,104**	**$2,638.4**	**$8,136.1**

Source: Sage, IMPLAN *Totals may not add due to rounding

Approximately 54 percent of that economic activity occurs in the nine Maryland counties on the Delmarva Peninsula, while 43 percent occurs in Delaware and the remaining 3 percent in Virginia. This is relatively similar to each state's share of the Delmarva Peninsula's overall employment base.

Exhibit 2: Economic Impacts by State (Delmarva Peninsula Counties Only)

Annual, Ongoing	Jobs	Labor Income (Millions $2024)	Economic Output (Millions $2024)
Delaware			
Direct effects	24,974	$829.1	$2,139.5
Indirect effects	4,165	$175.8	$737.9
Induced effects	3,695	$180.2	$625.88
Total	**32,834**	**$1,185.1**	**$3,503.3**
Maryland			
Direct effects	29,832	$960.2	$2,832.8
Indirect effects	5,103	$240.5	$901.5
Induced effects	3,727	$174.5	$619.07
Total	**38,662**	**$1,375.1**	**$4,353.4**
Virginia			
Direct effects	2,045	$57.6	$189.9
Indirect effects	356	$12.6	$57.1
Induced effects	206	$7.9	$32.44
Total	**2,608**	**$78.2**	**$279.5**

Source: Sage, IMPLAN *Totals may not add due to rounding

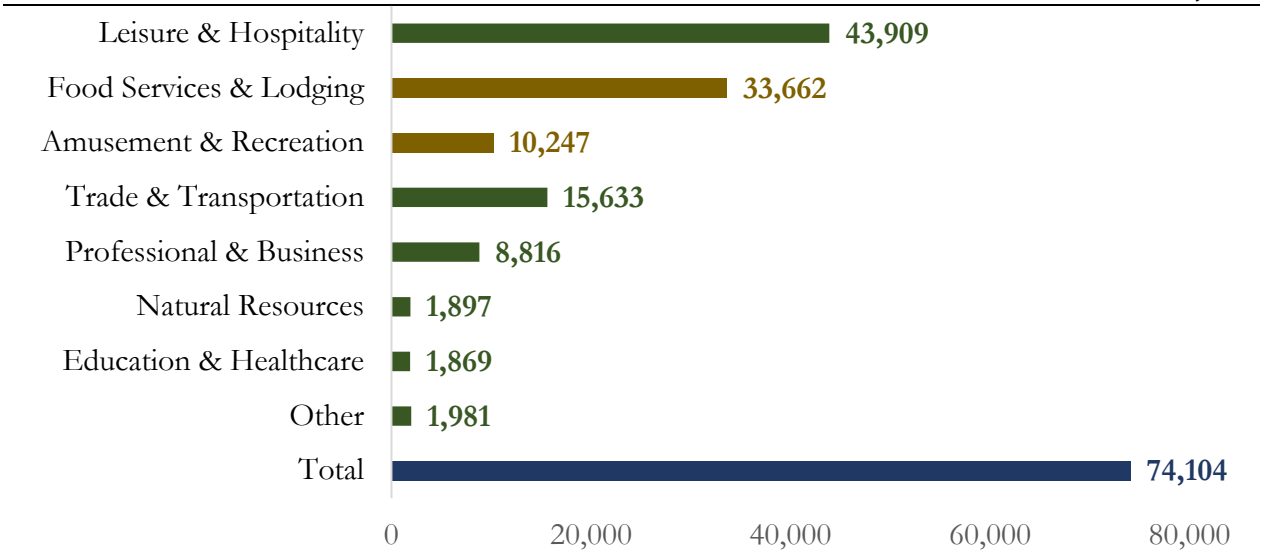
IMPACTS BY INDUSTRY

The majority of jobs supported by natural resources are in the leisure and hospitality super sector, a segment of the economy that includes nature parks and the associated jobs (e.g., guides) as well as food service and lodging positions attributable to visitor spending effects. For instance, there is significant hospitality activity related to several of the Peninsula's National Wildlife Refuges, including at Prime Hook, Blackwater, Bombay Hook, and Chincoteague.

The natural resources economy also supports significant activity in the trade and transportation sectors, including positions in retail and wholesale trade, warehousing and distribution, and truck and passenger transportation. The natural resources economy generates substantial income for households, which in turn supports demand for goods flowing through the region. Natural resources themselves are often transported, creating additional demand for distribution centers and trucking services.

Exhibit 3: Total Employment Impacts by Industry

Industry	Jobs
Leisure & Hospitality	43,909
Food Services & Lodging	*33,662*
Amusement & Recreation	*10,247*
Trade & Transportation	15,633
Professional & Business Services	8,816
Natural Resources	1,897
Education & Healthcare	1,869
Other[2]	1,981
Total	**74,104**



Source: Sage, IMPLAN *Totals may not add due to rounding

[2] The "Other" category encompasses utilities, manufacturing, agriculture, and other services.

FISCAL IMPACTS

INCOME TAXES

All three states with counties on Delmarva Peninsula levy an income tax. In Delaware, which has a graduated income tax rate ranging from 2.2 percent to 6.6 percent, natural resources activities support approximately $37 million in annual income tax collections. State-level income tax rates are similar but slightly lower in Maryland, topping out at 5.75 percent, and natural resources activities support an estimated $30 million in annual income tax collections for the Free State. Virginia, with income tax rates similar to Maryland's, collects an estimated $2.3 million in annual income taxes due to the Peninsula's natural resources.

Of the three states, only Maryland levies local income taxes. Economic activity supported by natural resources generates approximately $15 million in annual income tax revenues for local governments on Maryland's portion of the Peninsula.

SALES AND GROSS RECEIPTS TAXES

Sales taxes related to natural resources-related activities support approximately $230 million in annual revenues to Maryland State government, where the tax rate is 6.0 percent, and $8 million to the Virginia State government, where the sales tax rate is 4.3 percent. Virginia also has a one percent local sales tax, which supports approximately $1.6 million in annual revenues related to natural resources for local governments (included under "other"). Delaware does not levy a sales tax.

PROPERTY TAX

Maryland has a real property tax of 0.1120 percent and significantly higher local rates. Those rates respectively generate $13 million and $126 million in property tax revenues related to natural resources-supported activities on the Peninsula each year. Delaware and Virginia do not levy property taxes at the state/commonwealth level, but their local jurisdictions on the Peninsula collect $39 million and $7 million in annual property taxes due to the natural resources economy, respectively.

As noted, this analysis does not attempt to assess the impact on property values derived from being proximate to natural resources, including waterfront. Anyone who takes the time to glance at waterfront prices in Talbot County, MD, Worcester County, MD, or Sussex County, DE can tell that there is an impact.

All things being equal, the higher property values are, the more revenue government collects in the form of property taxes. However, all things are not necessarily equal. Practically speaking, a likely implication of lofty property values is that local governments can levy lower property taxes and still finance local government services. The implication is that residents of these communities are paying

lower property taxes than they otherwise would, a source of additional prosperity and perhaps one of many explanations regarding why property taxes on Maryland's Eastern Shore, for instance, are so much lower than on much of the Western Shore.

CORPORATE TAXES

Delaware's 8.7 percent corporate income tax and gross receipts tax—which collects between 0.0945 percent and 0.7468 percent of a business's gross revenue depending on the industry—generates nearly $140 million in annual revenues due to natural resources-related activities on the Peninsula. The State of Maryland (8.25 percent tax rate) and Commonwealth of Virginia (6.0 percent) collect $9 million and $500,000, respectively, in corporate income tax each year due to the economic impacts generated by the Peninsula's natural resources.

OTHER TAXES AND FEES

There are other revenue sources captured in this analysis including certain excise taxes, business taxes, and charges for services like motor vehicle and other licensing activities. At the state/commonwealth level, this broad category of revenues accounts for $2 million in Delaware, $18 million in Maryland, and $1 million in Virginia each year related to natural resources activities on the Peninsula. At the local level, other taxes and fees account for $14 million in Delaware, $15 million in Maryland, and $1 million in Virginia each year.

TOTAL FISCAL IMPACTS

Maryland's State tax revenues are augmented by more than $300 million each year due to the Peninsula's natural resources, while Delaware's State tax revenues are bolstered by nearly $180 million per annum. Commonwealth-level tax revenues in Virginia exceed $12 million per annum.

Exhibit 4: Fiscal Impacts by State (Delmarva Peninsula Counties Only)

Revenues (Millions $2024)	Delaware	Maryland	Virginia
State Government			
Income Tax	$37.6	$29.7	$2.3
Sales Tax	-	$230.5	$8.3
Property Tax	-	$13.3	-
Corporate Profits	$139.4	$8.5	$0.5
Other	$1.8	$18.2	$1.1
Total	**$178.8**	**$300.2**	**$12.3**
Local Governments			
Income Tax	-	$15.2	-
Property Tax	$38.5	$125.5	$7.2
Other	$14.2	$14.9	$3.0
Total	**$52.7**	**$155.7**	**$10.2**

Source: Sage, IMPLAN, effective tax rates calculated using public financial information

The nine Maryland jurisdictions on the Peninsula and the municipalities within them collect more than $155 million in annual tax revenues as a result of natural resources-related activities, with the majority of those revenues taking the form of property taxes. Sussex County and Kent County, Delaware, along with their municipal governments, collect more than $52 million in annual revenues due to natural resources, while local governments in Accomack County and Northampton County, Virginia, collect more than $10 million in annual revenues as a result of natural resources-related activities.

CONCLUSION

Natural resources-related activities on the Delmarva Peninsula support approximately 75,000 jobs, more than $2.6 billion in annual labor income, and more than $8.1 billion in annual economic activity. That economic activity supports more than $700 million in annual tax revenues for the State of Delaware, State of Maryland, Commonwealth of Virginia, and area local governments. These impacts are in addition to the invaluable ecological benefits of the Peninsula's natural environment. Ultimately, the massive economic and fiscal benefits associated with these resources highlight the critical importance of conserving the Delmarva Peninsula's natural splendor.

About Sage Policy Group

Sage Policy Group is an economic and policy consulting firm headquartered in Baltimore, MD. Dr. Anirban Basu, Sage's chairman and CEO, founded the firm in 2004. Sage has created a client base that encompasses more than forty states and seven countries and includes Fortune 500 companies, NFL teams, aquariums and zoos, state and local governments, insurance companies, banks, brokerage houses, major medical systems, trade organizations, and law firms, among others.

The company is especially well known for its analytical capabilities in economic and fiscal impact estimation, economic development, forecasting, legislative analyses, litigation support, environmental economics, and industry outlooks.

In addition to leading Sage, Dr. Basu has emerged as one of the nation's most recognizable economists. He serves as the chief economist to Associated Builders and Contractors, the Maryland Bankers Association, and the International Food Distributors Association and as the chief economic adviser to the Construction Financial Management Association. He chaired the Maryland Economic Development Commission from 2014 to 2021 and currently chairs the Baltimore County Economic Advisory Committee.

Dr. Basu's lectures in economics are delivered to audiences across the U.S. and abroad. He has lectured at Johns Hopkins University and is presently the Distinguished Economist in Residence at Goucher College, where he teaches History of Economic Thought.

Case Study #1: Ecological Improvements at Kentmorr Marina

Kentmorr Marina, located on the west side of Kent Island in Queen Anne's County, Maryland, will potentially undergo $12.9 million in ecological improvements including the development of a living shoreline, wetland restoration, and stormwater improvements.

KENTMORR MARINA ECONOMIC IMPACTS

The greater than $12 million investment in Kentmorr Marina would support an estimated 139 jobs throughout the State over the duration of the project, about 90 percent of which will be performed in Queen Anne's County. Note that a job, in this context, is defined as one position that lasts for one year. Those jobs will be associated with nearly $8 million in worker compensation and nearly $22 million in economic output (goods and services sold). Put another way, Maryland would see $1.67 of economic activity for every $1 invested in Kentmorr Marina.

Exhibit CS1.1: Kentmorr Marina Construction Phase Economic Impacts

	Jobs	Labor Income (Thousands $2024)	Economic Output (Thousands $2024)
Queen Anne's County			
Direct effects	96	$5,470.4	$12,925.3
Indirect effects	16	$1,124.5	$3,701.5
Induced effects	15	$578.89	$2,314.44
Total	**127**	**$7,173.8**	**$18,941.2**
Remainder of Maryland			
Indirect effects	6	$410.3	$1,436.6
Induced effects	6	$377.41	$1,170.0
Total	**12**	**$787.7**	**$2,606.7**
Statewide			
Total	**139**	**$7,961.5**	**$21,547.9**

Source: Sage, IMPLAN *Totals may not add due to rounding

Note that these impacts pertain only to the jobs and economic activity supported during the restoration project. There would also be environmental benefits as well as expanded economic activity—related to both sport fishing, events, and commercial tenants at the site—that would occur on an annual, ongoing basis due to the project.

KENTMORR MARINA FISCAL IMPACTS

The economic activity supported by this project would generate fiscal impacts—tax revenues—for both the State of Maryland and its local governments. At the state level, the construction phase of the project would support an estimated $609,000 in tax revenues, a majority of which would take the

form of sales taxes. Maryland's local governments would see approximately $145,000 in additional tax revenues as a result of the project, most of which would take the form of income taxes.

Exhibit CS1.2: Kentmorr Marina Construction Phase Fiscal Impacts

Tax Category	Revenues (Thousands $2023)
State of Maryland	
Income	$175.0
Sales	$340.2
Other	$93.9
Total State Tax Revenues	**$609.1**
Local Governments	
Income	$110.6
Other	$34.5
Total Local Tax Revenues	**$145.1**

Source: Sage

Importantly, these impacts pertain only to the construction phase of the project. Over time both the state and local governments will see additional tax revenue augmentation due to expanded operation of local businesses, while government expenditures could be reduced due to the mitigation of environmental harm.


Photo 1: Marina channel. Existing jetties to be replaced with cobble and boulder headland structures. Marshes and beaches within the cove will dissipate rather than reflect wave energy. Created tidal marsh and beach habitat will benefit rare and threatened wildlife; aesthetics and accessibility of shoreline protection structures are improved.

CONCLUSION

The potential $12.9 million in ecological improvements that could occur at Kentmorr Marina would, in addition to environmental benefits, generate significant economic and fiscal impacts for both Maryland and its local governments. The project, over its duration, would support an estimated 139 jobs statewide, and those jobs would be associated with nearly $8 million in employee compensation and nearly $22 million in economic activity. State tax revenues would be bolstered by approximately $610,000 over the duration of the project, while local government tax revenues would be bolstered by an estimated $145,000. Notably, these impacts pertain only to the construction phase of the project. The environmental improvements at the site would also lead to expanded annual, ongoing economic activity due to greater visitation and business activity.

Case Study #2: Cedar Island Resilience Project

Cedar Island is one of thirteen ever-changing barrier islands that protect Virginia's eastern shore from the Atlantic Ocean. Of those thirteen islands, Cedar Island is the one most rapidly deteriorating due to storms and rising sea-levels, and that deterioration has and will continue to lead to the loss of dunes, marshes, wetlands, and other vital habitats.

To address this vulnerability, the approximately 40 acres of marsh and shallow submerged land will be raised, slowing the island's migration. This has myriad environmental benefits including a more durable marsh habitat and increased carbon capture from the salt marshes.

The project, which is currently in its drafting stages, is slated to begin in 2025 and is expected to cost between $17-20 million (this analysis assumes that the project will cost $18.5 million).[3]

CEDAR ISLAND ECONOMIC IMPACTS

The $18.5 million investment in Cedar Island's resilience would support more than 200 jobs throughout the State over the duration of the project, more than 90 percent of which would be performed in Accomack County and Northampton County (a job being one position that persists for one year). Those jobs would be associated with approximately $9.3 million in worker compensation and nearly $30 million in economic output (goods and services sold). Put another way, Virginia would see $1.61 of economic activity for every $1 invested in Cedar Island's resilience.

Exhibit CS2.1: Cedar Island Construction Phase Economic Impacts

	Jobs	Labor Income (Thousands $2024)	Economic Output (Thousands $2024)
Accomack & Northampton County			
Direct effects	152	$6,438.7	$18,500.0
Indirect effects	22	$1,072.5	$4,388.5
Induced effects	21	$788.68	$3,228.87
Total	**195**	**$8,299.9**	**$26,117.4**
Remainder of Virginia			
Indirect effects	9	$426.5	$1,856.6
Induced effects	10	$560.46	$1,779.23
Total	**18**	**$987.0**	**$3,635.8**
Statewide			
Total	**213**	**$9,286.9**	**$29,753.2**

Source: Sage, IMPLAN *Totals may not add due to rounding

[3] This is a joint project between several partners: The Virginia Institute of Marine Science, Accomack-Northampton Planning District Commission, Stantec, Randolph-Macon College, George Washington University, and the Virginia Department of Wildlife Resources.

Note that these impacts pertain only to the jobs and economic activity supported during the project itself. The environmental benefits of this project would reduce future expenditures caused by the island's deterioration and spur visitor spending in the local economy by maintaining the shore's health, resulting in expanded annual, ongoing economic activity.

CEDAR ISLAND FISCAL IMPACTS

The expenditures related to this resilience project would drive tax revenues for local governments as well as the State of Virginia. At the state level, revenues would be bolstered by an estimated $742,000 over the duration of the project, and those would primarily take the form of income and sales taxes. Local governments—primarily Accomack and Northampton counties—would see their tax revenues collectively bolstered by $327,000 over the course of the project.

Exhibit CS2.2: Cedar Island Construction Phase Fiscal Impacts

Tax Category	Revenues (Thousands $2023)
State of Virginia	
Income	$312.3
Sales	$360.1
Other	$69.2
Total State Tax Revenues	**$741.5**
Local Governments	
Property	$271.0
Sales	$42.0
Other	$14.4
Total Local Tax Revenues	**$327.4**

Source: Sage

CONCLUSION

This proposed Cedar Island resilience project is an environmental imperative. While the economic and fiscal impacts are less critical than the ecological benefits, the potential investment would support significant employment opportunities and economic activity in Accomack County and Northampton County. The 213 statewide jobs would be associated with nearly $9.3 million in labor income and nearly $30 million in economic activity. State level tax revenues would be augmented by about $740,000, while local tax revenues would be boosted by $327,000.

Of course, those impacts only pertain to the construction phase. The improved habitats and mainland protections provided by a more resilient Cedar Island would have ongoing benefits due to reduced damage mitigation costs in the future and higher visitor spending due to a healthier shoreline.

Case Study 3: Submerged Gravel Wetland Project

The Delaware Center for the Inland Bays (DCIB), in partnership with Sussex County and with funding from the Delaware Department of Natural Resources and Environmental Control, will invest nearly $390,000 to install a submerged gravel wetland on county-owned agricultural land. The intent of the project is to reduce the level of nitrogen, phosphorus, and sediment entering the Eli Walls Tax Ditch and the Indian River Bay watershed. The primary benefit of this project will be environmental; the submerged gravel wetland will result in an estimated load reduction of 432.3 pounds of nitrogen and 9.03 pounds of phosphorus per year.

SUBMERGED GRAVEL WETLAND ECONOMIC IMPACTS

This investment will support four statewide jobs, more than $290,000 in employee compensation, and nearly $730,000 in statewide economic activity in Delaware. While those figures may seem modest, they represent a significant return on investment for the $390,000 outlay, especially considering that the primary objectives of this project are environmental. For every $1 spent on the project itself, the state will see $1.88 of economic activity.

SUBMERGED GRAVEL WETLAND FISCAL IMPACTS

This project will also support augmented tax revenues. The State of Delaware will collect an estimated $19,200 in tax revenues over the course of the project, while local government revenues will be bolstered by an estimated $1,800.

Again, while this may appear to be an insignificant benefit, it is illustrative of the return Delaware receives on investments in environmental and ecological improvements. For every $100,000 spent on this type of project, state and local government tax revenues will be collectively bolstered by more than $5,400 dollars. Were an investment the size of the Cedar Island Resilience Project to be undertaken ($18.5 million, see Case Study #2 beginning on page 14), State and local tax revenues would be bolstered by approximately $917,000 and $88,000, respectively.

CONCLUSION

In addition to the environmental benefits of reduced nitrogen, phosphorous, and sediment entering the Eli Walls Tax Ditch and the Indian River Bay watershed, this project would generate substantial economic activity while also bolstering state and local tax revenues. While the gross size of the impacts may appear small due to the size of the project, the impacts presented above are indicative of the significant economic and fiscal return generated by investments in environmental improvements.

Appendix A: How to Interpret Economic Impact Estimates

To quantify the economic impacts of the Peninsula's natural resources-related activities, Sage used IMPLAN economic modeling software and its embodied multipliers to generate estimates of employment, labor income, and output. Below is an abbreviated glossary of terms that may prove helpful in interpreting analytical findings.

EMPLOYMENT

As defined by IMPLAN, a job that lasts twelve months equals one job, two jobs that last six months equal one job, three jobs that last four months equal one job, etc. Based on this, **job-years** represents a useful term. For instance, an endeavor that supports 200 jobs for a six-month period would be considered to support 100 jobs measured in job-years. Note that IMPLAN jobs are not quite the same thing as full-time equivalents (FTEs). Each of IMPLAN's 536 unique industries has a different conversion rate between jobs and FTEs, although for almost every industry one job is equal to less than one FTE.

OUTPUT (BUSINESS ACTIVITY, ECONOMIC ACTIVITY)

Output equals the value of industry production or service provision. It might be easier to conceptualize this as total business sales or economic activity. For retail industries, it is the gross margin (not gross sales). For manufacturing, output is the quantity of total sales plus/minus the change in inventories. For the service sector, output is directly equal to sales. This is summarized by the following equation:

Output = (Manufacturing sales +/- change in inventories) + (service sector sales) + (gross margin for wholesale and retail trade)

LABOR INCOME

Labor income is comprised of wages, benefits, and proprietor income (money accruing to owners of businesses).

Labor Income = all forms of employee compensation (wages/benefits) + proprietor income

DIRECT EFFECTS

Direct effects are impacts tightly aligned with the endeavor under consideration. In this instance, direct effects are produced by activity driven by natural resources-related spending.

INDIRECT EFFECTS

Indirect effects stem from business-to-business spending activity within the study area that occurs as a result of the direct effects. These can also be considered broader supply chain effects. This is a form of **secondary** effect.

INDUCED EFFECTS

Induced effects relate to household spending that occurs due to expanded levels of labor/household income. This is also a form of **secondary** effect.