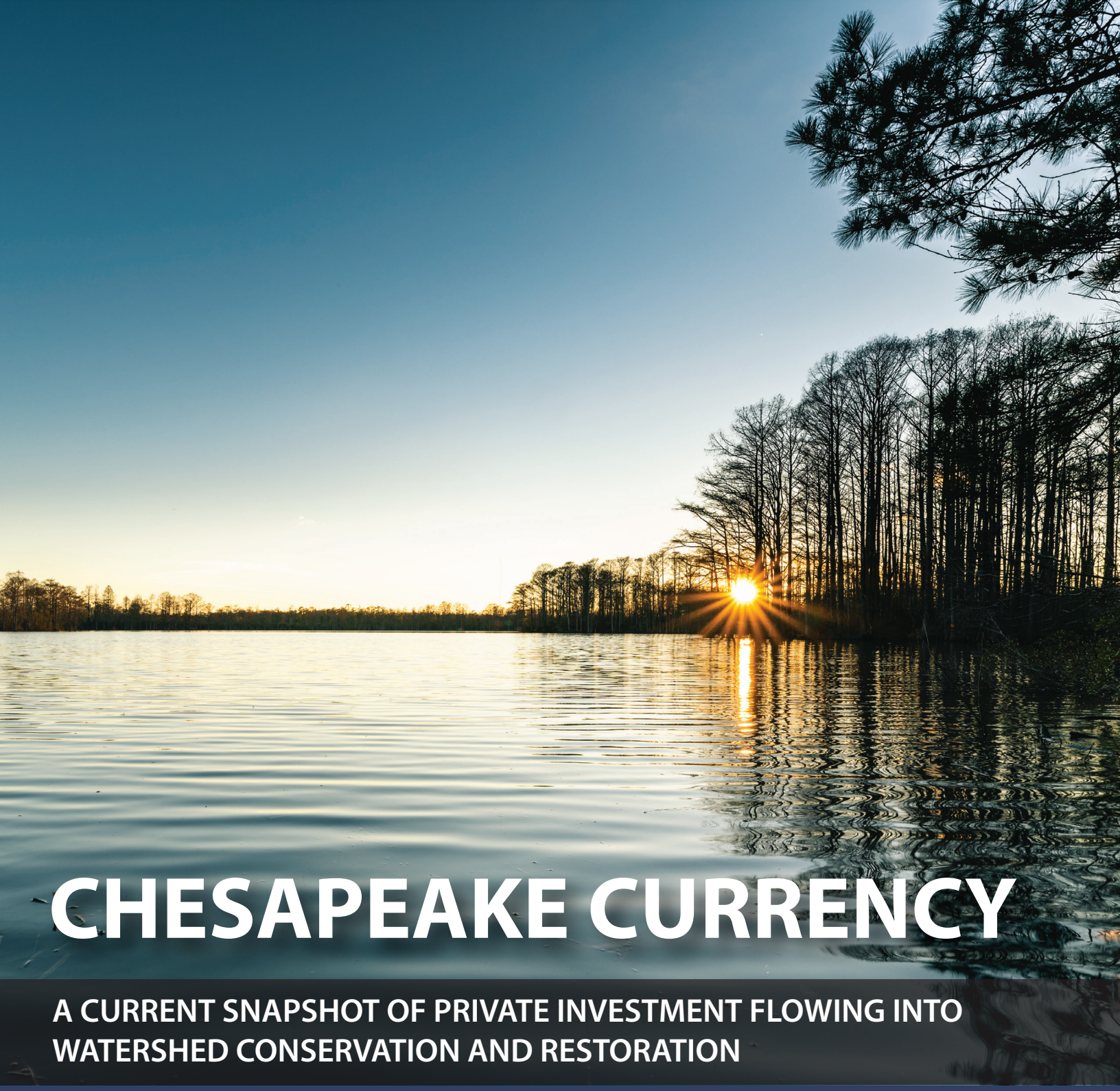

CHESAPEAKE CURRENCY

A CURRENT SNAPSHOT OF PRIVATE INVESTMENT FLOWING INTO WATERSHED CONSERVATION AND RESTORATION

The Conservation Finance Network

Environmental Policy Innovation Center

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INTRODUCTION

Nearly 18 million people live within the Chesapeake Bay Watershed and benefit from the multitude of benefits it provides in the form of water supply, climate resilience, wildlife habitat, human health and recreation, scenic beauty, historical and cultural heritage, agricultural productivity, and more. The Chesapeake Bay's aquatic and terrestrial biodiversity and ecology is significant and complex. The Bay hosts over 3,600 species of wildlife and plants, including nearly 350 fish species and almost 3,000 plant species. The Bay supports large and thriving industries for recreation, tourism, and fisheries and seafood. The economic value of the Bay has been estimated at $33 billion annually.[1]

In the Bay, water from the Atlantic Ocean mixes with water draining from over 100,000 streams and rivers in the 64,000 square mile Chesapeake Bay Watershed. The size of the Chesapeake Bay Watershed, covering areas in six states, gives the Bay the highest land area to water ratio globally. The Maryland Department of Natural Resources estimates that all inhabitants of the Chesapeake Bay Watershed live within a few minutes from a stream or river that feeds into the Bay.[2] The density of people and intensity of development and agriculture across most of the Chesapeake Bay Watershed has resulted in environmental challenges in the Bay, especially with regard to water quality but also impacting forest conservation and biodiversity.

Restoring the Chesapeake Bay is a core value of the public. Since 1983, a series of Chesapeake Bay agreements have codified the shared restoration commitment of the six Bay states, the District of Columbia, relevant federal agencies, and the Chesapeake Bay Commission, making the restoration movement in the region one of the most enduring and successful in the world. However, the environmental challenges continue to grow in the face of the myriad environmental issues the region faces. Progress has been made, but more must be done to meet the urgency of restoration objectives within and beyond the Chesapeake Bay Watershed Agreements.

Billions in local, state and federal funding have gone into restoring the Chesapeake Bay and the services it provides to the economy, diet, recreation, health, and prosperity of the region's population. While private conservation finance has played a secondary role over the last 20 years compared to tens of billions in public spending, private finance is increasing in scale and will likely continue to do so in the near future. Approaches through which private capital is deployed can dramatically improve the cost-effectiveness of public funding and the speed at which projects are implemented. Private capital supports innovation, and facilitates greater lending capacity. Each of these strengths of private capital increase the long-term benefits of conservation action.

This report provides a "current status" snapshot on private investment for conservation, restoration, and mitigation in the Chesapeake Bay region, as well as makes the case for new practices, guidance, and policies to accelerate the use of private capital as a tool. We highlight success stories and case studies, further providing context for the Chesapeake Bay dollar snapshot provided.

Definition of Private Capital: In the context of this report, private capital is defined as return-seeking capital, whether from private investment, corporate investment, a private firm satisfying a mitigation requirement, financing mobilized through philanthropic foundation programs or mission-related investments, or related capital resources (i.e. not public or philanthropic grants).

Suggested Citation: Kavita Kapur Macleod, Grace Edinger, Tim Male. 2023. "Chesapeake Currency: a Current Snapshot of Private Investment Flowing into Watershed Conservation and Restoration," Environmental Policy Innovation Center and the Conservation Finance Network; Washington D.C.

1 Pew Trusts, Cleaning Up the Chesapeake Bay, https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2012/02/13/cleaning-up-the-chesapeake-bay#sthash.LDt679FM.dpuf

2 https://dnr.maryland.gov/education/pages/chesapeake-bay.aspx

ACKNOWLEDGEMENTS

This report is the product of a partnership between the Environmental Policy Innovation Center's (EPIC) Restoration Economy Center and the Conservation Finance Network (CFN).

About EPIC: EPIC builds policies that deliver spectacular improvement in the speed and scale of environmental progress. A nonprofit start-up, EPIC is committed to finding and highlighting the best approaches for scaling up results quickly. EPIC focuses on water equity, watershed partnerships, endangered species, environmental markets, and the use of data and technology in producing conservation outcomes. For more information, please visit EPIC at www.policyinnovation.org.

About CFN: Since 2012, the Conservation Finance Network has advanced land and resource conservation by expanding the use of innovative and effective funding and financing strategies. By supporting a growing network of public, private, and nonprofit professionals through practitioner convenings, intensive trainings, and information dissemination, CFN helps to increase the financial resources deployed for conservation. For more information, please visit our resource hub at: www.conservationfinancenetwork.org.

This report would not have been possible without survey responses and interviews from a wide array of Chesapeake Bay restoration practitioners, investors, and nonprofits. Additionally, this effort is supported by funding from the National Park Service Chesapeake Bay Office through a partnership with the Conservation Finance Network, The Conservation Fund, the Land Trust Alliance, and the Chesapeake Conservation Partnership.

OBJECTIVES OF THE ANALYSIS

The objective of this report is to provide a rough estimate of the current state of private capital investment in Chesapeake land conservation, restoration, and mitigation through a survey of relevant stakeholders in Chesapeake Bay states. Additionally, we ask questions that look ahead, with the goal of assessing whether firms and other entities intend to deploy capital in the near future. Adding context to this numerical data, we explore identified barriers and opportunities to private capital investment and share a suite of successful case studies.

This report builds on and supplements previous research on investments in land protection and restoration in the Chesapeake Bay, including the 2019 report, Marking Milestones and the 2021 report, Private Conservation Finance: The Chesapeake Bay's Global Lead and How to Expand It, in which the Environmental Policy Innovation Center (EPIC) conducted a deeper analysis of private capital operating within restoration projects and markets in the Chesapeake Bay. This report aims to draw from and compliment those findings with insight on new capital deployed as well as market barriers and enabling conditions.

Over the last five years, new policies and guidance have been released relevant to this work, such as Maryland's Conservation Finance Act passed in 2022. We also share our insights and explain how these new developments can accelerate the use of private capital and financing as a tool for the Chesapeake Bay region.

METHODOLOGY: SOURCES AND COLLECTION METHODS

This report utilized a mixed methods approach using a survey and desk research. The survey was distributed to a list of 27 different organizations via email, two of which were networks who were asked to share with their membership. Additionally, we asked our recipients to forward our message on to other relevant entities in the region. We received 18 unique survey responses in the two week response period. The complete list of survey questions is provided in Appendix I of this report. It is important to note that with a limited sample size and wide array of responses, these results are not statistically significant nor representative of private capital distribution. Instead, the survey is meant to gain a snapshot in time and provide a rough estimate and forward outlook of private capital investment for conservation, restoration and resilience projects in the Chesapeake Bay.

Responses to the survey include those from philanthropic organizations and new private restoration firms who have not completed a project yet within the watershed but are interested in doing so in the near future. Their responses have been omitted from the presented findings, but show promise for increased engagement in the years to come.

Finally, we conducted desk research and built upon previous publications on this topic including the 2019 report, Marking Milestones and the 2021 report, Private Conservation Finance: The Chesapeake Bay's Global Lead and How to Expand It. We have included summary research from the 2021 report to provide background and context for the current update.

PRIVATE CAPITAL IN THE CHESAPEAKE

The Chesapeake Bay region has numerous existing enabling conditions for private capital investment in restoration and improving environmental outcomes. As aforementioned, the region has implemented a coordinated, systematic effort around improving water quality in the Bay for decades; this effort is supported by both the 2014 Chesapeake Bay Agreement and the Chesapeake Bay TMDL, a regulatory requirement for Bay states to reduce pollutant flows into the Chesapeake Bay. The Bay states have an agreed-upon currency to evaluate the impacts of conservation activities through the Chesapeake Bay model, providing certainty in how positive environmental benefits will be quantified. Finally, Bay states exhibit consistent public spending and can blend public money in the form of tax and other revenue - such as fees associated with mitigation for development - with private capital sources to invest in environmental outcomes.

In summary, the following conditions facilitate private investment in the Chesapeake Bay:

- **Coordinated effort among states**
- **Clear goals and regulatory requirements**
- **Agreed-upon outcomes**
- **Consistent public spending**

Pre-2021 Estimate of Private Capital Deployment in the Chesapeake Bay

Many programs and initiatives in the Chesapeake Bay direct private capital - defined in this report as capital that provides a return to investors - towards positive environmental outcomes. A 2021 report by the Environmental Policy Innovation Center estimated that roughly $4.2 billion (Figure 1) dollars of private capital has been invested in conservation goals in the region over the twenty previous years, and noted that this figure is likely an underestimate. Appendix II of this report provides a snapshot of state programs included in the 2021 report. The 2021 report categorized spending into several buckets as follows:

- Nutrient banking ($70M):
- Wetland and stream mitigation banking ($550M):
- Public and private partnerships ($280M):
- Pay-for-success contracts ($170M):
- Voluntary carbon market credits ($25M):
- Environmental Impact Bonds ($39M):
- Land preservation tax credits ($1.72M):
- Forest land acquisition and certification ($1.3M):

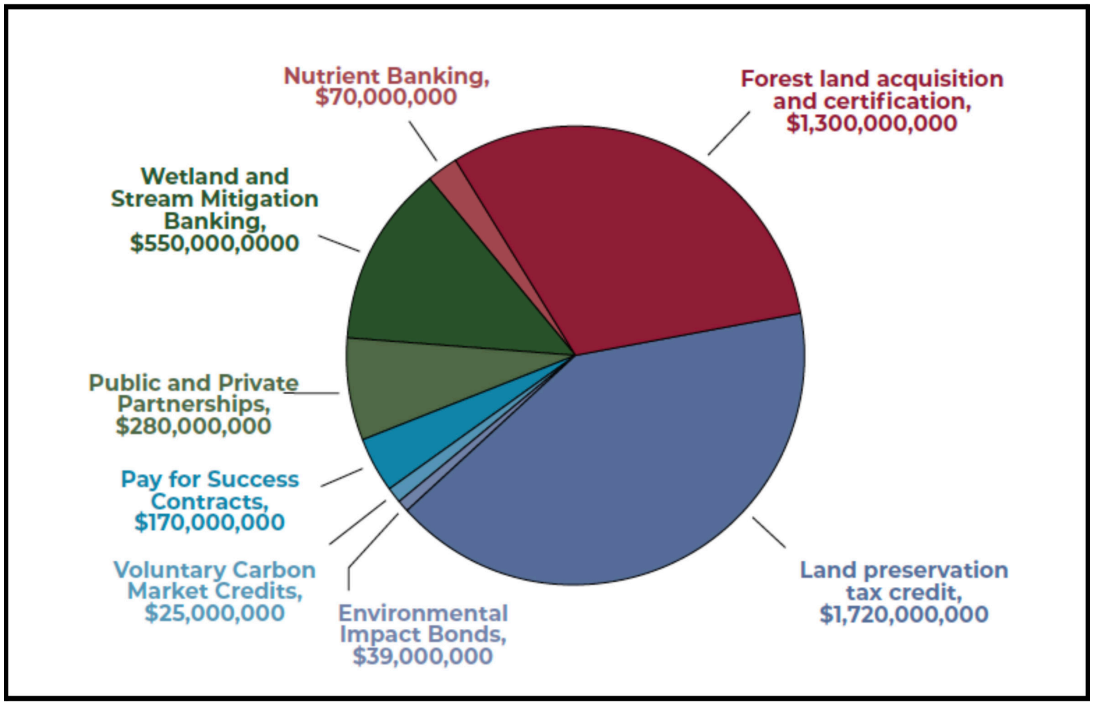

Figure 1: Private Capital Deployment in the Chesapeake Bay (as of 2021)

While the estimate of private investment is significant at $4.2 billion, it remains small compared to the "tens of billions" in public spending invested in Bay conservation and restoration.[3] Private investment also comes with speed and efficiency advantages over public investment for conservation and restoration projects. Based on these results, the 2021 EPIC report identified the following four types of state-level law and regulatory action that could serve as greater enabling conditions to build on the momentum and facilitate more private capital investment in the region:

- Change procurement laws to allow and promote outcomes-based procurement
- Adopt better tools to evaluate the full economic benefit of green infrastructure
- Expand public-private partnership authorities in the environmental space
- Establish a policy preference for completed private restoration projects as offsets to meet regulatory compliance needs

The current report discusses the state of private capital investment in the Bay today, providing a snapshot of where investment and barriers and opportunities are since the 2021 report and providing commentary on how some of these recommendations from the 2021 report have been addressed.

3 https://www.policyinnovation.org/publications/chesapeake-finance-report

Update on Private Capital Deployment in the Chesapeake Bay

To assess the current state of private capital deployment for conservation, restoration, and mitigation, EPIC and CFN conducted a survey to augment the results from the 2021 study with a more current snapshot of private capital in the region and to provide more detail on barriers and opportunities to private investment. Eighteen (18) unique responses were received. Survey responses were weighted more heavily towards for-profit actors (investment firms and for-profit restoration implementers). Of the 18 total responses, 6 responses (33%) came from investment firms; 5 responses (28%) came from for-profit restoration implementers; 4 responses (22%) came from nonprofit restoration implementers; and 3 responses (17%) came from philanthropic organizations. These entities have conducted a number of different types of projects utilizing private capital (Figure 2).[4] Stream restoration projects were most often reported, followed by land acquisition or easement projects and tree planting projects. Projects involving agricultural best management practices (BMPs) and sustainable forest management were less frequently reported. However, the survey results suggest that all types of projects are being implemented in the Bay.

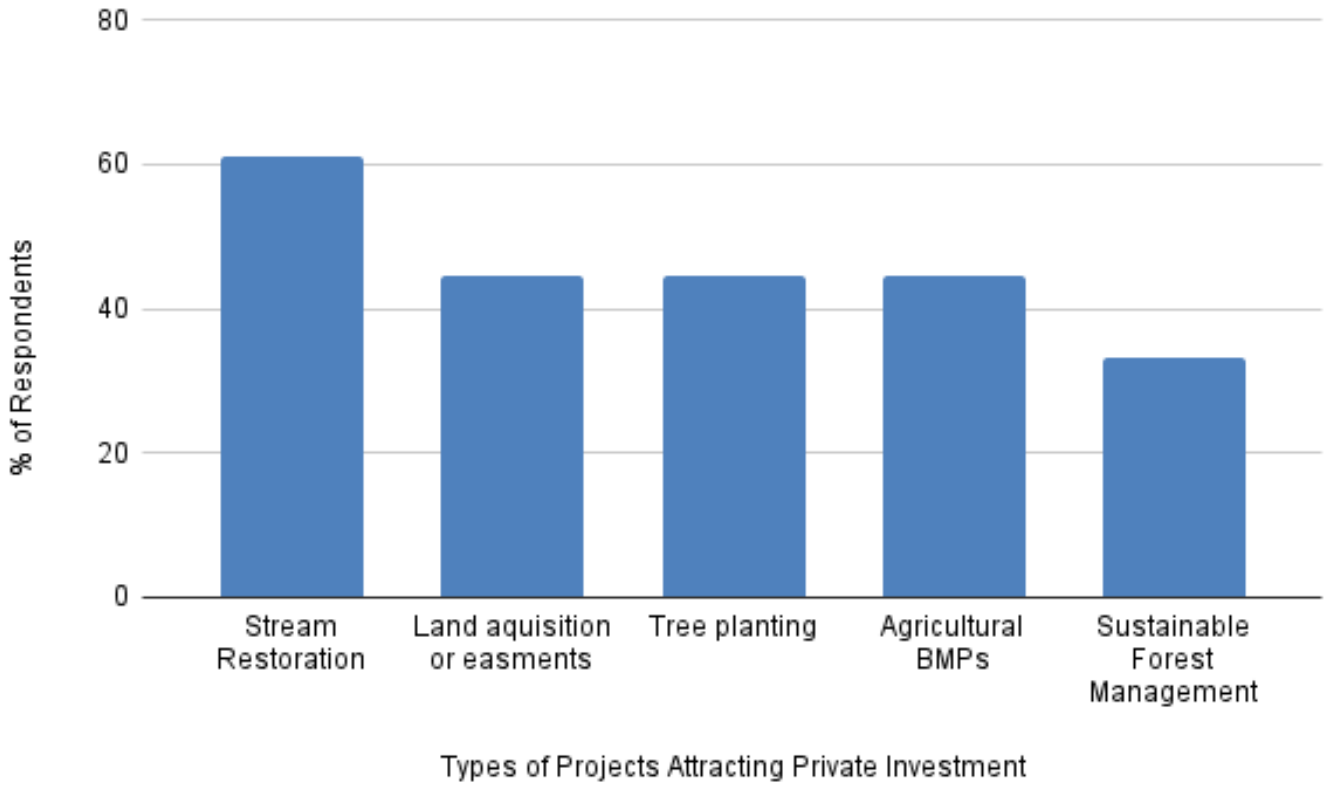

Figure 2: Percent of Respondents who reported each project type in survey results

Survey respondents were asked to report on the amount of private capital deployed in the Chesapeake Bay for land or natural resource conservation, restoration, and/or resilience projects before 2022, from 2022 to the present day, and what their plans are for future deployment of private capital for these types of projects. Table 1 summarizes the estimates. Estimates represent the lower bound of potential private capital investment in each time period indicated. This is the case because these results are not representative of the universe of private investment in this space, and because respondents often indicated that they did invest in conservation, restoration and/or resilience projects but did not provide an associated dollar figure.

Multiple drivers for investment were present for each survey respondent. TMDL and Chesapeake Bay Agreement goals were listed the most (14), followed by permit/compensatory mitigation requirements (11) and voluntary activity (10).

These survey results suggest that the Chesapeake Bay is at an inflection point where more private capital is anticipated, with parties that are interested in investing more on both the supply and demand side.

4 Survey respondents were not asked to indicate a specific time period; responses to types of projects attracting private investment could therefore be pre- or post-2021.

Table 1: Summary of Private Capital Investment (Lower Bound) in the Chesapeake Bay

Time Period	Lower Bound Estimate	Comments
Pre - 2022	$339 million	Estimate reflects a lower bound given survey responses (3) that responded "yes" to investment but did not provide an associated dollar figure.
2022 - Present	$34.7 million	Estimate reflects a lower bound given survey responses (3) that responded "yes" to investment but did not provide an associated dollar figure.
Future Estimate	$234 million	Estimate reflects a lower bound given survey responses (7) that responded "yes" to investment but did not provide an associated dollar figure.

BARRIERS TO AND OPPORTUNITIES FOR PRIVATE INVESTMENT

The 2021 EPIC report and the current update identify ongoing and planned private capital investment for conservation, restoration and resilience projects in the Chesapeake Bay. This is a dynamic space, however, with several barriers to expanded private investment, and some notable opportunities and enabling conditions that have been recently introduced in the region.

Identified Barriers to Private Investment

Barriers to private investment in the Chesapeake Bay were identified in survey results for this update through open-ended responses and multiple-choice questions. In open-ended responses, survey respondents noted the following barriers that hinder private investment:

- Lack of regulatory demand/buyers for nutrient load reductions and other environmental outcomes from restoration projects in the region.
- Existing contracting structures that are not conducive to outcomes-based/Pay for Success procurement and purchasing.
- Organizational focus on issues (e.g., social justice) that may lack an internal nexus with conservation/restoration/resilience projects to justify investment.
- Misalignment of state outcomes procurement program (e.g., Clean Water Procurement Program - CWPP) requirements with investor requirements.
- Timelines of state outcome procurement programs.
- Availability of low-cost subsidized public capital (e.g., State Revolving Funds - SRF, Water Infrastructure Finance and Innovation Act - WIFIA).

Survey respondents were also asked in a multiple-choice question to identify barriers to private capital investment. The most frequent barriers to private capital investment for conservation, restoration and resilience projects in the Chesapeake Bay identified by survey respondents were the risk/return profile of these types of projects, an uncertain demand for outcomes, and small project size. (Figure 3). The uncertain demand for outcomes among potential regulatory and compliance buyers is likely one of the most significant drivers of risk/return profiles for projects, causing them to be undesirable from the perspective of a potential private capital investor.

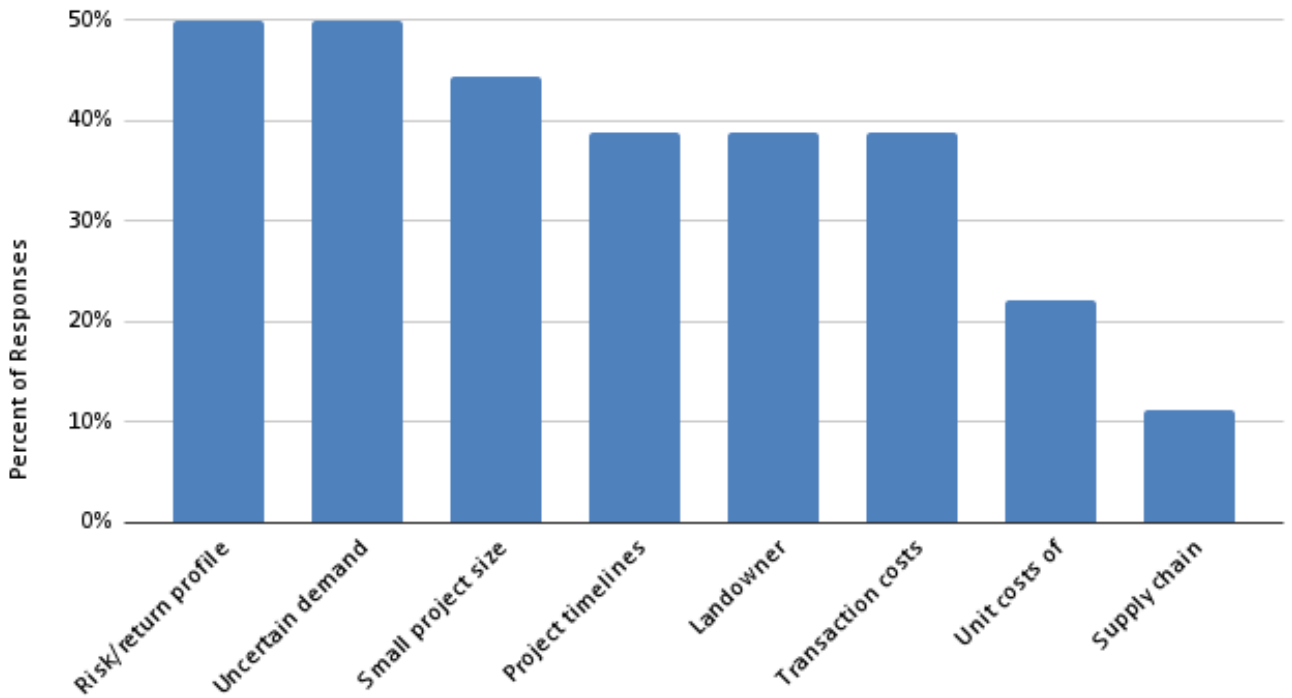

Figure 3: Identified Barriers in Survey Results

Survey results and past assessment on the state of private capital investment in the Chesapeake Bay suggest that work remains to allow private sector investors to capitalize on economies of scale in the region. Creating more certainty of demand for outcomes, for example through replicating Maryland's CFA and/or outcomes procurement programs such as the Clean Water Commerce Act (CWCA) in MD and the Clean Water Procurement Program (CWPP) in PA in other Bay states, could improve the risk/return profile of projects by reducing uncertainty and creating better price signals and reduce the time required to develop and complete projects. Another vehicle through which to reduce the time to develop and complete projects is Public-Private Partnerships (PPPs; see for example the PG County/Corvias case study below): through these partnerships, project timelines can be shortened and efficiencies realized through sustained engagement between private suppliers of environmental outcomes and public entities that require those outcomes.

Identified Opportunities for Private Investment

To assess if opportunities have changed or evolved since the 2021 EPIC report, survey respondents were asked in a pre-populated multiple-choice question to identify enabling conditions for private capital investment in the Chesapeake Bay. The most frequent enabling conditions for these types of projects in the Bay identified by survey respondents included consistent policy support and/or clear guidance and incentives, government subsidies, foundation grants and/or other sources of catalytic capital (Figure 4).

The survey results summarized in Figure 4 generally align with the 2021 report. As programs like CWCA and CWPP are put into practice, it will be important to track changes

Survey respondents were also asked and indicated a number of other forms of guidance, policy directions, or interventions that could speed up the deployment of private capital in the Chesapeake Bay. Table 2 summarizes these comments by topic area.

Table 2: Survey Respondent Suggestions on Enabling Conditions to Accelerate Deployment of Private Capital in the Chesapeake Bay

Topic	Suggestions
Policy	Implement Maryland's Conservation Finance Act (CFA), and replicate incentive and contracting components in other state agencies Evaluate Maryland's Clean Water Commerce Act (CWCA) to identify limitations and inform future policy Revise procurement policies Consider pathways for the federal government to purchase outcomes
Guidance	Provide clear and consistent guidance on credit generation Provide guidance on working on public lands
Funding	Provide predictable funding (state and federal) for restoration projects in the Chesapeake Bay Provide funding for federal facilities to comply with the Chesapeake Bay TMDL (e.g., Department of Defense facilities)
Modeling	Improve modeling of load reductions in the Chesapeake Bay model for higher resolution outcome estimation
Program Administration	Accelerate credit releases Reduce mitigation bank review times Provide predictable timelines for public infrastructure projects Develop consistent contracting documents for use across jurisdictions and permittees Ascribe value to other outcomes (e.g., water management)

Relevance of Survey Results to Current Developments in the Chesapeake Bay

Survey results on opportunities for private investment align with and bolster current policy developments in the Chesapeake Bay. Indeed, a number of enabling conditions and opportunities for greater private capital investment are evident today in the Chesapeake Bay, with Maryland as a leader in this regard. Maryland passed the Clean Water Commerce Act in 2021 which allows the state to buy nitrogen pollution reduction outcomes from urban, suburban, and agricultural land. The state's clean water state revolving loan fund (SRF) has been changed to permit loan guarantees to for-profit and nonprofit organizations. Most recently in 2022, Maryland enacted the Conservation Finance Act also known as the CFA (SB0348/HB0653), an Act that made important and sweeping changes to programs and authorities of the state's Departments of Environment, Natural Resources, Agriculture, and Transportation.

The Act also made changes to the state's finance and procurement code, defining environmental outcomes and authorizing their purchase. Together, these changes seek to enable and facilitate greater private capital investment for conservation, on the order of at least $100 million annually. While the focus of the Act is on water quality, it will also positively impact other environmental outcomes such as forest and soil carbon sequestration, flood risk reduction, climate resilience, and environmental justice and public health.

Some of the most significant provisions in the 2022 Conservation Finance Act that serve as enabling conditions to speed implementation pathways for private capital are:

- Blue and green infrastructure can be financed in the same way as gray infrastructure.
- The state can purchase environmental outcomes (e.g., through creating authority for the state to use Pay for Success contracts to achieve Chesapeake and Coastal Bays 2010 Trust Fund goals).
- Green infrastructure has been defined to be climate-inclusive, and blue infrastructure is defined for the first time in any law. Both have been defined to include carbon sequestration and flood risk reduction as primary goals.
- Appointment of a commission (the Green and Blue Infrastructure Policy Advisory Commission) focused on expediting permitting for restoration and resilience projects. This commission is also charged with promoting green and blue infrastructure projects.
- Prioritizing environmental justice outcomes in several state programs.
- Permitting the Water Quality Revolving Loan Fund and the Drinking Water Revolving Loan Fund to pay for restoration and acquisition of forests and other natural resources.

Maryland's CFA is model legislation for other states in the Chesapeake Bay and could unlock greater private capital investment in conservation, restoration and resilience projects across the region. Pennsylvania has followed suit with developing the Clean Water Procurement Program (CWPP), which is a $25 million fund that empowers the Pennsylvania Infrastructure Investment Authority (PENNVEST) to directly buy–through either a request for proposals or a competitive bidding process–verified sediment or nutrient reductions that count toward meeting the Chesapeake Bay TMDL. Between Maryland and Pennsylvania, a precedence has been set for outcomes-based purchasing.

SELECT CASE STUDIES

Case studies presented in this section seek to illustrate the application of private capital to conservation, restoration and resilience projects in the Chesapeake Bay. The first case study highlights an Environmental Impact Bond (EIB) used to implement green infrastructure to meet stormwater compliance obligations of the DC government; the second two case studies detail programs at the county level in Maryland that enable Pay-for-Success (PFS) contracting and facilitate important social and environmental co-benefits. The PFS case studies provide county-level examples of work that is also occurring in environmental outcome procurement at the state level: in addition to Maryland, these approaches are being implemented in California, Nevada, and North Carolina as well.[5]

Environmental Impact Bonds: Quantified Ventures

The intermediary Quantified Ventures specializes in performance-based financing, sometimes referred to as outcomes-based contracting or Pay for Success projects and sometimes structured as Environmental Impact Bonds (EIBs). According to Quantified Ventures, an EIB is "...a type of municipal bond label which signals to investors that the issuer has market-leading ESG transparency and accountability in their bond. The EIB commits to the prediction, evaluation, and disclosure of environmental outcomes of funded projects. It is compatible with ICMA Green Bond Principles and UN Sustainable Development Goals."

In 2015, Quantified Ventures partnered with Washington, DC municipal water utility District of Columbia Water and Sewer Authority (DC Water) to structure the very first EIB. Under their 2005 federal consent decree mandating a long-term strategy for curtailing the issue of combined sewer overflow, DC Water was exploring the potential for green stormwater infrastructure. In 2016, EPA allowed DC to use more green infrastructure to control stormwater; specifically, to avoid construction of one of three gray infrastructure tunnels with 300 acres (~$90 million) of green infrastructure. However, the utility faced perceptions of performance risk over doubts that green infrastructure would be as effective as conventional gray infrastructure (e.g. concrete pipes and storage tunnels) in helping DC Water meet its legal mandate. In general, green infrastructure has cost and co-benefit advantages over gray infrastructure, but performance effectiveness is less certain. In particular, modeling the stormwater impacts of green infrastructure is site-specific, varying based on soil properties, climate, and other factors. For this reason, risk-averse utilities and municipalities are hesitant to invest up-front in green infrastructure to meet regulatory stormwater requirements. Through an EIB structure (Figure 5), Quantified Ventures and DC Water, together with Goldman Sachs and Calvert Impact Capital, transferred the performance risk of green infrastructure to investors. Specifically, through the EIB $25 million in municipal bonds were sold to investors to generate the up-front capital necessary to pay for 25 acres of bioretention (e.g., rain gardens and other similar green infrastructure). Repayment of the EIB was tied to the performance of the green infrastructure after 5 years, thereby mitigating the performance risk to DC Water, as follows:

- **Scenario #1:** If the green infrastructure reduced runoff as expected through modeling, the EIB would work as a 30-year municipal bond: investors would receive a 3.43% coupon and principal repayment at bond maturity.
- **Scenario #2:** If the green infrastructure underperformed the expected reduction in runoff, investors would pay DC Water a $3.3 million "shared risk" payment, nearly equivalent to the cost of DC Water's interest payments for five years. This would allow DC Water to avoid losing the invested dollars, which it could instead use to redesign its stormwater strategy to likely include more gray infrastructure.
- **Scenario #3:** If the green infrastructure overperformed the expected reduction in runoff, DC Water would pay investors a $3.3 million "outcomes payment" in addition to the coupon and principal payments. This outcomes payment would be based on a significant overperformance of the green infrastructure that could portend cost savings for DC Water through replacing more gray infrastructure with green.

In 2021, DC Water repaid the EIB successfully after Scenario #1 was realized, in which the green infrastructure reduced runoff as expected.

The project was evaluated after the five-year period of performance, and was determined to be successful. Looking back on the effort, Quantified Ventures CEO Eric Letsinger reflected that "the number one overlooked benefit of the bond's structure is its power to control the project's total cost of ownership."

5 Environmental Policy Innovation Center, 2017. "Nature, Paid on Delivery: Leadership by Louisiana, California, Maryland and Nevada in creating outcome-based opportunities for private investment in natural resource restoration and protection."

With climate change producing more severe and variable precipitation events that will stress stormwater systems in urban areas, the EIB structure for municipalities to engage in novel green infrastructure projects is an important additional tool for the 770 or so other communities in the United States that have combined sewer systems and uptake is evident elsewhere.

Contact: Eric Letsinger, Founder and CEO (letsinger@quantifiedventures.com), Todd Appel, Managing Director (appel@QuantifiedVentures.com)

For more detailed information, please see CFN article: "A Pioneering Environmental Impact Bond for DC Water (Updated)" and Quantified Ventures case study: "DC Water: First Ever Environmental Impact Bond".

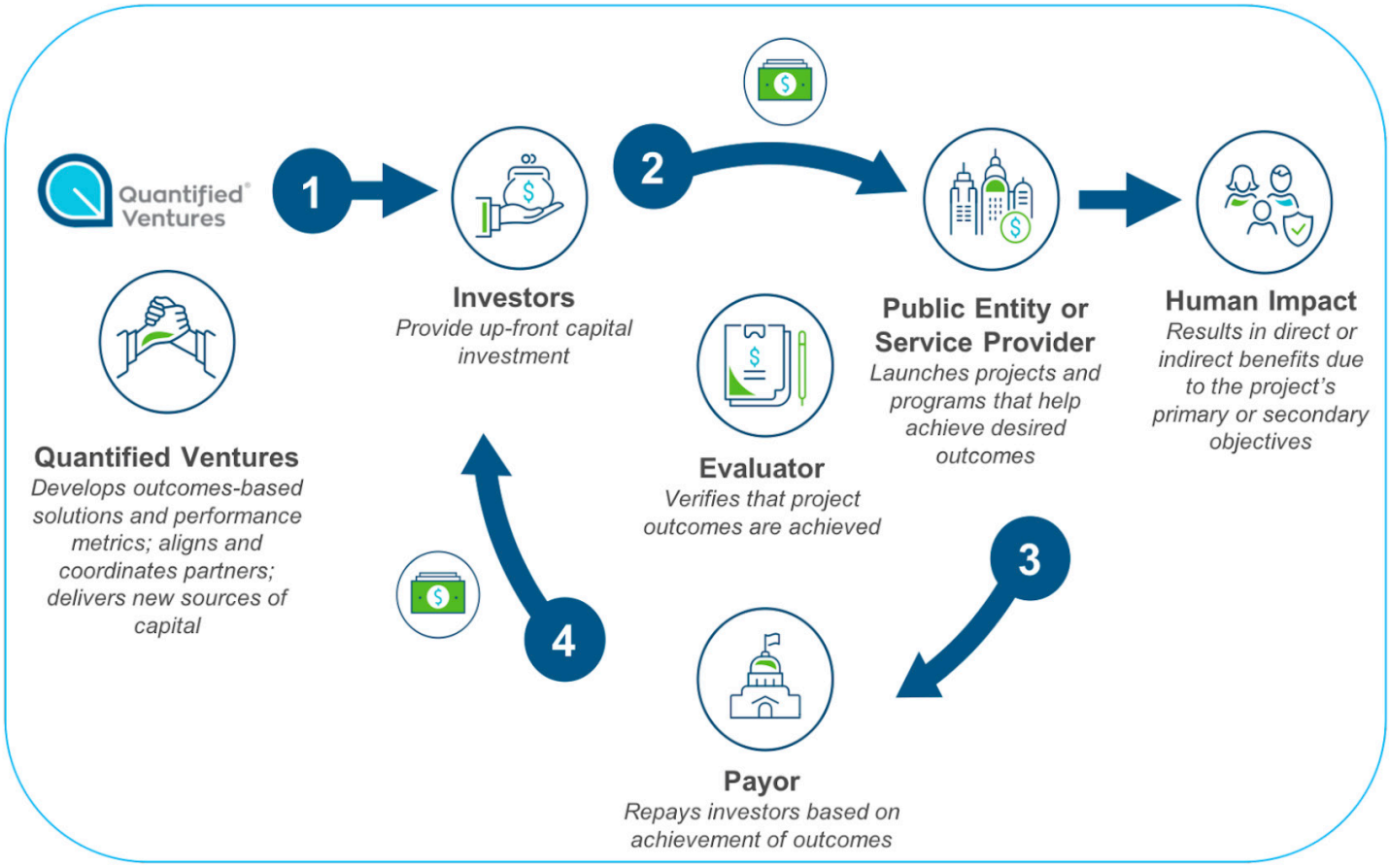

Figure 5: EIB Structure; Source: https://www.quantifiedventures.com/blog/what-is-an-environmental-impact-bond

Pay for Success Contracting: Anne Arundel County, MD

Anne Arundel County's Bureau of Watershed Protection & Restoration (BWPR) implemented the Full Delivery of Water Quality Improvements ("Pay-for-Success" or "PFS") Program in 2018 to expedite the process of restoring local waterways through public-private partnerships. This program, which funds contracts to private firms that result in the construction of cost-effective stormwater Best Management Practices (BMPs), has become a pillar in the County's progress toward the goals of its NPDES MS-4 permit, the Chesapeake Bay TMDL, and the EPA Clean Water Act. The PFS Program has created a resilient and cost-effective pipeline of restoration projects that ensure the County's local tax dollars are being invested towards a sustainable future. Innovative public-private partnerships facilitated by the program help to expedite the process of restoring Anne Arundel County's waterways.

Not only has this shift in contracting resulted in significant progress towards Anne Arudnel County's goals and permit requirements, these projects are significantly cheaper than previous contracts under traditional structures (Table 3).

Table 3: Price history and contract method of Anne Arundel County's Water Quality Improvement Projects. The first three rows show average practice costs under traditional procurement to exemplify the cost savings of PFS.

Projects	Cost per Acre Treated	Treated Acres & Total Cost
Bioretention retrofits (traditional contract)	~ $200,000	
Stormwater pond retrofits (traditional contract)	~ $75,000	
Stream restoration (traditional contract)	~ $50,000	
Pay for Success Cycle 1	~ $16,000	131 acres for $2.1 million
Pay for Success Cycle 2	~ $15,000	113 acres for $1.7 million
Pay for Success Cycle 3	~ $21,000	255 acres for $5.4 million
Pay for Success Cycle 4	~ $26,000	115 acres for $3 million
Pay for Success Cycle 5	~ $12,000	137 acres for $1.6 million
Pay for Success Cycle 6	~ $9,000	219 acres for $2 million

Table 3 demonstrates that shifting to PFS has been immensely beneficial to Anne Arundel County. Over the last six years, the County has realized a drop in the average cost of BMPs for water quality of almost half. The County has continued to improve the Request for Proposal structure over the years, and have shown consistency to the private sector, resulting in a competitive bid process that drives down the price.

The key to this program is that contractors front the initial cost of implementation, and then are reimbursed by the County after the project is constructed and verified to be effectively generating water quality credits. Competitive proposals are prioritized based on readiness for construction.

Contact: Eric Michelsen, Senior Environmental Policy Officer & Department of Public Works (pwmich20@aacounty.org)

6 The Community-Based Public Private Partnership (CBP3) model was developed by the USEPA Region III.

Corvias: PG County, Maryland PFS

In 2014, Prince George's County, Maryland created the Clean Water Partnership (CWP), a 30-year, $250 million Community-Based Public-Private Partnership (CBP3) with Corvias Solutions, a private company that partners with public sector entities to address environmental and other challenges, to address the county's stormwater regulatory compliance needs under the Chesapeake Bay's Total Maximum Daily Load (TMDL).[6] The 30-year agreement is to retrofit up to 4,000 impervious acres in the County with green infrastructure, with Corvias assuming a role as partner rather than traditional contractor with the County. The CWP represents the first PPP developed to implement the entire project cycle (design, build, finance, operate and maintain) of green infrastructure in order to meet stormwater regulatory requirements of a Municipal Separate Storm Sewer System (MS4) permit.

Under this partnership, Corvias invests its own capital to implement green infrastructure in PG County and is repaid by the County upon delivery of the green infrastructure acres. This arrangement shifts the risk from the public sector (state/local government) to the private sector (Figure 6), with the public sector partner assuming the responsibility of program oversight rather than significant other parts of the project cycle.

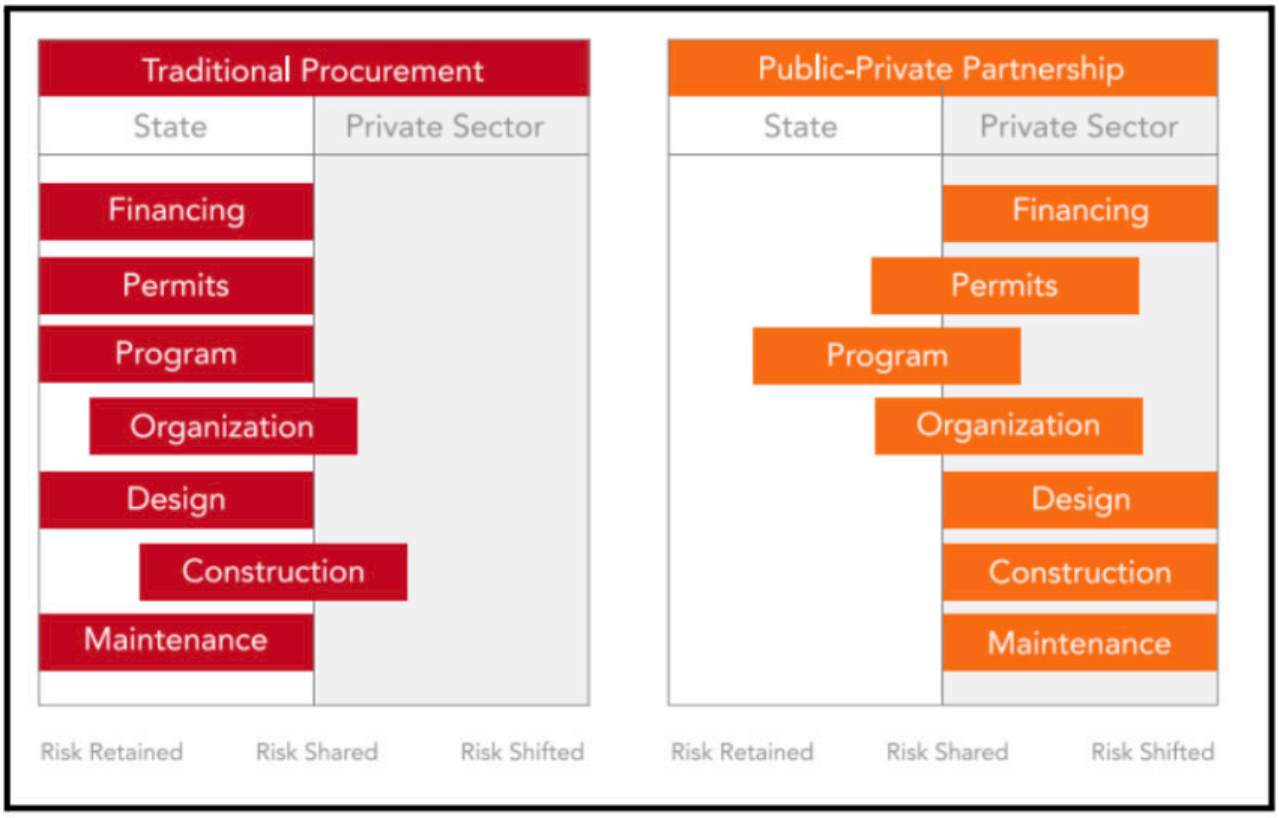

Figure 6: Shifting Risk through a CBP3; Source: https://thecleanwaterpartnership.com/program-goals/#1508194235542-5d0c136f-270b

The CWP was also designed to have significant equity co-benefits: PG County's contract with Corvias rewards the company with incentive payments based on the number of local small, minority, and women-owned businesses that are subcontracted to deliver services around green infrastructure project implementation. The CWP aims to deliver the project using at least 30-40% local, small, minority, and women-owned businesses.

The initial pilot project under the CWP was successful: 2,000 acres were retrofitted with green infrastructure with significant subcontracting (87%) to local small, minority, and women-owned businesses. In addition, the procurement method of the CWP saved the County more than 40% as compared to status quo procurement methods.[7]

7 Corvias, 2018. "Clean Water Partnership Progress Report." https://thecleanwaterpartnership.com/annual-report/

CONCLUSION

This report updates important existing data and information on private capital investment in the Chesapeake Bay with current survey results that point to continued investment and interest on the part of the private sector to participate in the conservation and restoration of the Bay. Given the limited distribution of the survey, the figures estimated from results (~$35 million in private capital invested from 2022 to today, and $234 million planned for private investment in the future) are underestimates of actual recent and planned private investment. There is a palpable interest the private sector has in growing its involvement in the success story of cleaning up the Bay, but barriers remain. Survey results suggest that similar to other industries, the private sector can be further motivated to invest more if better clarity and consistency of policy and guidance is provided by the public sector - in other words, a more predictable regulatory environment.

Important strides have been made to address some of these barriers. Maryland's CFA is important legislation that would have tremendous impact if replicated in other Bay states. Additional outcomes-based procurement / Pay for Success programs could be established to further generate predictable demand for environmental outcomes. Public-private partnerships (PPPs) and better estimation of the different environmental outcome values of green infrastructure could also help facilitate greater private capital investment in conservation and restoration activities in the Bay.

APPENDIX I: SURVEY QUESTIONNAIRE

I. Survey Questions:

1. Contact Information [short response text boxes]
   Name:
   Affiliation:
   State/Province:
   Email Address:
   Phone Number:
2. Affiliated Organization Type [check box]
   - ☐ Nonprofit Restoration Implementor
   - ☐ Investment Firm
   - ☐ For-profit Restoration Implementor
   - ☐ PhilanthropicGiving
   - ☐ Other: Please Specify
3. Has your organization completed any specific projects in the Chesapeake Bay Watershed that utilized private capital? Please check all project categories that apply. [check box]
   - ☐ Stream restoration
   - ☐ Agricultural BMPs
   - ☐ Land acquisition or easements
   - ☐ Sustainable forest management
   - ☐ Tree planting
   - ☐ Other: Please Specify
   - ☐ None of the above
4. Has your organization deployed private capital for land or natural resource conservation, restoration, and/or resilience projects in the Chesapeake Bay before 2022? If yes, how much? If not, why not? [long response text box]
5. Has your organization deployed private capital for land or natural resource conservation, restoration, and/or resilience projects in the Chesapeake Bay from 2022-present? If yes, how much? If not, why not? [long response text box]
6. Do you have future plans to deploy private capital for land or natural resource conservation, restoration, and/or resilience projects? If so, how much? If not, why not?
7. What drove your organization or firm's deployment of capital? Please check all that apply. [check box]
   - ☐ Permit/Compensatory mitigation requirement
   - ☐ TMDL/Chesapeake Bay Watershed Agreement Goals
   - ☐ Voluntary activity (e.g., conservation/restoration investment on private lands; ESG-related investments)
   - ☐ Other: Please Specify
8. Please describe completed projects, including links to any press releases or public write-ups. [long response text box]
9. How might you describe the barriers that prevent additional private capital from being invested across the
   - ☐ Chesapeake Bay Watershed? Check all that apply. [check box]
   - ☐ Time it takes to develop and complete a project
   - ☐ Risk/return profile of a given project
   - ☐ Small project sizes or acreages
   - ☐ Transaction costs
   - ☐ Uncertain demand for outcomes
   - ☐ Supply chain constraints (lack of available labor, trees, etc.)
   - ☐ Unit cost of restoration activities too high in a given geography
   - ☐ Landowner hesitancy
   - ☐ Other: Please Specify

10. How might you describe enabling conditions that could help to accelerate the deployment of private capital in the Chesapeake Bay watershed? Check all that apply [check box]

- ☐ Ideal information flow
- ☐ Consistent policy support and/or clear guidance
- ☐ Incentives, government subsidies, foundation grants or other sources of catalytic capital willing to under write bespoke deals with high development and transaction costs.
- ☐ Sustained commitment by partners to work through difficult issues over time
- ☐ Well established data (e.g. heat maps, climate corridors), plans (e.g. basin management action plans), good instrumentation in place or available for measurement, accountability frameworks, etc.
- ☐ Other: Please Specify

11. Are there other forms of guidance, policy, or intervention that could help to accelerate the deployment of private capital in the Chesapeake Bay watershed? [long response text box]

12. Is there anything else you think the authors of this report should know? Any resources you'd like to share? Please use the box below to add any additional links, context, resources, etc. you think are relevant. [long response text box]

APPENDIX II: STATE PROGRAM INVENTORY

State	Program	Description
Maryland	Clean Water Commerce Act	A non-regulatory program that uses public funding to purchase modeled water quality outcomes instead of paying for project costs. The program has $20 million annually available as of 2022.
Maryland	Forest Banking Program	The Maryland Forest Conservation Act created the State Forest Conservation Fund, which collects fees when developers are not able to conduct on-site reforestation or afforestation. Money deposited in the Fund can only be used to offset forest losses and for future reforestation and afforestation.
Maryland	Anne Arundel County Purchase of Water Quality Improvement Credits	See case study above.
Maryland	Department of Transportation Full Delivery Initiative	In 2017, the Department of Transportation State Highway Administration initiated a request for proposals for 150,000 linear feet (28 miles) of stream restoration in eleven counties to supply offsets required under the agency's 2015 MS4 permit for stormwater discharges. The initiative is unlike many other MS4 impervious surface offset projects because it is deployed on private lands. Project applicants also have long-term maintenance responsibilities for the stream restoration. Personal communications from MDOT staff indicate that the cost of **these full delivery projects was less than 50% of the cost to taxpayers of projects funded through MDOT's traditional contracting approach in previous years.**
Maryland	Chesapeake and Atlantic Coast Bays Trust Fund	In 2016, private equity firm Ecosystem Investment Partners (EIP) partnered with the Cecil Land Trust on an innovative grant application to the state's Chesapeake and Atlantic Coastal Bays Trust Fund. The project involved a traditional contract whereby the state provided a grant to the land trust. It in turn, they issued their own Pay for Success contract with EIP to deliver outcomes sought under the program. EIP identified multiple project areas along streams on private farmland that could be restored to reduce thousands of pounds of nitrogen, phosphorus, and suspended sediment through 8,215 linear feet of stream restoration and 24.8 acres of riparian buffers.
Maryland	Clean Water Partnership - Prince George's County and Corvias	See case study above

State	Program	Description
Maryland	Department of Transportation Smart Ponds	The Nature Conservancy, Walmart, and water technology company OptiRTC29 teamed up with the Maryland Department of Transportation to take existing stormwater treatment ponds and retrofit them to capture much more water pollution. MDOT's performance contract is set up to purchase the estimated 100 acres of impervious area treatment credits expected to be generated by these ponds once the installations are certified, which includes 42,000 pounds of sediment, 6,000 pounds of nitrogen, and 3,800 pounds of phosphorus. This creates a financing need during planning, installation, and pre-certification operations. The expected cost to MDOT for these credits is about $37,500 per acre, which is roughly 75% lower than the average construction cost of conventional stormwater devices of $150,000 per acre.
Maryland	Baltimore Department of Public Works' Environmental Impact Bond	In 2018, a new environmental impact bond by the Baltimore City Department of Public Works and the Chesapeake Bay Foundation was proposed to help Baltimore complete 115 green-infrastructure projects in more than three dozen neighborhoods. Baltimore would issue $6.2 million in impact bond financing (along with an additional $11.3 million from a state revolving fund loan) to pay for the projects.
Maryland	Oyster Restoration Nutrient Credits	While no large-scale deals have been made, at least 10 different oyster farmers have listed credits for sale on MDE's trading board. Price per pound ranges anywhere from $75 to a few thousand dollars.
Pennsylvania	PENNVEST	The Pennsylvania Infrastructure Investment Authority, called PENNVEST, is Pennsylvania's source for public capital funding for projects related to drinking water, wastewater, or stormwater. PENNVEST also manages the federal/state Clean Water State Revolving Fund and Drinking Water State Revolving Fund dollars.
Pennsylvania	State Revolving Fund Forest Protection Loans	PENNVEST approved a $50 million, 1% interest rate loan from the SRF to funds managed by The Lyme Timber Company LP for the acquisition of 63,500 acres of forestland in Pennsylvania. In exchange for the loan, Lyme Timber granted the state a working forest conservation easement on approximately 9,200 acres.
Pennsylvania (& Delaware)	Brandywine-Christina Healthy Water Fund	The Water Fund uses a blended approach to funding water infrastructure. The economic value of BMP conservation measures is monetized and these values become environmental service credits (i.e. nutrient credits, carbon credits, etc.). The fund can tap into public or private financing to provide the upfront capital needed to implement BMPs in targeted watersheds.

State	Program	Description
Pennsylvania	Clean Water Procurement Program	$25 million fund that empowers the Pennsylvania Infrastructure Investment Authority (PENNVEST) to directly buy–through either a request for proposals or a competitive bidding process–verified sediment or nutrient reductions that count toward meeting the Chesapeake Bay TMDL.
Pennsylvania	Department of Environment's Nutrient Trading Program	In 2006, Pennsylvania approved a policy to allow nutrient trading among facilities or farmers to address state-wide water quality issues and to comply with Chesapeake Bay pollution reductions. To date, this policy is primarily used among wastewater treatment plants, but innovative trades between industrial and agricultural partners have also occurred. This policy provides a more cost-efficient way for parties holding a Clean Water Act water quality permit to meet their limits for nutrients.
Pennsylvania	Chester and Corvias' Public-Private Partnership	In 2017, the stormwater utility of Chester, PA put together a $50 million P3 that involves 30 years of project maintenance. This P3 funds dozens of stormwater projects identified, planned, designed, and implemented by Corvias that will be paid back by Chester's stormwater utility. The project is estimated to have a $149 million local economic benefit through the local jobs and property value appreciation. Chester financed its costs of the project by borrowing money through a loan from the state's Revolving Loan Fund.
Pennsylvania	Resource Enhancement and Protection Program (REAP)	REAP provides transferrable tax credits for agricultural best management practices. The 2019 Pennsylvania Farm Bill expanded REAP to $13 million in annual funding. The program is administered by the State Conservation Commission and the tax credits are granted by the Pennsylvania Department of Revenue. Eligible applications may receive either 50% or 85% of project costs as state tax credits for up to $250,000 per agricultural operation over a 7-year period.
Pennsylvania	Endangered Species Banking	The private restoration company, RES, created a statewide species conservation bank for the Indiana Bat in 2018 by protecting a 438-acre forested site that supports multiple bat breeding colonies. A second bank of 214 acres was created by the CleanWater Conservancy in 2020. Like wetland banks, private funding or other sources have to pay for conservation before credits are certified and released for sale.

State	Program	Description
Virginia	Nutrient Banking Program	Virginia regulates phosphorus runoff from development sites, and since 2009 has allowed developers to achieve a portion of their phosphorus pollution reduction requirements by purchasing credits from nutrient banks elsewhere in the river basin. These banks are typically established on former agricultural lands, put under permanent conservation easements, and reforested with native trees. Some banks also include stream restoration and reforestation. Developers building on less than five acres of land can choose to offset 100% of water quality impacts by buying credits from a nutrient bank under the Virginia Stormwater Management Program.
Virginia	Wetland and Stream Banking	Virginia has the most active and successful wetland and stream mitigation banking efforts, with more than triple the number of banks in Maryland and Pennsylvania combined. There are currently approximately 155 active, approved, or sold-out stream or wetland mitigation banks in Virginia (RIBITS Database).
Virginia	Land Preservation Tax Credit	Virginia's Land Conservation Incentives Act created the Land Preservation Tax Credit which provides an income tax credit of up to 40 percent of the donated value of land or easements and taxpayers can use up to $50,000 of that credit each year to offset state tax liabilities and are able to sell unused credits. In 2018, the program provided $50 million in tax credit benefits.
Virginia	Hampton Roads Environmental Impact Bond	In 2020, Hampton Roads became the first city in Virginia to use an environmental impact bond structure to finance $12 million in stormwater management and flood risk-reduction projects. The projects are meant to provide 8.6 million gallons of stormwater storage capacity in the City. Development of the bond was financed with a grant from the Kresge Foundation.
Washington, D.C.	DC Water's Environmental Impact Bond	See case study above
Washington, D.C.	Department of Energy and Environment (DOEE) Stormwater Credit Trading Program	In 2013, the DOEE established the Stormwater Retention Credit (SRC) Trading Program incentivizing the voluntary installation of green infrastructure in the areas of the city where it's most needed to address stormwater runoff impacts in the Anacostia, Potomac, and Rock Creek watersheds. The majority of projects must meet at least fifty percent (50%) of their stormwater requirement on-site, but projects located in the area of the city that drains to combined sewer system storage tunnels have the flexibility to meet 100% of their retention requirements by purchasing SRCs generated from green infrastructure located in the MS4.

State	Program	Description
Washington, D.C.	Department of Energy and Environment SRC Price Lock Program	In 2017, DOEE launched the SRC Price Lock Program, which guarantees the city will purchase SRCs that have not found a buyer. The program uses $11.5 million in public funds to back future potential purchase of credits. The program helps increase investment because of the presence of the District government as a guaranteed buyer. This ensures that SRC generators will always be able to sell their credits, improving access to private capital and spurring investment in a supply of stormwater offset projects that provide the highest water quality outcomes for the city.
Washington, D.C.	Washington, D.C.l's Green Bank	In 2018, the DC Green Bank is a green investment vehicle for Washington, D.C.-based entities to pursue energy efficiency and clean energy project finance. For the first several years it is expected to have a capitalization of $105 million. One of the bank's first products is financing to support the Property Assessed Clean Energy program (PACE). PACE helps homeowners and businesses finance the installation of clean energy projects (e.g. solar panels) and make payments in installments rather than paying 100% of the costs for proj ects upfront.
Bay-Wide Mechanisms	Wetland and Stream Mitigation Markets	America's wetland and stream mitigation banking market is one of the largest environmental markets in the world, with more than $4 billion in estimated transactions. Virginia's level of investment and volume of transactions eclipses other states in the region. Private investment backed stream and wetland protection and restoration efforts could potentially expand in all of these states, depending on the pace of regional development, population trends, and shifts in transportation technologies.
Bay-Wide Mechanisms	Nonpoint Nutrient Trading	Virginia, Maryland, and Pennsylvania have all made efforts to build state-run programs with centralized credit registries that allow regulated point sources that create water pollution to offset that pollution by purchasing documented and verified nutrient pollution reductions from unregulated nonpoint sources. The registries, clearinghouses, and programs create a marketplace that facilitates connections between supply and demand.
Bay-Wide Mechanisms	State Revolving Loan Funds (SRFs)	SRFs established under both the federal Water Quality Act of 1987 and the 1996 Safe Drinking Water Act Amendments, are resources available to every state to help fund water infrastructure projects. Public utilities are able obtain low-interest, no-interest, or negative-interest loans or grants for water infrastructure projects. States differ in how they administer their SRFs and how creative or innovative projects can be.

State	Program	Description
Bay-Wide Mechanisms	Sustainably Managed Institutional Timberlands	Institution investment in timberlands in the U.S. has been estimated at more than $100 billion. A large portion of this is focused on sustainable forestry, where Forest Stewardship Council or Sustainable Forestry Initiative certifications and conservation easements are common.
Bay-Wide Mechanisms	Compliance Greenhouse Gas Offset Markets	In Virginia, more than 4.5 million metric tons of carbon credits were sold into the California compliance market. Investment-backed efforts created these credits by preserving and setting up sustainable management for Virginia forests. Other Chesapeake region projects, like methane capture from livestock operations in Pennsylvania have also been sold under California's market.
Bay-Wide Mechanisms	Voluntary Carbon Markets	Especially in Maryland and Virginia but also in parts of Pennsylvania, small properties make up the largest share of forest and agricultural land ownership and are often excluded from the carbon market simply due to high fixed development costs for registering a single carbon project that makes carbon credits they could produce much more expensive than those from other states (or countries) that have larger properties. Two national programs that are active in the Chesapeake Bay are helping landowners overcome this barrier. SilviaTerra is a precision forestry company that uses remote sensing to create a high-resolution base map of every forest acre in the United States. The Family Forest Carbon Program is another new forest carbon program focused on the problem of quantifying, registering and verifying improvements in carbon storage on small properties. It was created by the American Forest Foundation and The Nature Conservancy with funding from Amazon, Inc. Similar to SilviaTerra, the Family Forest Carbon Program launched its pilot in Pennsylvania, enrolling eligible landowners with incentive payments to implement sustainable forestry practices to carbon sequestration and storage while improving forest health.
Bay-Wide Mechanisms	Wastewater Plan Trading Programs	While these programs rely on ratepayer funds, not private investment, Pennsylvania, Maryland and Virginia all created nutrient trading programs that allow wastewater treatment plants with greater-than-required nutrient reductions from facility upgrades to sell that extra pollution reduction to others that have not yet been upgraded.