



# ECOSYSTEM SERVICES WORKING GROUP FINAL REPORT



*OCTOBER 2011*

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## *INTRODUCTION*

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In August 2010, pursuant to recommendations by the Governor's Green Jobs and Industry Task Force, the Department of Natural Resources established an "Ecosystems Services Working Group" (ESWG) to identify changes in existing programs to enable market-based mechanisms, the private sector, and landowners to play a larger role in environmental conservation and restoration in order to more efficiently and effectively recover the true costs of ecosystem services lost through land conversion and infrastructure development.

Members of the ESWG include State environmental, agricultural, planning, and economic development agencies; private environmental restoration and investment companies; and a non-profit organization that specialize in ecosystem markets and financing. In December 2010, the ESWG issued an Interim Report assessing the status of existing markets and government programs related to ecosystem services in Maryland. This Final Report updates and clarifies the Interim Report based upon input received since its initial publication.

The ESWG Final Report has several parts. The Executive Summary provides an overview and discusses guiding principles as Maryland moves forward into the future. The main section of the Report contains a description of existing ecosystem services and markets in Maryland with recommendations for change, and the Additional Research section contains a list of future study areas. Lastly, Appendix A identifies the members of the ESWG and Appendix B provides a List of Resources relating to ecosystem services.

All members of the ESWG were encouraged to provide their candid assessments, perspectives, and observations to Maryland's current and potential ecosystem markets and programs. A separate Observations section in the Report lists issues or themes advanced by a single ESWG member or shared by others, but not by the entire group. The ideas or concepts they embody may have value in other forums or in the future.

## *EXECUTIVE SUMMARY*

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An ecosystem is a community of organisms – plants and animals – in a physical environment: a forest, wetland, stream, waterway, or riverbank. Ecosystems provide essential "services" to human beings and nature. Forests absorb carbon and reduce our vulnerability to climate change, wetlands purify the water we drink, streams and waterways provide habitat for fish and other living creatures, and streamside forests prevent soil erosion. Ecosystems collectively comprise Maryland's "natural capital."

Maryland is rich in ecosystems. From the Appalachian Mountains in the west to the Atlantic Ocean in the east, with the Chesapeake Bay and its tributaries in between, Maryland is home to biodiversity. Of the State's 6.8 million acres of land, there are:

- 2.6 million acres of forest cover;
- 460,000 acres of nontidal wetlands;
- 680,000 acres within 1,000 feet of the Chesapeake and Atlantic Coastal Bays and tributaries (known as "the Critical Area"); and
- 15,000+ miles of streams and waterways.

Maryland has identified 167 species of wildlife (invertebrates, fish, amphibians, reptiles, birds and mammals) and 445 species of plants that are deemed in need of conservation, threatened, or endangered.

As in many states, Maryland's natural resources are inevitably being lost or at least challenged by human development. While lawmakers in Maryland have enacted programs designed to mitigate or offset development, it is safe to say that these programs are not fully replacing the value of lost ecosystem services. By way of overview, Maryland is losing forest cover at an average rate of 7,000 acres/year. While wetlands are lost at a rate of 45 acres/year from regulated activities, the State is creating small-scale wetlands at the same rate; however, it is often unknown if the quality of wetlands created fully replaces the wetlands that are lost in the same manner as larger wetland mitigation sites.

The ecosystem services that are lost to development in the Critical Area – removal of sediment and nutrients from runoff and fish and wildlife habitat – has not been quantified. Nor has the services lost to development the same in streams and waterways. On the habitat side, while strong protections exist for threatened and endangered wildlife species in Maryland – likely preventing loss of the services of

biodiversity – there are no specific prohibitions against habitat modification caused by development.

A market is the voluntary exchange of goods or services for value. Private markets throughout the United States create and restore ecosystem services – forests, wetlands, and habitat – and sell credits for these services to offset the impact of development. Markets offer another approach to ecosystem restoration by internalizing negative environmental impacts associated with development and land use actions and creating systemic, market incentives for protecting and restoring natural resources. While regulatory requirements generally create the demand for ecosystem goods or services that are sold through a market, there are also some voluntary markets fueled by a “good will” demand for environmental restoration.

In Maryland, forest mitigation banking opportunities exist in ten counties and two municipalities, but only a few banks are active. Federal and state laws and policies do not currently optimize effective wetland mitigation banking, though active efforts toward change are underway. While there are private banking opportunities in the Critical Area, they are little known and not effective. A single habitat conservation bank was established to protect the federally endangered Delmarva fox squirrel, yet all credits have now been sold and no other banks have been established since. Generally, programs that do allow banking are not coordinated and miss opportunities to achieve multiple environmental objectives, landscape-scale conservation, ecosystem and watershed restoration, and improved resiliency to climate change impacts.

A water quality nutrient trading program is established in Maryland for trading between pollution point sources (wastewater treatment plants) and nonpoint sources (farms). The work to set up rules for trading between nonpoint sources -- e.g., farms and urban stormwater -- for offsetting existing pollutant loads or future development is currently in progress. A market opportunity may be created for carbon trading as the State establishes its final greenhouse gas reduction plan over the next 18 months.

This Report describes, assesses, and makes recommendations to improve protection of ecosystem services, including further development of ecosystem markets to offset impacts to those services. As Maryland charts its path forward into the future, it should employ the following Guiding Principles:

- Continue to place the highest priority on protecting the State’s unique and irreplaceable natural resources by requiring actions to avoid or minimize resource impacts in order to reduce the need for, and extent of, mitigation. Hand-in-hand with this principle is the ongoing need for consistent and

thorough enforcement of the regulatory protections that Maryland's environmental programs currently provide.

- Strive in its programs and decision-making to recover the true value of ecosystem services lost to development and other human activity.
- Wherever practicable, use the marketplace as a mechanism for offsetting adverse impacts to ecosystem services. Ecosystem markets can offer a more cost-effective means of mitigating development impacts while reducing government expenditures on regulatory programs. Markets also incentivize restoration and protection of natural resources by providing an opportunity for private investors to generate credits by restoring degraded ecosystems and selling those credits to developers at a later date.

## *ECOSYSTEM SERVICES AND MARKETS*

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### **Forests**

Forests cover 41% of Maryland, or 2.6 million acres. Forests provide infinite values and benefits, ranging from biological diversity, water quality and quantity, and wildlife habitats. Forest buffers, or strips of forests on either side of streams, rivers, ponds, lakes, and bays, are essential in maintaining clean water. Forests also play a crucial role in purifying the air by absorbing carbon dioxide and releasing oxygen. Seventy-six percent (76%) of the State's forest land is owned by an estimated 130,000 private individuals and enterprises; federal, state, and other public owners hold the remaining 24 percent.

For the eight-year period from 2002 – 2010, Maryland lost an estimated 7,000 acres of forest per year. The calculation of loss is the estimated net result from all forest acres cleared minus (a) acres planted pursuant to the Forest Conservation Act (FCA), which only applies to forests lost to development; and, (b) acres planted through voluntary and State-initiated programs such as Marylanders Plant Trees and Forest Brigade.

Enacted in 1991, the FCA applies to any subdivision, grading permit, or sediment control permit on areas 40,000 square feet (approximately 1 acre) or greater and provides that certain amounts of forest must be retained and/or replanted. To retain forests in targeted areas, the preferred sequence of compliance is as follows: onsite retention, onsite planting, offsite planting, offsite retention, mitigation banking and, lastly, fee-in-lieu payment. Although the Maryland DNR Forest Service oversees administration of the FCA, the Act is implemented by local jurisdictions.

The FCA was not intended as a no-net-loss program; rather, it seeks to reduce the rate of forest loss resulting from development. While FCA has helped to slow the annual rate of forest loss by approximately 25%, there is great concern over losing any forest cover at all because of the critical ecosystem services forests provide. The Governor-appointed Sustainable Forestry Council is currently engaged in developing a definition and implementation plan to guide a "No Net Loss" policy recommendation for forests. The Council's report is due in December 2011.

Of the 104 local jurisdictions subject to the FCA – 21 counties (Allegany and Garrett are exempt) and 83 municipalities – 12 have some form of mitigation banking program, and a few banks are active. Banking programs differ significantly from one jurisdiction to

the next. For example, Prince George's County is a "partner" in the banks, Somerset County allows banks only for commercial projects, and Anne Arundel County has separate banks for inside and outside the Critical Area. According to FCA reporting, 5,084 acres of forest bank credits have been transacted since 1997, the beginning of the bank option. Credit costs range from \$2,000/acre in Charles County, \$10,000/acre in Carroll County, and \$21,000/acre (only in the Critical Area) in Anne Arundel County.

All counties except for Carroll, Cecil, Harford and Dorchester provide a fee-in-lieu option. The fees are low, ranging from \$0.40/sf to \$0.90/sf. (The minimum fee is set by State law at \$0.30/sf inside a priority funding area (PFA) and \$0.36/sf if outside a PFA). During the first 15 years of the program, about \$17.72 M or \$1.2M/year was collected through fee-in-lieu programs, although banking was not always an option. In recent years, fee-in-lieu collections totaled \$2.65 M in 2008 and \$2.33 M in 2009. A comprehensive summary of how funds are expended, or whether replanted forests are replacing the full suite of ecosystem services of those they are replacing, is currently unavailable. In part, this is due to the widely differing mitigation rules among counties, some of which allow landscaping and street tree planting as mitigation options. For example, Baltimore County has used fee-in-lieu funds to establish a successful urban tree canopy program.

One successful example of forest banking in the State is Carroll County. By intentionally rejecting the fee-in-lieu option at the outset of the program, the County encouraged the development of private sector banks and reduced the staffing capacity needed to administer the program. There are now 15-20 banks in the County; since the mid-1990s, about 62% (397.6 acres) of off-site mitigation needs in Carroll have been provided through forest banks.

### **Analysis and Recommendations**

Maryland is not recovering the full value of ecosystem services resulting from forests lost to development. It is also unknown how the fee-in-lieu option is being implemented by each county and whether the forest cover that is planted replaces the forests that are lost.

The ability of the market to help recover lost ecosystem services is hampered by existing rules. Current low fee-in-lieu pricing is well below the costs of developing mitigation banks and effectively blocks out the market for these banks. Also, banking options are not offered by all programs and rules for bank mitigation can be more restrictive than for fee-in-lieu mitigation. Using fee-in-lieu as a last resort and a high-cost option, and

establishing consistent rules across the board, would give preference to banking and stimulate markets.

The ESWG recommends the following actions:

- Amend the FCA to require “no net loss of forests” from development by:
  - Establishing a preference for forest mitigation banking. If an approved forest mitigation bank is within the local jurisdiction and has available credits, the applicant must purchase credit from this bank rather than paying the fee-in-lieu;
  - Establishing consistent rules for banking;
  - Requiring local jurisdictions to account for fee-in-lieu funds collected and spent; and,
  - Allowing inter-jurisdictional banking for local jurisdictions sharing a common watershed.
  
- Analyze existing programs to determine:
  - Whether there is any gap between the ecosystem values that are being lost and those that are being replaced; and
  - How fee-in-lieu funds are spent within each program.

## **Nontidal Wetlands**

Maryland’s nontidal wetlands are inland freshwater areas not subject to tidal influence. Nontidal wetlands help protect the Chesapeake Bay, the Atlantic Coastal Bays, and streams by filtering phosphorous, nitrogen, and other pollutants from upland runoff. There are currently about 460,000 acres of vegetated nontidal wetlands in Maryland, or 7.0-7.4% of the State’s land mass. Development annually impacts about 45 acres of wetlands in Maryland, which is low compared to other states.

Wetland mitigation is required for all projects with  $\geq 5,000$  sf permanent nontidal wetland impacts and for projects with  $< 5,000$  sf permanent nontidal wetland impacts within the sensitive areas such as the Critical Area or certain category streams. Wetland regulation is inter-jurisdictional. For nontidal wetland impacts for single and complete projects that result in no more than minimal individual and/or cumulative impacts (Category I), the Maryland Department of the Environment reviews mitigation proposals under State law and the mitigation required by the United States Army Corps of Engineers (USACE) pursuant to the Maryland State Programmatic General Permit

(MDSPGP-3). The USACE may be involved in mitigation for projects that do not qualify as a MDSPGP-3 Category I.

There are three potential forms of mitigation. One, an applicant or permittee may propose to perform the mitigation; or two, the applicant may purchase a credit from an approved wetland mitigation bank. A mitigation bank is a large wetlands project this is set aside to compensate for future wetlands losses through the purchase of credits by permittees who are disturbing wetlands. In March 2008, the ACOE adopted the Compensatory Mitigation Rule, which states that banks are the first preference for mitigation. If an approved wetland mitigation bank is within the watershed and has available credits, the applicant must purchase credit from this bank rather than paying into the MDE In-Lieu Fee Program (ILF). Under the current federal rule, the applicant has to mitigate one acre for every acre impacted.

Currently, there is only one mitigation bank in Maryland with remaining credits to sell. The bank, located in Dorchester County, was approved prior to the 2008 Compensatory Mitigation Rule. There has been no mitigation banks approved since the 2008 Mitigation Rule went into effect. In contrast, nationally more than 950 wetland mitigation banks have been approved by the USACO and the United States Environmental Protection Agency.

The third option for mitigation is for the permit applicant to make payment into an in-lieu-fee (ILF) fund. MDE uses the fund to establish small-scale wetland banks. The ILF is set by county and ranges from \$11,100 - \$58,000 per acre. Nationally, prices range from \$3,000 - \$653,000 per ILF credit; the national average is \$74,535. Close to home, prices for nontidal wetland credits in Northern Virginia range from \$125,000 - \$150,000 per acre.

### **Analysis and Recommendations**

Maryland may not be recovering the full value of ecosystem services resulting from loss of wetlands. Because there are no wetland mitigation banks that have been created since the 2008 compensatory mitigation rule, permittees continue to pay into the ILF. While this has enabled Maryland currently to achieve a no net loss in wetlands, it is not clear whether small-scale mitigated wetlands function as well as those affected or destroyed.

In contrast, large-scale, private mitigation banks which satisfy the mitigation requirement of dozens of regulated projects may be of better quality. Lack of large-scale mitigation banks increases government expenditures as MDE staff devote

extensive time to locate, design, review, and follow-up on projects using ILF money. Finally, it is more efficient to manage large-scale mitigation banks than smaller permittee-responsible mitigation sites.

However, there are barriers to private sector creation of mitigation banks. The current interpretation of the federal Mitigation Rule has resulted in mitigation banking requirements that are too strict. There is a relatively low amount of impacts in Maryland, making it difficult for the mitigation banks to be economically feasible while still meeting these strict banking requirements. MDE is working to increase the Service Area size for the Mitigation Banks, which would allow credits to be sold faster. MDE is also evaluating the current Mitigation Banking Instrument template and will encourage modified approaches to make the banks feasible, including reducing liability associated with the current eminent domain clause and evaluating the financial assurance requirements and the credit release schedule.

On the State regulatory side, current ILF pricing is well below the market price for mitigation. If an approved and successful bank were in place, use of the ILF fund would generally be the least preferred option. In addition, the required ratio of mitigation for banking is higher than it is for permittee-responsible mitigation.

The ESWG recommends the following actions:

- Maryland should continue to work with the USACE to remove the strict banking requirements under the federal Mitigation Rule.
- MDE is currently revising the ILF program to be consistent with the Mitigation Rule. MDE should generally not accept ILF funds when there is an approved mitigation bank having available credits within the applicable service area so that mitigation banks will not have to compete with the ILF program.
- Current ILF pricing is well below the market price for mitigation and is therefore a barrier to private sector involvement. Maryland should set the ILF at costs that more accurately reflect cost of acquisition, construction, monitoring, and long term management.
- Maryland has a mitigation ratio for banks that is higher than permittee-responsible mitigation, depending upon the impact. An applicant that purchases credit from a bank may have to mitigate 1.5 to 2 acres of wetland for every one acre of impact, whereas permittee-responsible mitigation is 1:1. Maryland

should adjust the mitigation bank ratio requirements to be equivalent to those required for other forms of mitigation.

## Chesapeake and Atlantic Coastal Bays Critical Area

Maryland's "Critical Area" consists of all tidal waters and wetlands, and all land within 1,000 feet of these resources in the Chesapeake and Atlantic Coastal Bays. The land area (680,000 acres) is deemed "critical" because land closest to the water, especially the first 100 feet (known as the "Buffer") acts as a water quality filter for removal of sediment and nutrients found in runoff. The same land also provides valuable habitat for fish, wildlife, and plants.

Enacted in 1984, the Critical Area law established a land use program to: minimize adverse impacts on water quality from runoff; conserve fish, wildlife, and plant habitat; and establish land use policies that accommodate growth. The program is based on State law and regulations and administered by local governments in 16 counties, 47 municipalities, and Baltimore City. Among other requirements, impacts to resources located within the Critical Area must be mitigated within the Critical Area.

Although the Critical Area Program has been implemented for more than 25 years, it is only in the last five to ten years that the need for mitigation banks and the concept of these banks as part of a Critical Area ecosystem market were identified. Participation in an ecosystem market is possible where there is a requirement to mitigate for a development-related impact, and the mitigation cannot be accomplished on the project site. Increasingly, off-site mitigation or alternative forms of mitigation are necessary for development projects to demonstrate compliance with Critical Area program requirements and to obtain approvals and permits. The four applicable areas are:

Buffer Impacts: Within the 100-foot Buffer, new development activities, redevelopment activities, and land disturbance are prohibited unless they are for a shore erosion control measure, associated with riparian water access, or involve development or redevelopment of water-dependent facilities (e.g. outfall structures). For permitted activities and for those involving approval of a variance, mitigation based on the project area is required at a minimum 1:1 ratio for shore erosion control, 2:1 ratio for access and water-dependent facilities, and 3:1 for variances. The Buffer regulations also include provisions for the collection of a fee-in-lieu of Buffer mitigation and specify a fee of \$1.50 per square foot.

Forest Cover: The total acreage of forest coverage within a Critical Area local jurisdiction is required to be maintained or preferably increased. When forests are developed and converted to other land uses, typically there is insufficient area on the project site to meet the reforestation requirements.

Forest Habitat: “Habitat Protection Areas” (HPAs) require additional resource protection. For example, the habitat for forest interior dwelling birds, or FIDS, is a tract of mature forest of 50 acres or greater. The Critical Area program has adopted guidance for protection and conservation of FIDS habitat that specifically allows for mitigation for clearing associated with development. Habitat for the federally endangered Delmarva Fox Squirrel is another example. The Critical Area Commission has worked closely with the U.S. Fish and Wildlife Service to assist in mitigation efforts when required. In some cases, the mitigation requires total replacement of affected habitats by planting unforested areas on another property in the Critical Area.

10% Stormwater Pollutant Removal: Intensely Developed Areas (IDAs) comprise approximately 5% of the Critical Area land in the State. These areas are developed regions where residential, commercial, industrial, and institutional uses predominate. The focus of the Critical Area regulations within IDAs is on improving water quality through provisions that require a post-development 10% reduction in pollutant levels over pre-development levels. On some development and redevelopment sites, current stormwater design practices and methodologies that meet MDE’s requirements do not result in a 10% improvement in pollutant levels, or the 10% reduction may not be obtained because MDE’s regulations allow for certain exemptions that are not allowed in the Critical Area. On these sites, additional practices can be implemented, or an applicant can meet the pollutant removal requirement by treating stormwater on another site, performing offsets as described in the stormwater guidance manual, or paying a fee-in-lieu as specified in the local Critical Area program. Fee-in-lieu amounts vary by jurisdiction and range from \$20,000 to \$30,000 per pound of phosphorus.

### **Analysis and Recommendations**

Maryland is not recovering the full value of ecosystem services lost in the Critical Area. Mitigation and conservation is often most effectively accomplished on larger tracts in areas that are not on or immediately adjacent to development sites. Centralized mitigation banks provide opportunities and economies of scale that cannot be realized through a project-by-project approach.

To date, in most cases the mitigation areas identified have been directly linked to satisfying the needs of specific projects, and there were no remaining “credits” that

could be sold. The current informal, largely demand-based market often results in State and local government staff being placed under considerable pressure by developers and government officials to “find” mitigation opportunities in order to allow development projects to move forward. Identifying mitigation opportunities on a project-by-project basis is time consuming, and the Commission and most local governments lack the resources and expertise necessary to do this effectively.

The recently-adopted Buffer regulations have the potential to be a significant market driver because the regulations: 1) mandate mitigation at specified ratios; 2) require fee-in-lieu payments if mitigation cannot be met on site; and, 3) specify that these funds be tracked and maintained in a separate account so that their use for appropriate projects can be monitored by the Critical Area Commission. Annual reporting on the status of these funds to the Commission is required, so a better assessment of the potential of this market can be made after reports are submitted and reviewed.

All four of the current “markets” are underdeveloped, informal, and demand-based, and therefore currently exist more as “market opportunities” than actual markets. This is due largely to the cost of land within the Critical Area, which is a significant deterrent to exploring or speculating in mitigation banking opportunities.

In order for this market to flourish, more private sector opportunities must be identified. The ESWG recommends that the Commission:

- Advertise on its website needs for buffer, forest cover, forest habitat, and stormwater mitigation.
- Maintain a registry of ecosystem market aggregators who can assist landowners and developers in identifying and creating mitigation opportunities.
- Allow inter-jurisdictional banking for local jurisdictions sharing a common watershed.

## **Streams & Waterways**

Home to more than 100 species of fish, 13 types of turtles and 21 kinds of salamanders, Maryland’s 15,000+ miles of streams and waterways feature freshwater mussels, crayfish, macro invertebrates, and larval insects. Snakes, lizards, salamanders, and frogs make their abode along the stream banks. Stream and waterway habitats – there

is a stream with 15 minutes away of every Marylander – are a vital part of the State’s ecosystem.

A person who proposes a construction project in a waterway – such as fill, a building, bridge, or culvert – or to change in any manner the course, current, or cross section of a stream or body of water is required to obtain a permit from MDE. MDE annually receives 600-700 applications for impacts requiring waterway construction permits.

Mitigation is not always a regulatory requirement for stream construction or alteration. However, MDE may require stream mitigation for projects having any adverse stream impacts, and the USACOE may consider a mitigation requirement for projects with greater than 200 linear feet of stream impacts. To meet these requirements, an applicant can propose permittee-responsible mitigation or purchase credit from an approved stream mitigation bank.

There is currently only one consolidated stream mitigation site in Maryland, located in Anne Arundel County. This site was created before the 2008 Mitigation Rule when a consultant identified a highly degraded stream in need of restoration. At the time, there was no funding currently available for restoration so the consultant established the site as a consolidated stream mitigation site, accepting payments for stream mitigation requirements to fund the larger stream restoration project.

As discussed in the Wetlands section above, the Compensatory Mitigation Rule states that mitigation banks are a first preference. Further, mitigation banks may be more successful than permittee-responsible mitigation sites.

### **Analysis and Recommendations**

Whether Maryland is recovering the full value of ecosystem services lost as a result of waterway and stream construction or alteration is difficult to answer as there is no comprehensive, accepted protocol to assess affected or lost ecosystem services in streams and waterways as a condition of permit review and mitigation assessment. Evidence collected through the Maryland Biological Stream Survey would indicate that the answer is no. Almost half (46%) of all Maryland freshwater streams are in poor biological health, 42% are rated as fair, and only 12% are good.

The ESWG recommends that Maryland should:

- Develop a comprehensive protocol for assessing and characterizing unavoidable impacts to streams resulting from permitted waterway and stream construction projects in order to structure appropriate and consistent mitigation requirements.
- Continue to work with the USACE to remove the strict banking requirements under the federal Mitigation Rule.

## Species & Habitat

*All living things are part of a complex, often delicately balanced network called the biosphere. The earth's biosphere, in turn, is composed of countless ecosystems, which include plants and animals and their physical environments. No one knows how the extinction of organisms will affect the other members of its ecosystem, but the removal of a single species can set off a chain reaction affecting many others.<sup>1</sup>*

Maryland has identified 167 species of wildlife – invertebrates, fish, amphibians, reptiles, birds, and mammals – and 445 species of plants that are legally protected as in need of conservation, are threatened, or are endangered. An endangered species is a species whose continued existence is determined to be in jeopardy, and a threatened species is one that is likely to become endangered in the foreseeable future. The definitions include species listed as threatened or endangered under federal law.

As a general rule, Maryland law prohibits the “taking” of threatened or endangered species. “Taking” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Legal take of endangered wildlife species may only be considered for the federally and State endangered Delmarva Fox Squirrel and the federally threatened and State endangered Puritan Tiger Beetle. For these species, an “incidental take” permit may be issued if the taking occurs as the result of an otherwise lawful activity and the permit applicant minimizes and mitigates the impact of the take.

Habitat banks, or conservation banks, are parcels of land containing natural resource value that are conserved and managed in perpetuity for specified listed species and used to offset impacts occurring elsewhere to the same resource values. Conservation banking facilitates recovery of listed species through economies of scale. Many

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<sup>1</sup> [http://www.fws.gov/Endangered/pdfs/Why\\_Save\\_End\\_Species\\_July\\_2005.pdf](http://www.fws.gov/Endangered/pdfs/Why_Save_End_Species_July_2005.pdf)

protected species are much more likely to thrive in fewer, large habitats than in small, non-contiguous habitats, such as those developed through on-site mitigation.

Conservation banks must remain under active management in perpetuity and can be either privately or publicly owned. In each case, the bank operator may sell credits to those needing to satisfy legal requirements for the compensation of their project's environmental impacts. For federally listed species, the banks must be approved by the US Fish and Wildlife Service and the Maryland Department of Natural Resources.

The first habitat banks in the US were established in California after it became the first state to institute a formal policy governing the use of mitigation banking for endangered species in 1995. Currently there are 119 species banks in the country. Habitat banks in Maryland protecting Delmarva Fox Squirrel habitat did exist but have since sold out. When operative, the banks sold credits at a price between \$5,000 and \$6,500 per acre over the last 10 years.

Presently, there are no active approved habitat banks in the State of Maryland. From a policy perspective, habitat mitigation banks are not encouraged for certain most threatened and endangered species because they usually depend on unique and irreplaceable habitats that cannot be recreated.

### **Analysis and Recommendations**

Whether Maryland is recovering the full value of ecosystem services that are lost when there is a protected species is difficult to answer. Direct take of wildlife is generally prohibited and incidental take permits are only possible for two endangered wildlife species. Since it is the incidental take permit requirement that drives the demand for species banks, there is little or no incentive to establish a conservation mitigation bank for threatened and endangered wildlife and plant species.

While a direct take of protected species is largely prohibited, the habitat of threatened and endangered species will inevitably be impacted as Maryland continues to develop. Habitat protection is not now a specific objective of Maryland law.

The ESWG recommends Maryland should consider:

- Defining "take" to more directly include habitat modification.
- Allowing incidental taking permits for the few threatened and endangered species that can truly benefit from them.

- Developing a conservation banking program as the preferred form of mitigation for those few species.
- Incorporating benefits for protected species into conservation banking programs developed to mitigate other resources.

## Nutrients

Over the years, pollution levels in the Chesapeake Bay and its tributaries have been increasing. Chief among the pollutants degrading water quality are nutrients (nitrogen and phosphorus) and sediment. These substances enter the waters of the Bay watershed from direct discharges (point sources) as well as from diffuse sources (nonpoint sources), along with atmospheric deposition. Although a series of federal, State, and local programs has been developed during the last 30 years to assist in mitigating the impacts of pollutants, public sector funding has fallen short in achieving the environmental goals of a clean Bay.

Water quality trading offers an innovative option for addressing water quality issues. In 2008, MDE issued the *Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed*, which represented Phase I of the State's policy development on nutrient trading: offsetting growth in wastewater nutrient loads. Point source trades are implemented and enforced via NPDES permits. Offsets can be achieved by either optimizing treatment options, using spray irrigation, upgrading or retiring existing minor wastewater treatment plants (WWTPs), retiring septics by connecting them to advanced wastewater treatment plants, or trades between point sources. To date, several offsets and trades have been transacted between point source entities.

Also in 2008, MDA issued the requirements and procedures for Phase II point-to-nonpoint trading to provide the mechanism for generating credits from agricultural sources and describe how credits are to be exchanged between buyers and sellers. Phase II is intended to create economic incentives for implementation of agricultural practices to generate tradable credits that can be used (a) as offsets to manage existing loading caps, and (b) to accommodate new or increased loads resulting from development. The program is based upon the World Resources Institute's widely recognized NutrientNet platform with its online suite of tools that includes a credit calculator, a marketplace, and a central registry. The Maryland credit calculator has

been customized to incorporate both the Chesapeake Bay Program model efficiencies and the data contained in the national Nutrient Tracking Tool (NTT) developed by USDA's Natural Resources Conservation Service. Whether credits are sold directly to a buyer or through a third-party broker or aggregator, the marketplace enables users to assess trading activity and find potential trading partners. The registry provides a central location for the posting and tracking of certified credits and completed trades. These tools are available on a dedicated website found at [www.mdnutrienttrading.com](http://www.mdnutrienttrading.com).

In December 2010, the Environmental Protection Agency established a "total maximum daily load" (TMDL) for nitrogen, phosphorous, and sediments that may be discharged into the Chesapeake Bay. Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia are required to achieve specified reductions in these sources of pollutants by 2025. Maryland has submitted and EPA has approved a Watershed Implementation Plan (WIP) which commits the State to achieving its pollutant reduction goals by 2020. Maryland's reductions are allocated to pollutant sources or sectors, including WWTPs, agricultural runoff, stormwater, and septic systems. The Maryland WIP requires loads from all new development or redevelopment projects to be offset. The strategy to account for growth will likely require the trading of credits to offset growth as well as to help local governments meet their Bay TMDL allocations using maximum flexibility and innovations.

Maryland has established a workgroup to determine how to account for future growth per the State's commitment in the WIP. This workgroup is evaluating the feasibility of updating current Trading Policies and/or developing a Phase III policy – nonpoint to nonpoint source trading – to reflect the Bay TMDL. For example, nutrient reductions proposed to be achieved through retrofitting urban stormwater facilities may be met through implementation of urban best management practices (BMPs) such as reforestation.

### **Assessment and Recommendations**

Maryland's nutrient trading program for Phase I and II is operational and accessible and several point source transactions have occurred. However, large-scale trading is not anticipated in the near term. On the demand side, market pressure may encourage trading when local governments (a) seek to purchase credits to increase WWTPs capacity and nutrient loadings; (b) seek trading as a cost-effective option to meet load allocations; or, (c) are required to offset loads from new development. On the supply side, Maryland's farms are subject to very stringent baselines, and as a result, credit generating capacity may prove low. To boost supply, recent policy changes base

eligibility on the whole farm rather than individual fields and permit the independent trading of nitrogen and phosphorus credits.

For Phase III trading, many new practices and ideas are being promoted by local governments and private companies that need evaluation and approval of the State and the Chesapeake Bay Program. The development of innovative and emerging technologies and new trading options is encouraged for future consideration. The State is interested in third-party initiatives to create nutrient credits/offsets to be made available to new or expanding point sources, local jurisdictions and other groups.

The ESWG recommends that Maryland:

- Continue to investigate and adopt an acceptable Trading Strategy within the regulatory process to promote innovation and flexibility and to ensure that growth in loads is offset.
- Investigate and endorse a range of the credit supply options.
- Encourage various State agencies and programs participation in offset initiatives and proposals.
- Propose legislation as necessary to adopt these initiatives and proposals.

## **Carbon and Other Greenhouse Gases**

Greenhouse gases (GHG in Maryland, chiefly carbon dioxide, which represents 90% of emissions from power plants, automobiles and manufacturing sources – remain resident in the atmosphere for decades, trap heat from the sun, and warm the planet. Reducing GHG emission is key to halting climate change and its impacts on Maryland, including sea level rise.

Maryland is a member of the 10-state Regional Greenhouse Gas Initiative (RGGI), an agreement requiring participating States to cap GHG from electricity generators at 2009 levels through 2014 and to lower the cap by 10% between 2015 and 2018. RGGI generators are required to purchase allowances issued by any of the ten participating states to cover each ton of CO<sub>2</sub> emitted via auction. There have been twelve auctions since 2007. States invest proceeds from these auctions in measures to improve energy efficiency and renewable energy.

Carbon reduction or sequestration projects can be used to generate CO<sub>2</sub> offset allowances and traded through RGGI via the CO<sub>2</sub> Allowance Tracking System (COATS). Eligible offset project types include landfill methane capture and destruction; reduction in sulfur hexafluoride emissions; sequestration due to afforestation; avoided methane emissions from agricultural manure management; and energy efficiency in buildings to reduce emissions from natural gas, oil, or propane end-use combustion. However, while COATS is now operational, the rules and language of the multi-jurisdictional RGGI makes Maryland-based projects infeasible. In addition, the national economic recession has reduced energy usage and surplus supply of CO<sub>2</sub> allowances has devalued the auction rate to \$1.86/ton. A compliance source would not offer to pay more than \$1.86 for each CO<sub>2</sub> offset allowance – a rate which is not considered adequate to cover the cost of an offset project.

The Greenhouse Gas Reduction Act of 2009 (GGRA) requires Maryland to achieve a 25% reduction in Statewide greenhouse gas (GHG) emissions from 2006 levels by 2020. The GHG reduction is from an estimated 105.1 million tons of CO<sub>2</sub> in 2006 to 82.1 million tons in 2020. GGRA mandates development of a proposed plan to achieve these reductions by the end of 2011 and a final plan by the end of 2012.

The GHRA emissions reduction plan is required to contain a provision for use of offset credits generated by “alternative compliance mechanisms” executed within the State, including carbon sequestration. GGRA also contained language for providing “credit” to GHG sources for voluntarily reducing GHG emissions in advance of implementing GGRA.

One potential option for achieving the GHG emission reduction goal is Nutrient Trading with Carbon Co-benefits. Since many of the agronomic, land use, and structural practices promoted by the Maryland Nutrient Trading Program administered by MDA also store carbon and lower other GHG emissions, the existing nutrient marketplace provides a platform for the addition or “stacking” of a voluntary carbon component.

### **Assessment and Recommendation**

Development of the proposed and final GGRA plan over the next 18 months provides an opportunity to move forward with offset protocols that could potentially be used in Maryland but were rejected by RGGI, such as Maine's improved forest management protocol and Maryland's ideas for urban tree canopy and salt-marsh restoration.

The ESWG recommends that Maryland should:

- Continue to engage the private sector in the development of offset protocols.

## *OBSERVATIONS*

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The Observations section of the report lists issues or themes advanced by a single ESWG member or shared by others, but not by the entire group. The ideas or concepts they embody may have value in other forums or in the future.

- The fee-in-lieu option should be used as a last resort. Projects in the ground or ecosystem banks should be given a preference over the use of ILF. To the extent ILF exist, the fees should be high enough to take into account true cost accounting.
- If collected, in-lieu fees (ILF) revenues should be spent within a year of receipt. If fees are idle for a given time, funds should be used for credit purchases from existing banks.
- Collected fees-in-lieu and interest acquired should not be considered revenue for government's general funds, and should only be spent, and publicly documented, toward restoration and/or market development. Private mitigation banks or projects should be able to apply through an RFP for the use of MDE wetland, FCA forest, and Critical Area mitigation ILF funds to create mitigation banks to offset future development.
- Maryland should develop a "One-Stop Shop": a centralized office which has the authority to coordinate all required and voluntary ecosystem service transactions in one place. Both buyers (e.g., developers needing to offset impacts) and sellers (landowners, investors) would deal with one office, not multiple agencies, for approvals for offsets to or mitigation of impacts to a range of ecosystem services – wetlands, forests, Critical Area. In addition, targeted banking projects could be developed that would achieve multiple environmental objectives, landscape scale conservation, ecosystem restoration and improved resiliency to climate change – outcomes that generally cannot be achieved through isolated efforts.

## *ADDITIONAL RESEARCH*

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Additional research and policy recommendations would help implement the Guiding Principles discussed at the beginning of this Report, including the following tasks:

- Explore and assemble academic research estimating ecosystem services valuation and State government policies that quantify ecosystem pricing.
- Develop recommendations on how to insert identified ecosystem services' "true costs" into State policymaking and the private sector.
- Develop programmatic guidance that to foster inclusion of full cost accounting elements, market-based benefits, and landowner opportunities into economic, social, and environmental decisions undertaken by State government.

## APPENDIX A – MEMBERSHIP

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Joe Gill (Chair)	Department of Natural Resources
Dan Baldwin	Department of Planning
John Campagna	Restore Capital
Denise Clearwater	Department of the Environment
Christine Conn	Department of Natural Resources
Marianne Dise	Office of the Attorney General
Renee Fizer	Department of the Environment
Dave Goshorn	Department of Natural Resources
George Kelly	EBX USA
Doug Lashley	GreenVest
Marya Levelev	Department of the Environment
Sean McGuire	Department of Natural Resources
Dominick Murray	Department of Business & Economic Development
Dan Nees	Environmental Finance Center, University of Maryland
Kelly Neff	Department of the Environment
Mary Owens	Critical Area Commission
Susan Payne	Department of Agriculture
John Rhoderick	Department of Agriculture
Dan Rosen	Department of Planning

## APPENDIX B – LIST OF RESOURCES

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During the process of their work and research, ESWG members and staff identified online and published resources regarding ecosystem services.

Maryland Government Ecosystem Services

[www.dnr.state.md.us/es](http://www.dnr.state.md.us/es)

United States Department of Agriculture (USDA) Ecosystem Services

[www.fs.fed.us/ecosystems-services](http://www.fs.fed.us/ecosystems-services)

United States Environmental Protection Agency (EPA) Ecosystem Services Research

[www.epa.gov/ecology/](http://www.epa.gov/ecology/)

Ecosystem Marketplace

[www.ecosystemmarketplace.com/](http://www.ecosystemmarketplace.com/)

Millennium Ecosystem Assessment Reports

[www.maweb.org](http://www.maweb.org)

Report to the President. Sustaining Environmental Capital:

Protecting Society and the Economy

[www.whitehouse.gov/sites/default/files/microsites/ostp/pcast\\_sustaining\\_environmental\\_capital\\_report.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_sustaining_environmental_capital_report.pdf)