



Virginia Citizen's Guide to Environmental Credit Trading Programs: An Overview

Kurt Stephenson, Professor, Agricultural and Applied Economics, Virginia Tech
Sarah Chase-Walsh, Student, Agricultural and Applied Economics, Virginia Tech
Alyssa Lindrose, Student, Animal and Poultry Sciences, Virginia Tech
Julie Worley, Student, Animal and Poultry Sciences, Virginia Tech
John Ignosh, Area Specialist, Biological Systems Engineering, Virginia Tech

Virginia has implemented several regulatory programs to improve environmental quality and protect Virginia's diverse ecosystems. One approach to help achieve Virginia's environmental goals is through the development of environmental credit trading programs. These programs can complement pollution control and environmental protection programs by providing citizens, businesses, and local governments with incentives and additional flexibility in achieving how these requirements are met.

The objective of this publication is to provide an overview of environmental credit trading programs that impact Virginia citizens. For more information, please refer to the additional resources listed at the end of this document.

What Are Environmental Credit Trading Programs?

Virginia citizens use and enjoy the environment in many ways. Virginia's lakes, rivers, and estuaries, for instance, provide us with swimming and boating opportunities, drinking water, commercial and recreational fishing, and places to explore the diversity of nature. While most land managers aspire to be good stewards, citizens also rely on the government to establish laws and regulations to protect these valuable resources and their ability to provide this array of services. To protect water quality, Virginia regulations

Terms to Know

compliance option - A way in which to adhere to the regulations put forth in the law.

credit - The unit of trade used in environmental trading programs, usually a measure of the level of environmental enhancement provided.

credit providers - People or organizations that provide the credits for sale in environmental credit trading programs.

environmental credit trading program - A program created to help regulated parties comply with regulations by buying environmental improvements (credits) achieved at another location.

off-site compliance - Actions taken to comply with regulations at another location away from the environmental impact.

on-site compliance - Actions taken by the regulated party to comply with regulations at the site of the environmental impact.

point sources - Regulated discharger under the Clean Water Act.

regulated party - Person or persons who are required to comply with regulations.

regulator - Government agency that develops, implements, monitors, and enforces the state or federal regulations to achieve environmental goals.

require companies and municipal wastewater treatment plants to limit the amount of pollutants released into state waters. To protect wildlife habitat, reduce flooding, and recharge groundwater, government limits what landowners can do to wetlands. Yet the effects of regulations that limit environmental impact are often not free. Installing pollution control equipment or restricting property can impose costs on the people required to comply with the regulation (called “regulated parties”).

Governments create environmental credit trading programs to provide regulated parties with additional ways to comply with requirements that can potentially reduce their costs. Environmental credit trading programs allow regulated parties to meet some of their requirements by purchasing improvements in environmental quality, quantified as “credits,” from a third party (see fig. 1). A credit is a specific, quantified level of environmental improvement. A credit might be a specific reduction in the amount of pollutant discharged (pounds per year) or an increase in acres of wetland habitat. Generally, the government establishes procedures for how credits should be quantified. Thus, regulated parties have choices about whether they will meet regulatory requirements themselves (on-site compliance) or get help from someone else at another location through buying credits (off-site compliance).

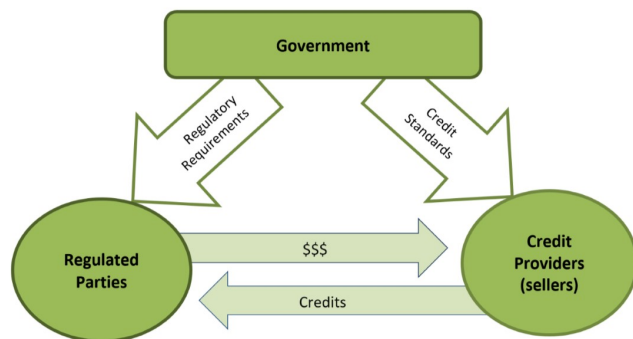


Figure 1. Relationship between regulated parties and credit providers.

In concept, environmental credit trading programs can lower costs without compromising environmental quality. The regulated party can reduce its costs if it is less expensive to buy credits from a third party than it is to achieve the same

result itself. For example, if a wastewater plant finds it costs \$100 per pound to reduce a pollutant with its existing equipment, but it would cost \$60 per pound for a newer plant at another eligible location to make the same reduction, the wastewater operator can buy reductions from the newer plant and save up to \$40 per pound without increasing overall pollutants. Such a system would also financially reward people (e.g., credit seller) for making investments in effective, low-costs ways to improve the environment. This description might make it clear that the environmental credit trading alone does not improve the environment; nor is credit trading a “free market” devoid of government involvement. Environmental goals and regulatory requirements tend to be set by elected officials and public agencies.

Credit trading provides for a way to make environmental protection more affordable to people facing mandatory requirements. Credit trading programs also provide another way to maintain and protect environmental quality in the face of population and economic growth and change because new impacts might be required to be offset by equivalent improvements elsewhere.

In practice, environmental credit trading can take on a variety of forms. Trading programs must find ways to quantify environmental services from different parties in different locations. Trading programs must address potential problems that might arise when trading moves impacts and improvements around the landscape. Many regulatory programs also prefer that regulated parties minimize adverse impacts themselves before being allowed to trade. As the following summary highlights, Virginia’s environmental credit trading programs reflect this diversity.

Environmental Credit Trading Programs Impacting Virginia

Virginia operates at least four major environmental credit trading programs (table 1). Virginia’s credit trading programs provide wetland, stream habitat, and water quality improvements to assist land developers, industrial and municipal wastewater treatment plants, and municipal governments to achieve Virginia’s environmental goals. Virginians can participate in these programs as either buyers (the regulated party) or as credit sellers. In some instances, Virginia citizens can also participate in

national and/or regional credit programs. Links in the Additional Resources section at the end of this document provide current information on trading program activities.

Wetland and Stream Credit Programs

Regulated parties: Land developers (commercial/residential developers, Virginia Department of Transportation), port or river dredging authorities

Wetlands provide a range of services to surrounding landowners and the broader community, including flood protection, water purification, groundwater recharge, and wildlife habitat. To prevent losses of wetland and stream services, federal and state governments require that land developers obtain permits before disturbing a wetland or stream for development (e.g., discharge of fill material into wetland or stream). The goal of the permit program is to achieve no net loss in wetland and stream services from development at the national level.

Regulated parties must meet two requirements. First, parties must demonstrate that no practicable, less-damaging alternative exists to the proposed development. Second, for stream and wetland impacts that cannot be avoided, the regulated parties must undertake actions to minimize the impact. After these conditions are met, regulated parties must replace or compensate for any unavoidable wetland or stream impacts. Developers can purchase wetland

credits to mitigate the remaining impacts from the development activity.

Wetland credit providers produce credits by creating, restoring, enhancing, or preserving wetlands. Government regulatory agencies provide procedures for estimating how much a wetland or stream has been improved. A wetland improvement project is sometimes called a “wetland bank” because wetland improvements are credited to an account and drawn down — “debited” — when credits are sold. These off-site mitigation banks have environmental advantages over small, on-site mitigation because banks tend to be large in area, generally providing better wildlife habitat. Wetland credits are typically denominated in acres of a particular type, and stream credits are quantified in linear feet of restored stream. Once the wetland is created, the wetland credit provider must ensure that the wetland remains protected from future development forever.

Virginia citizens can participate in a wetland/stream credit market in a number of ways. First, land developers have options to buy credits to lower the development costs and reduce the time to obtain a permit. Virginia landowners can participate in this environmental credit trading program by allowing the restoration or creation of wetlands or stream restoration projects on their land. In such cases, landowners will typically work with wetland mitigation experts who have the technical knowledge of how to do mitigation

Table 1. A general description of four environmental trading programs in Virginia.

Regulatory program	Regulated party	Regulatory requirement	On-site options and requirements	Credits
Wetland and stream permits	Developer	No net loss of wetland/ stream function	Avoid and minimize wetlands/ stream losses	Wetland mitigation from third parties that enhance, restore, create, or preserve wetlands (or streams)
Virginia Stormwater Management Program	Developer	Control runoff volume and quantity of phosphorus runoff from a development	Must limit amount of water running off-site. Implement some phosphorus controls (small developments have exceptions)	May buy permanent phosphorus credits
Chesapeake Bay Point Source Nutrient Trading Program	Municipal and industrial wastewater treatment plants in Chesapeake Bay watershed	Existing sources assigned amount of nitrogen and phosphorus that can be discharged (called wasteload allocation)	New sources must meet stringent concentration limits on-site	Existing sources may buy point source credits to meet wasteload allocation; new sources must offset all loads and may buy credits from point sources or nonpoint sources if no point source credits available
Municipal separate storm sewer systems (MS4)	Municipal government in Chesapeake Bay watershed	Limits on the total amount of nitrogen, phosphorus, and sediment that can be discharged	Implement stormwater control practices, tree plantings, and stream restoration projects within MS4 community	Buy credits from sources outside MS4; credits can be from ag best management practices, land conversion, nutrient assimilation

and experience in navigating the process of getting credits approved by regulatory agencies. Wetland credits create an opportunity for landowners to benefit from land that may be less profitable in other uses. To ensure that the wetlands will continue to provide mitigation into the future, a permanent conservation easement or similar form of permanent legal protection affecting future usage and development is required for the wetland mitigation site. Landowners can also receive some tax benefit from placing lands under perpetual easement.

Phosphorus Credits Under the Virginia Stormwater Management Program

Regulated parties: Urban land developers

The commonwealth regulates the quality and quantity of stormwater runoff from urban land development activities under the Virginia Stormwater Management Program (VSMP). The creation of impervious surfaces (e.g., roads, sidewalks, rooftops) increases the quantity of runoff during storms (i.e., stormwater). The additional stormwater runoff can contribute to localized flooding and degraded stream habitat. Stormwater runoff can also increase the amount of pollutants that reach Virginia's streams, lakes, and estuaries.

Under a VSMP permit, urban land developers are required to implement a site-specific stormwater pollution prevention plan. This plan details how to reduce both the amount of runoff and the amount of pollutants (particularly phosphorus) discharged from the development after construction. All developers must implement runoff control practices to prevent localized impacts, such as flooding. Since phosphorus is transported throughout a watershed, dischargers can meet some (up to 25 percent) of their water quality requirements through off-site compliance, including the purchase of phosphorus credits from third-party credit providers. Small developments (generally defined to be less than 5 acres of disturbed land) can buy phosphorus credits to meet all of their water quality requirements. Developers can purchase permanent phosphorus credits from a number of credit providers across the state.

To satisfy VSMP regulatory requirements, phosphorus credit providers must provide long-term reductions in

phosphorus load. To date, phosphorus credit providers typically generate permanent phosphorus reductions by converting land to less nutrient-intensive uses.

As with wetland credits, Virginia citizens can benefit from the stormwater phosphorus credit trading (VSMP) either as buyers of phosphorus compliance credits (developer) or by helping create and then sell phosphorus credits. Virginia landowners can participate in this environmental credit trading program by permanently converting agricultural land (crop, hay, pasture) to forest or by permanently converting cropland to hay, pasture, or open land. Generating phosphorus credits for the VSMP requires permanent land development restrictions on credit-generating lands. Developers can buy phosphorus credits generated within the same watershed as the development. For example, a developer in the James River watershed can only buy phosphorus credits generated in the James River watershed.¹ The number of phosphorus credits generated is increasing sharply. A listing of phosphorus credit projects in Virginia can be found at the Virginia Department of Environmental Quality's nutrient trading website (www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/NonpointCreditRegistry.pdf).

Nutrient Credits for Municipal Separate Storm Sewer Systems

Regulated parties: Selected municipal governments in the Chesapeake Bay watershed

Municipal governments are responsible for managing the urban runoff that occurs during rainstorms. The area that must be managed is called the municipal separate storm sewer system, or simply MS4. All Virginia MS4s must meet certain requirements to manage and treat urban stormwater runoff, and these requirements are spelled out in MS4 permits. In the Chesapeake Bay watershed, those with MS4 permits must also meet additional requirements in order to help achieve specific water quality goals for the bay. Virginia recently placed limits — to be phased in by 2030 — on the total allowable pounds per year of total nitrogen, phosphorus, and sediment released by urban areas managed by MS4s.

¹ Regulations specifically require credits be purchased within the same or adjacent eight-digit hydrologic unit code. HUC is simply a way to subdivide a watershed. For instance, the James River watershed is subdivided into 8 eight-digit HUC subwatersheds. For a map, see <http://dswcapps.dcr.virginia.gov/htdocs/maps/HUExplorer.htm>.

MS4 operators can reduce nutrient and sediment in a number of ways, including implementing stormwater treatment practices, restoring urban streams, street sweeping, or by purchasing nutrient credits from credit providers from within the same river basin. Municipalities can join together with neighboring municipalities to meet total nutrient and sediment requirements of the group.

The commonwealth allows MS4s to purchase nutrient credits from a variety of sources, including point sources and nonpoint sources. Virginia defines nonpoint source credits broadly; they can include certifying credits from nutrient reductions from “agricultural and urban stormwater best management practices, use or management of manures, managed turf, land use conversion, stream or wetlands projects, shellfish aquaculture, algal harvesting, and other established or innovative methods of nutrient control or removal, as appropriate” (Nutrient credit certification, Code of Virginia § 62.1-44.19:20.B.1.b, 2005). Virginia’s Department of Environmental Quality is finalizing new rules that describe how possible implementation of best management practices and nutrient-reducing activities can be counted and recognized as “certified” tradable nutrient credits (proposed regulation 9 VAC 25-900).

At the time of this writing, it remains uncertain how MS4s will comply with new nutrient requirements. However, the wide range of possible crediting options mean that farmers, landowners, and watermen can all potentially be involved in the creation of nutrient credits for MS4s. Managers of MS4s will evaluate nonpoint source compliance options against other alternatives, including stormwater improvements within their community and also the purchase of surplus point source credits.

Point Source Nutrient Trading Program for the Chesapeake Bay

Regulated parties: Municipal and industrial point sources in Chesapeake Bay watershed

In 2005 the Virginia General Assembly passed the Chesapeake Bay Watershed Nutrient Credit Exchange Program (Article 4.02. Chesapeake Bay Watershed Nutrient Credit Exchange Program, Legislative findings and purposes, Code of Virginia § 62.1-44.19:12). The law and subsequent regulations established a system to limit the total amount of nitrogen and phosphorus that can be discharged to the Chesapeake Bay by industrial and municipal wastewater treatment plants, called point sources. Point sources within Virginia’s portion

of the Chesapeake Bay watershed must restrict the total amount of nitrogen and phosphorus (in pounds) released into the Chesapeake Bay each year (called a “waste load allocation” or WLA). Furthermore, the Virginia Department of Environmental Quality might not issue any additional waste load allocations to new point sources.

Many point sources achieve compliance by making technological improvements to their plants (e.g., installing advanced nutrient removal technologies, etc.) that reduce nutrient discharges below their allowable amount (WLA). When this occurs, the point source receives credits for lowering discharge below what is allowed (credits = WLA – discharge).

The Chesapeake Bay Watershed Nutrient Credit Exchange Program provides a way for point source dischargers that find it technologically or financially difficult to reduce nutrients on-site to comply with the new nutrient WLA discharge limits. For example, some point sources might not be able to upgrade their treatment facilities immediately due to financial considerations. In other cases, some dischargers may be located in areas where land is unavailable to expand and upgrade. Virginia’s point source trading program provides these point sources an option to buy credits from other dischargers that have generated credits. Finally, state law addresses population and economic growth by requiring all new point sources to buy credits to offset their discharge, thereby ensuring that overall discharge does not exceed the limits specified for the Chesapeake Bay.

Currently, Virginia point sources buy and sell nutrient credits amongst themselves. Point source facilities that cannot limit discharge below their wasteload allocation can buy credits from other point source facilities that have created surplus reductions. Virginia law also created an association of point source dischargers — the Virginia Nutrient Credit Exchange Association — to help coordinate compliance between member facilities. Since the program’s inception, in the aggregate, point sources have been very successful in reducing nutrient discharge well below their overall allowable limit, generating surplus credits every year. The Virginia nutrient point source program has been one of Virginia’s most successful efforts in reducing nutrients to the Chesapeake Bay.

The program places priority on trades between point sources; however, point sources are allowed, in certain circumstances, to purchase nutrient credits from nonpoint sources. Thus far, point sources have not purchased

credits from nonpoint source projects. Given the large surplus and generally lower cost of point source credits being generated, point sources are unlikely to need nonpoint source credits in the foreseeable future.

Environmental Credit Trading Programs Beyond Virginia

In certain cases, Virginians can also participate as credit providers in other programs beyond the commonwealth's borders. These programs exist outside of Virginia's regulatory authority, the details are subject to the prerogatives of the issuing authority (e.g., a different state, voluntary registry, etc.), and the project eligibility rules are subject to change at any time. For example, one relevant out-of-state environmental credit trading program for which Virginia project developers might be eligible pertains to solar renewable energy certificates. To encourage development of renewable energy sources, some states require electricity suppliers to provide a certain amount of electricity by renewable energy. To help meet this requirement, electric power companies can buy solar renewable energy certificates, which are based on one megawatt hour (Mwh) of solar-generated electricity. While there is no Virginia-based solar renewable energy certificates market, some Virginia-based solar energy projects might be able to market the certificates to out-of-state purchasers. Similarly, a variety of land, waste, and energy management projects based in Virginia might also be able to register greenhouse gas offsets through certain offset registries.

Conclusion

Environmental credit trading programs provide ways to comply with regulatory programs at a lower cost. In particular, wastewater treatment plants and land developers actively use trading to manage the costs of reducing nutrients to Virginia's waterways. However, the amount of revenue these trading programs provide landowners, farmers, and citizens in general for improving the environment has been modest. For more information, please refer to the Additional Resources section.

Additional Resources

Wetland and Stream Permit (404 Permits)

Background information - <https://www.epa.gov/cwa-404/compensatory-mitigation>

Virginia permitting program and mitigation overview - www.deq.virginia.gov/Programs/Water/WetlandsStreams/Mitigation.aspx

Database of wetland and stream banking sites in the United States - https://ribits.usace.army.mil/ribits_apex/f?p=107:2

Point Source General Information

Program information from the Virginia Department of Environmental Quality - www.deq.virginia.gov/Programs/Water/PermittingCompliance/PollutionDischargeElimination/NutrientTrading.aspx

Virginia Nutrient Credit Exchange Association - www.theexchangeassociation.org/

Virginia Stormwater Management Program for Construction Activities

Regulations - www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPPermits/ConstructionGeneralPermit.aspx

Virginia Nonpoint Source Nutrient Credit Registry - www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/NonpointCreditRegistry.pdf

Municipal Separate Storm Sewer System

General information, Chesapeake Bay Total Maximum Daily Load implementation - www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPPermits/MS4Permits/ChesBayTMDLActionPlanInformation.aspx

Nonpoint Source Credit Certification

Existing nonpoint source credit guidelines - www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/VANPSTradingManual_2-5-08.pdf

Credit certification regulations: see Virginia Town Hall website - <http://townhall.virginia.gov/L/ViewStage.cfm?stageid=6556> (under proposed regulation 9 VAC 25-900)