Healthy Livestock, Healthy Streams

Policy Actions To Promote Livestock Stream Exclusion

A REPORT OF THE

CHESAPEAKE BAY COMMISSION

MAY 2015

Chesapeake Bay Commission

Policy for the Bay

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Preface

"Love thy neighbor, and don't pull down your hedge."

— Benjamin Franklin

Farmers have long promoted good stewardship of the land. With fully one quarter of the Chesapeake watershed in agriculture, they are on the front line in promoting sustainable and environmentally friendly land use practices. Restoring and protecting the Chesapeake Bay is impossible without the cooperative stewardship of our farmers.

While there are many examples of farm stewardship and agricultural practices that benefit the Bay, there are still some farming practices that deserve more attention. This report highlights one of the most significant near-term opportunities: keeping livestock out of the streams while protecting the streamside vegetation that works naturally to limit the nutrient and sediment runoff, provide shade and stabilize the banks. Known as "livestock exclusion," this best practice uses fencing and alternative water sources to draw livestock away from the streams. When combined with riparian buffers, these practices can yield powerful, cost-effective and proven results.

The Chesapeake Bay Commission offers this policy report, focused on its member states of Maryland, Pennsylvania and Virginia, in the spirit of continuous improvement and cooperative actions by all stakeholders to protect our Bay.

Introduction

The activist is not the man who says the river is dirty. The activist is the man who cleans up the river.

— Ross Perot

The Chesapeake Bay is considered the crown jewel of the United States' 850 estuaries. It is a vast and complex landscape encompassing more than 100,000 miles of rivers, streams and creeks, nearly 12,000 miles of shoreline, a watershed of just over 41 million acres, 17.8 million residents — and 87,000 farms, most of which are family owned.

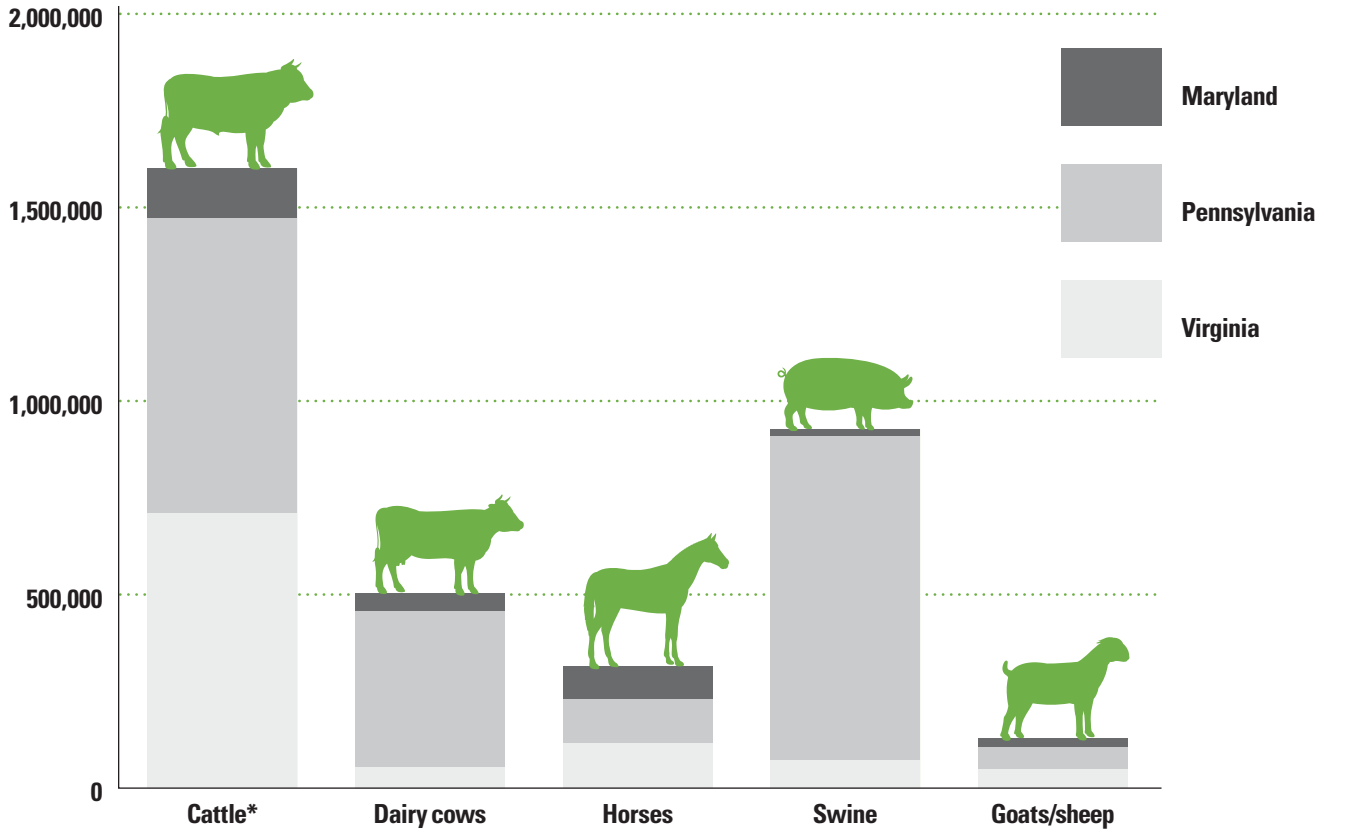
Agriculture is a defining feature across the entire Chesapeake Bay region. As an industry, it is an economic powerhouse in the region, creating millions of jobs, and is tightly woven into the social and cultural fabric of communities from the Shenandoah to the Eastern Shore. The landscape of much of Maryland's, Pennsylvania's and Virginia's watershed is defined by the contours, crop rows and patchwork of farm fields.

Given the nature of agriculture and the impact it has on land use, it is not surprising that the pollutant load from this sector is high. In 2012, the Chesapeake Bay Program estimated that agriculture contributed roughly half of the pollutant load to the Bay: 42 percent of the nitrogen, 58 percent of the phosphorus and 58 percent of the sediment. In recognition of agriculture's impact, the farming community has already implemented conservation practices throughout the watershed to reduce pollution from millions of acres of farmland. Government programs as well as the private sector are constantly in search of ways to improve these practices and provide better incentives to encourage and expand farmer and landowner participation.

For our farmers, keeping livestock out of the streams has been a long-term challenge. Livestock must have ready access to drinking water and in practice this means that livestock often drink from, and loiter in, both large and small tributary waters. When livestock are allowed access, they trample and erode stream bottoms, stream banks and streamside vegetation as they seek water to cool themselves and drink. This increases sediment erosion and nutrient runoff, while increasing water temperature. The direct deposit of feces and urine also

Livestock in the Chesapeake Bay Watershed

LIVESTOCK HEADCOUNTS FROM 2012 USDA CENSUS OF AGRICULTURE



*INCLUDES BEEF CATTLE, CALVES, DRY DAIRY COWS, STEERS AND BULLS.

contributes to nutrient pollution and high bacteria counts in the waterways.

In the Bay watershed states of Maryland, Pennsylvania and Virginia, there are over 3.5 million hoofed animals — livestock including dairy and beef cattle, horses, pigs, sheep and goats. Most of the livestock are grazed on the more than 2.4 million acres of pasture while some are kept in confined feeding operations. Either way, they are often located near streams.

The net result is significant damage to hundreds of miles of streams and stream banks. Despite the upland location of many smaller streams, the aggregated impact from livestock on all of these streams has been documented as a major source of nutrients, sediment and bacteria to the Bay.

The states of Maryland, Pennsylvania and Virginia have each made commitments to help farmers implement livestock exclusion practices and establish riparian vegetative buffers to improve water quality and meet Bay water quality goals. But practices are mostly voluntary, widely varied, and achieve mixed results. While some livestock producers have installed fencing to keep their stock from getting near or in the streams, many of their neighbors have not.

This report investigates why so many streams are still accessible to and impacted by livestock. It examines how fencing and other exclusion practices can improve water quality, promote livestock health, and provide other producer benefits. The report analyzes why more producers do not participate in stream fencing or riparian protection programs and examines the actions or changes in policy that can be taken to help farmers get all livestock out of the streams.

In summary, this report identifies policy issues that must be addressed and actions that should be taken to advance efforts to keep livestock from our streams.

Framing the Issue

There is nothing in the stream that is good for your cows, and there's nothing your cows do to the stream that's good for the stream.

— Frank Lucas, NRCS Pennsylvania

For the Chesapeake Bay to be truly healthy, all of the rivers, creeks and streams that define it must also be healthy. This means they must no longer receive tons of excess pollution, must support abundant, native living resources, and must not be harmful to human health. To tackle these complex problems, the Bay states and the federal government established a "Bay pollution diet" — called the Chesapeake Bay Total Maximum Daily Load (TMDL) — that sets pollution limits for every tributary river and its streams.

To achieve these limits, the TMDL sets loading caps on the amount of nitrogen, phosphorus and sediment that may enter the Bay and each of its many tributaries. Maryland, Pennsylvania and Virginia have identified livestock exclusion as a critical and cost-effective strategy to help achieve these pollution caps.

In addition to the Bay-wide TMDL, there are thousands of more localized TMDLs focused on smaller waterways. Virginia, for example, has 280 bacterial TMDLs on streams in areas with significant livestock, 83 percent of which call for reductions in loadings due to cattle. Yet despite this recognition, livestock exclusion in

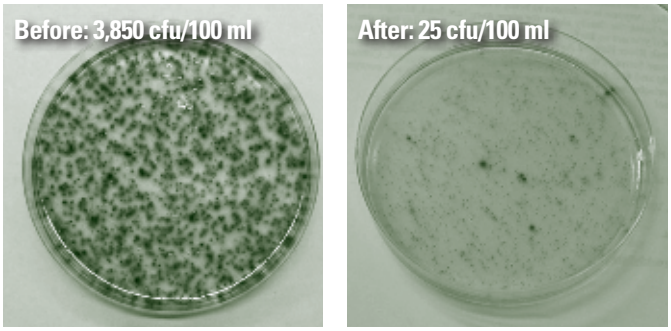


PHOTO: BOBBY WHITESCARVER

If a stream exceeds 235 colony-forming units (cfu) per 100 milliliters of water, the stream is considered unsafe for humans. Photos above show dramatic result of farmers getting together to practice stream exclusion on Pogue Run in Augusta County, Va.

these areas remains insufficient, rarely occurring at the levels needed to remediate the problem.

The paybacks of livestock exclusion reach far beyond achieving these TMDL pollution caps. Livestock exclusion practices provide extensive benefits to livestock wellbeing, wildlife health, the integrity of farmland adjacent to the streams, and community welfare.

An important long-term goal across the entire watershed is to ultimately exclude — through the cooperative efforts of government and the agricultural community — all livestock from the Bay's waterways.

TO BEGIN: WHAT IS "LIVESTOCK EXCLUSION"?

Livestock exclusion is one example of an agricultural "best management practice" (BMP). A BMP is an on-the-ground practice or plan designed to achieve significant improvements in water quality. Typical agricultural BMPs include animal waste storage, soil erosion control, forest buffers, nutrient and sediment filtration and retention, nutrient management planning, conservation tillage and winter cover crops.

Livestock exclusion incorporates a suite of BMPs designed to keep livestock out of streams and wetlands via fencing, alternative water sources, vegetative buffers or a variety of techniques. The most commonly practiced approach to exclusion involves the installation of fences set back from the stream bank in order to create riparian buffers. These riparian buffers are often vegetated for optimal effect. Alternative drinking water sources, such as strategically located troughs in the pasture, accompany the fencing and buffers so that livestock migrate away from the stream in favor of cleaner, cooler water.

The design of these off-stream watering sites is critical; improper design can result in concentrating nutrients and sediments and increasing loads delivered to local waterways. Proper hardening of the ground around the watering location as well as proper drainage is essential to preventing the creation of a manure-laden mud hole. Equally essential is regular collection of the accumulated manure. Finally, maintenance of the downslope pastures ensures their continued function as a buffer, capturing any polluted runoff flowing downhill toward the stream.

CHESAPEAKE BAY FUNDERS NETWORK

Farmers and policy makers are learning that successful livestock exclusion is critical to achieve water quality standards and restore native fish populations in local stream.

CORY GUILLIAMS, USDA NATURAL RESOURCES CONSERVATION SERVICE

Alternative watering systems are necessary when livestock are excluded from streams and can be strategically placed to improve overall pasture use.

WHAT ARE THE BENEFITS OF LIVESTOCK EXCLUSION?

Livestock exclusion offers a win-win opportunity for producers, for those who swim and fish in local streams, for safe drinking water and the Bay's ecosystem.

BENEFIT 1 Stable Stream Banks, Better Water Quality

At hundreds of pounds, a cow or horse can trample vegetation and destabilize a stream bank as it walks down the bank to enter the stream to drink. The damage can be severe. Grazing only further exacerbates the damage, denuding the streamside vegetation. At the same time, the livestock often deposit urine and feces in and near the water, directly discharging nitrogen and phosphorous while elevating bacteria levels.

Keeping livestock out of a stream protects the stream banks and maintains a vegetative filter to trap sediment and other nutrients that would otherwise flow into the stream during rains and snow melt. Healthy stream banks and their buffers ensure the integrity of the vegetation, providing needed shade, cooling the water, and supplying leaf litter to fish and the organisms of the food chain that support them.

Proper exclusion can yield positive results. With fencing and alternative water sources installed, a Virginia study found reductions of stream bank erosion of 77 percent and phosphorous by 81 percent.

BENEFIT 2 Healthy Streams, Healthy Animals

In a livestock operation, the health and productivity of livestock is a top priority. Producers who have installed fences along streams report improved herd health, decreased incidences of sores in cattle, and decreased leg injuries. There is also an increase in calf survival. Providing alternative watering systems away from the streams also contributes to reduced cases of foot rot, bacterial inflammation, jaundice, fever, red nose, bovine virus diarrhea, tuberculosis and mastitis.

Mastitis is considered one of the most expensive diseases in the dairy industry. The effect on a cow ranges from mild irritation to affecting the cow's ability to produce milk, or even leading to death in severe cases. Mastitis can severely affect a producer's income, raising veterinary bills while triggering a drop in the immediate volume of milk produced, a decrease in the market value of the milk, and more long-term reductions in milk production overall. Monetary stakes are high: In 1996 the National Mastitis Council estimated annual losses due to mastitis to be $18,440 for a herd of 100 cows.

Good for Animal Health

A veterinarian's view

The importance of livestock exclusion reaches well beyond dairy cows and beef cattle. In fact, in Maryland and Virginia horses outnumber dairy cows. Yet horse operations often are ineligible for or unaware of agricultural conservation programs. Pennsylvania veterinarian Dr. Helen Aceto makes sure that livestock owners are aware of the benefits of excluding livestock from their streams.

It all starts with the water, says Dr. Helen Aceto, director of biosecurity for the New Bolton Center, the large animal hospital at the University of Pennsylvania School of Veterinary Medicine.

"One of the first things I always do when I am visiting a herd is to look in their water supply. Even if you have an on-farm source of water, you have to maintain it and keep it nice and clean."

As an epidemiologist, Dr. Aceto has been on the front lines of investigating infectious diseases in dairy cows and other large farm animals for over a decade.

Given a choice, says Aceto, cattle like to stand in streams, where contagious conditions, like "strawberries" (Hairy Heel Wart), can pass between cows and herds — or cattle are susceptible to foot rot. Unstable footing in stream channels and banks result in cuts and bruises to cows' hoofs and legs.

The resulting lameness in cattle can have all kinds of effects. "Their reproduction is compromised. And production won't be as good because they don't like to stand and eat for very long," Aceto says.

Another reason for keeping cows out of streams, says Aceto, is the bacteria leptospirosis, which is carried by rodents and feral swine that may frequent the same streams. Infections from these bacteria can lead to mastitis, inflammation of the mammary gland and udder tissue, compromising production and animal health.

And there are implications for human health. "When you have cows that are shedding [through feces] salmonella in pastures with access to streams, the pathogens can travel from cow to cow — and downstream to other herds." Salmonella can also pass to humans. "If a herd is shedding salmonella — even if you have very good teat preparation — there's still going to be organisms that end up in the bulk tank."

BENEFIT 3 Good Water, Good Productivity

Healthy livestock require a convenient and consistent water source. Livestock will also drink more when the water is cool and clean. Thus, producers often pair exclusion fencing with strategically dispersed watering systems located away from the stream. Mineral licks and shade are often used to lure livestock away as well.

The results can be dramatic. One study showed that cattle drank from an off-stream water trough 92 percent of the time compared to time spent drinking from the stream. Other studies have shown significant increases in water consumption as a result. For dairies, this can mean increasing weight gain in the cows, and an increase in production, and butterfat content in the milk. For beef cattle, this can mean a gain of up to 25 additional pounds, or a 5 percent increase in weight, which translates to real money when an animal goes to market to be sold.

LANCASTER COUNTY CONSERVATION DISTRICT

Cows and horses inevitably cause destabilization of streamside habitat. In large numbers, they can cause severe damage.

LANCASTER COUNTY CONSERVATION DISTRICT, MATTHEW W. KOFROTH

By coupling stream fencing with hardened crossings, the waterway is protected and livestock have safe access to pastures.

WHY ARE SOME PRODUCERS HESITANT TO KEEP LIVESTOCK OUT OF STREAMS?

Regardless of the benefits, some farmers remain reluctant to exclude their livestock. Their reasons range from simply not being aware of the available assistance to far more complex, often personal, reasons. The reasons include the following:

REASON 1 Financial Burden

Government incentive programs typically require financial contribution from the producer. A farmer's ability to invest may be limited — competing investment needs and financial or health setbacks are commonly cited. Farmers operate on a very tight financial margin and do not always have the funds to act upon a good idea.

REASON 2 Absentee Landlords, Tenant Farmers

As much as 80 percent of the farmland in some areas of the Bay watershed is rented. Tenant farmers are often reluctant to invest in exclusionary structures on land they rent with a handshake or yearly lease. Government programs require the permission of the landowner who may be absentee, unwilling or uninformed about conservation practices and how they might increase the value of their land.

REASON 3 Don't Take Government Funds

Some farmers do not take government funding. These include the Plain Sect communities (Amish and Mennonite) in significant agricultural areas such as Lancaster, Pennsylvania, the Shenandoah Valley of Virginia, and northwestern Maryland. Some of these

Good for the Farm

A dairy farmer's view

ASHLEY SPOTTS

On Evergreen-Valley Farm, the cows have always been fenced out of the stream, but farmer Matt Espenshade was tired of fixing fence. So in 2013, he decided to couple more durable fence with native trees and shrubs, creating a 70-foot wide riparian buffer.

"We've been fencing the cows out of the stream for as long as I know," said Matt Espenshade, dairy farmer from Elizabethtown, Pennsylvania. But the electric fencing was prone to damage from the cows and required frequent and time-consuming repairs. And because the fence was always breaking, he couldn't use his pastures to full potential for his 80-head herd.

So in 2013, Espenshade took advantage of federal and state cost-share funding to install 3-wire stream exclusion fencing and livestock crossings. With the trees planted, he's now got a 3½-acre "wildlife sanctuary" on Evergreen-Valley Farm.

And clean water.

"I was really surprised at how fast the creek healed itself, how the natural vegetation came back," Espenshade said. "And, how clean the water is now."

Benefits to farming operations were immediate, too. The quality of the pasture is better, Espenshade said. "Overall, our cows are cleaner, and it takes less work to prepare them for milking." Since the new fencing, the herd has been healthier, and there's less mastitis.

Others have noticed the difference, too. "My veterinarian has commented on how much better the farm just looks."

With the stream buffer protected, Espenshade is thinking about other projects — and about his two sons, who are growing up on the farm. "We're looking at stocking the stream with fish. We want to see pheasant come back, maybe introduce bobwhite quail."

"I grew up seeing washed out gullies on the farm," said Espenshade, a seventh generation farmer. But the best management practices — including stream exclusion fencing — are healing the land now and for future generations.

farmers will accept tax credits or assistance from non-government organizations that run programs supported by government funds, while others due to past experience or beliefs are reluctant to trust government.

REASON 4 It's a Tradition

Land with streams has been historically valued highly because it provides livestock with ready access to water. Cows watering in streams is simply a traditional farming practice.

REASON 5 Not Enough Help

Funding for state and federal conservation planning assistance has remained basically flat or has declined while funding for exclusion programs has grown over the past decade. The need to make direct, targeted contact with farmers to build a working relationship founded on trust is a basic element of livestock exclusion implementation. Typical field assistance, once the farmer's interest is captured, may require three to five visits to the farm site to assess resources, survey, engineer, install and inspect practices. Inadequate funding has limited the number of technical providers who can make multiple visits to a farm.

REASON 6 Too Many Confusing Options

The array of state and federal incentives, their prescribed standards, and farmer eligibility — not to mention the qualification process itself — can all be overwhelming and time-consuming. Communications and marketing also vary in effectiveness. A quick review of programs in Virginia, for example, found over 15 variations on the practice of stream exclusion. These variations contain various widths, alternative watering systems, and fence type. Pennsylvania and Maryland similarly have multiple options.

REASON 7 Not Enough Flexibility

Contracts requiring on-going maintenance with limited funding support can last for 10 to 15 years. Some cost-share programs require the fence to be placed 35 to 180 feet from the stream bank with planted buffers; these significant width requirements are not always possible. Farm topography, layout or just available pasture may not always allow for these kinds of fence setbacks.

REASON 8 Over Engineering and Unnecessary Requirements

Some farmers have strong engineering and construction skills and are proud of their problem-solving abilities. Many — not all — are very familiar with the operation of heavy land moving equipment and building techniques. To them, the strict engineering standards that come with government funding for livestock exclusion fencing and stream crossings are "overkill" and viewed as a "waste of money." After fencing, for example, a farmer may want to allow for natural succession, instead of having to plant trees that have a poor survival rate as is required with some government practices.

REASON 9 All or Nothing

Because simple exclusion techniques may not meet government program specifications, thereby precluding regulatory credit or receipt of cost-share dollars, farmers receive little encouragement to implement these simple techniques. The perception is that voluntary efforts are under-valued.

REASON 10 Do Not Trust Government

Farmers are very independently minded people. Some farmers do not want the government's "nose in their business." They need to see that these practices are working, hear from their peers that livestock exclusion has improved the farmer's bottom line, and understand that their participation will not compromise the integrity of the farm operation or their privacy.

CURRENT FEDERAL AND STATE PROGRAMS

The federal government and the states of Maryland, Pennsylvania and Virginia all have programs to help farmers exclude livestock from streams, along with complementary programs to encourage the establishment of riparian buffers. The work is supported by the Conservation Districts and conservation nonprofits from across the watershed. Together, they provide outreach, education and technical assistance targeting both stream fencing and riparian buffers. These programs have grown

Good for the Fish

An aquatic ecologist's view

Dr. Greg Garman and his crew at Virginia Commonwealth University often see significant improvements in fish and macroinvertebrate communities when streams are fenced and riparian buffers are protected.

"Speaking as an aquatic ecologist, there's no better thing we can do for our streams than fence livestock out of them," says Dr. Greg Garman of Virginia Commonwealth University, who has walked, fished, and sampled Virginia streams for over 30 years.

When livestock are allowed unlimited access to streams, stream banks lose their vegetation including any trees that shade the water. Trampled by livestock, the banks constantly erode, sending silt into the water. Some of the silt is deposited on the bottom, some stays in the water column. In both cases, says Garman, it's not good for the organisms that live in the stream.

"It clogs the gills of everything from the aquatic insects at the bottom of the food chain to larger organisms, like fish," says Garman, making it hard for them to extract oxygen. And the sunfishes and basses that need clear water to see their prey can't survive. "You still may have a good number of fish, but they won't be the kind that you'll want to fish for recreationally."

Without trees to shade the stream, the water is warmer. And when livestock defecate or urinate directly into the stream, the excess nutrients stimulate the growth of algae. All these effects add up, says Garman. "You have altered that stream physically and chemically in some very profound ways."

But when the cattle are fenced out, says Garman "you can see water clarity improve literally within 24 hours." In a decade, streams can be rehabilitated just from excluding the livestock.

"This is a tactic that we know works," Garman says. "I think everybody who does stream assessment work agrees that livestock exclusion is the one thing we know we can do that will make this kind of a positive difference for local streams and for the Bay."

organically over the last 20 years, reflecting significant differences in definition, practice criteria, financial support and mandates.

Federal

Federal regulations cover only very large livestock farms. For example, a farmer raising more than 700 mature dairy cows or 1,000 feeder cattle in a confined space with a discharge into a local waterway must obtain a federal Clean Water Act permit. USDA cost-share and incentive programs, however, are available to farms of any size.

EPA's Regulatory Programs

Farms regulated under the Clean Water Act fall under the U.S. Environmental Protection Agency's (EPA) Concentrated Animal Feeding Operations (CAFO) program. A farmer operating a CAFO must obtain a Clean Water Act permit; the permit provisions include a requirement excluding confined livestock from nearby streams and other surface waters. This includes livestock confined in feedlots and barnyards; it does not include pastured livestock. The exclusion system, along with any associated buffers, must not only exclude the livestock from direct contact with the water but must also prevent the manure from reaching it. While EPA does not require fencing or buffers, the exclusion system must achieve this goal.

USDA's Incentive Programs

Two programs administered by the U.S. Department of Agriculture (USDA) — the Conservation Reserve Enhancement Program (CREP) and the Environmental Quality Incentives Program (EQIP) — are the most critical to farmers who want to exclude livestock from their streams. These programs provide the backbone of federal funding available to farmers in our three states.

The gold standard for environmental protection and the most generous financial assistance comes from CREP. It is a funding program offered in partnership with states interested in pursuing environmental protection on farms. State contributions "enhance" the federal program by increasing the level of incentives. CREP mandates fence setbacks (35–100 feet) from streams, determines allowable fence types, requires 10- to 15-year contracts, prescribes the planting of native plants or trees in the buffer area, and applies to lands that are marginal or highly erodible. The Farm Service Agency (FSA) administers CREP and the Natural

DAN McGARVEY

Riparian buffers are the ultimate green filter, stabilizing the stream banks and reducing pollution that enters the stream through rain runoff and groundwater. Excluding livestock makes buffer restoration possible.

Good for the Pocketbook

A cattleman's view

Bellevue Farm in Swoope, Virginia, is a cattle farm in the headwaters of the Shenandoah River. "We are right at the foot of the mountain, with two streams that merge into one about halfway into the farm," said Charlie Drumheller. "But our streams quit flowing during the drought in 2002, and we had to haul water to the cattle."

"I knew then the best thing for this farm long term would be to put in some waterers and fence out the streams."

So Drumheller enrolled his farm in two cost-share programs* that helped with fencing the cattle out of the streams. "The fencing along with rotational grazing," Drumheller said, "has surely been a cost benefit from the point of production, and very good on the cattle as well."

And there have been other benefits. "Getting the cattle into the barn for spraying and tagging got a whole lot easier," Drumheller said. Before fencing his herd out of the stream, he'd have to "go to church twice on Sunday" to make up for all the cussing it took to get his cattle rounded up and into the barn.

Drumheller has an animal science degree from Virginia Tech and worked in Kroger's meat quality assurance program before starting to develop his Red Angus herd. Bellevue now has 40 cow-calf pairs and offers custom grazing for neighboring cattle producers.

Drumheller thinks the cattle are healthier. "I don't have many vet bills. I have very little scours in the calves," referring to the diarrhea caused by waterborne organisms that causes more financial loss to cow-calf producers than any other disease-related problem.

And he no longer worries about droughts. "We're in the middle of one right now, and I know they've got water, and that they've got clean water."

*Conservation Reserve Enhancement Program (CREP) and Environmental Quality Incentives Program (EQIP)

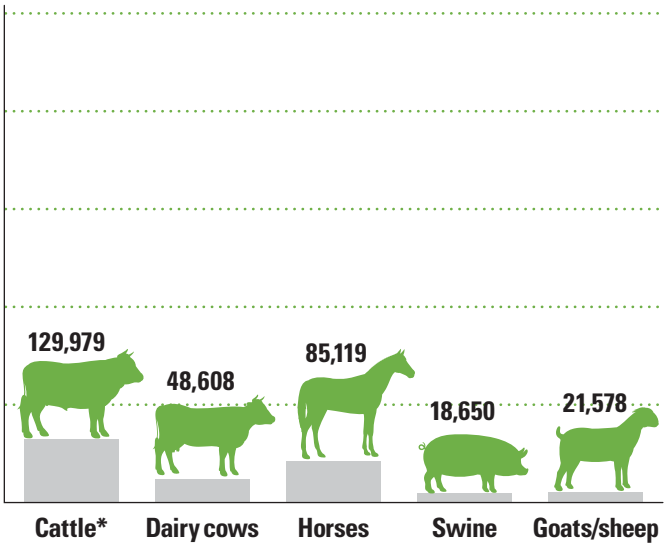
Resources Conservation Service (NRCS) provides the complementary technical assistance necessary for implementation. Maryland, Pennsylvania and Virginia all participate in CREP.

CREP is favored by many farmers because of its generous financial support package: a minimum cost share of 50 percent, plus per-acre land rental payments and a one-time signing incentive payment. The state supplemental funding can bring the total close to or even more than 100 percent of the installation costs. But the bar is set high: the practices are weighted based on their value to wildlife habitat, water quality, erosion control and benefits to the farm beyond the contract period.

EQIP is a second federal program that supports stream exclusion. It is also voluntary. NRCS provides farmers with cost-share and technical assistance to implement livestock stream exclusion. Funding is available for up to 75 percent of installation costs and can be combined with available state funding. In special cases, NRCS is able to adjust the practice requirements when an innovative approach is determined to be preferable. In both Virginia and Maryland, NRCS has provided more flexible fence setback options to reflect the particular needs of each state.

Livestock in the Watershed: Maryland

LIVESTOCK HEADCOUNTS FROM 2012 USDA CENSUS OF AGRICULTURE



*INCLUDES BEEF CATTLE, CALVES, DRY DAIRY COWS, STEERS AND BULLS.

MARYLAND

Each state also has specific programs focused on livestock exclusion; some are mandatory and some are voluntary. Maryland has the least number of hooved livestock of the three states, but the highest percentage of horses, which represent nearly one third of the total livestock.

Maryland's Regulatory Framework

Maryland's Agricultural Nutrient Management Program, as of January 2014, mandates livestock stream exclusion for farmers who earn at least $2,500 annually from farm sales or have eight or more cows (or the equivalent in other types of livestock). While livestock must be kept at least 10 feet away from streams, fencing is not explicitly required to achieve the exclusion. Watering facilities, stream crossings, pasture management techniques, or vegetative exclusion are all permissible practices as long as the local Soil Conservation District determines that these practices will keep the livestock out of the streams.

Some doubt the effectiveness of these alternative practices as there is still no physical barrier to prevent the animals from reaching the stream. The Department of Agriculture does have the authority to require fencing if alternative approaches are unsuccessful.

In addition, while Maryland's Critical Area Act does not require exclusion fencing, it does require protections for stream banks and shorelines. This may or may not compel a producer to install fencing. Agricultural activities, like grazing, are allowed in the Critical Area buffer if a minimum 25-foot vegetated filter strip with trees and dense ground cover or a thick sod of grass is established. In addition, the law precludes livestock disturbance of stream banks and tidal shorelines, and requires feeding and watering to occur at least 50-feet away from the mean high water line.

To encourage fencing as a choice, the Maryland NRCS has begun allowing flexible fencing options in flood prone areas. Cost-share for temporary fencing is available for fences that can be moved, based on water conditions, to allow the farmer time to determine the best location before making the fence permanent.

Maryland's Incentive Programs

Maryland's incentive programs focus primarily on cost-share, loan and grant programs. Tax incentives do not play a significant role.

Good for the Community

A water quality specialist's view

NILES PRIMROSE

Wildflowers abound in Ben's Branch, a creek in Frederick County, Maryland, just one year after cattle were fenced out. Numerous saplings, protected by photo-degradable plastic sheaths, will one day grow into a forested riparian habitat.

There are thousands of miles of creeks and streams all across the watershed impaired due to livestock pollution. In Maryland, Pennsylvania, and Virginia there are multiple cases where installing stream exclusion fencing (along with other agricultural BMPs) has improved water quality — sometimes to the point where the streams once again meet state water quality standards.

Louise Lawrence, Maryland Department of Agriculture's Chief of the Office of Resource Conservation, makes it clear. "If you directly deposit nutrient dense materials — cow manure — into streams, you will have direct water quality impacts."

Most of the streams in agricultural settings can benefit, says Ken Shanks, an environmental program manager with MDA. "In the end, we have to deal with domestic animal sources, and fencing is pretty much the best way to do it."

In 2006, farmers on Ben's Branch in Frederick County, Maryland, installed 8,000 feet of stream fencing, improved stream-crossing areas, and provided alternate water systems for cattle. In only one year, phosphorous levels were reduced by an order of magnitude — from a high of 0.2 mg/L in 2006 to a low of 0.025 mg/L in 2007 — and the streambed composition changed from mud and sand to gravel, providing habitat for nesting fish.

When 4,000 cattle were fenced out of the Willis River, 34 miles of river were removed from Virginia's impaired waters list, says Charlie Lunsford, TMDL Coordinator for Virginia Department of Environmental Quality. Lunsford says that excluding livestock from streams is good for livestock and good for the farmer.

In some cases, Lunsford says, there's a lag time — as much as five or even 10 years — to see lasting results. "That's because implementation doesn't happen all at once. But everything follows from that." Better watering systems, better pasture management, better grazing.

The Maryland Agricultural Water Quality Cost-Share Program (MACS) offers farmers funding to cover up to 87.5 percent of an exclusion practice. Producers can receive up to $50,000 per project and up to $150,000 per farm. In recent years, MACS has provided increased financial assistance for fencing and decreased assistance for other exclusion practices.

Maryland was the first state in the nation to participate in CREP, setting a goal of 100,000 enrolled acres. The program offers a $250/acre sign-up bonus plus a one-time incentive payment worth 40 percent of the installation price. As a result, some farmers have received as much as 127 percent of the installation costs. The program peaked in 2008 with 74,500 acres enrolled. Since then, enrollment has fallen by 11 percent, reflecting, perhaps, increased development opportunities, improved commodity pricing and less willingness to commit to the contractual obligations of the program.

The Chesapeake and Atlantic Coastal Bays Trust Fund also provides dollars each year to support MACS and other pollution control projects. In 2013, in response to new livestock exclusion regulatory requirements, the Fund began to provide dollars for fencing; in 2014, it awarded $4,300 for exclusion fencing and $188,636 for non-fencing exclusion. This is but a small portion of the Fund's $6 million-plus cost-share dollars — the opportunity exists for far more farmers to receive support for livestock stream exclusion.

Finally, Maryland's Low Interest Loans for Agricultural Conservation (LILAC) program helps farmers meet "out-of-pocket" costs with low-interest loans.

Overall, Maryland provides substantial opportunities and financial support for livestock exclusion.

Maryland's TMDL Implementation

Under its Chesapeake Bay TMDL implementation plan, Maryland has identified livestock exclusion as the method for achieving 2 percent of the nitrogen, 18 percent of the phosphorus, and 9 percent of the sediment reductions required of the agricultural sector. Maryland's new livestock stream exclusion regulations will help the state meet its goal. The goals are less than what is possible; the availability of additional pasture acreage provide opportunity for still further reductions.

In its TMDL implementation plan, Maryland set a goal to achieve an additional 8,015 acres of "Off Stream Watering *Without* Fencing" by 2025, yet the target for "Stream Access Control *With* Fencing" is only 2,027 new acres. Right now, Maryland is on track to achieve both goals. But this may represent a lost opportunity.

Off Stream Watering Without Fencing (the larger of the two goals) does not require exclusion fencing and earns just 8 percent reduction in phosphorus levels counted toward the TMDL; the same practice with fencing achieves five times as much reduction, at 30–45 percent. Yet Off Stream Watering Without Fencing still requires the same high levels of technical assistance and cost share. Greater reliance on fencing would provide significantly greater reductions toward Maryland's TMDL goal.

Maryland's requirements for livestock stream exclusion are relatively new, effective as of just last year. The state is committed to monitoring compliance to ensure that livestock are kept out of Maryland waterways. If compliance proves inadequate, the state may require fencing in the future.

PENNSYLVANIA

The Susquehanna River delivers nearly 50 percent of the freshwater flowing into the Chesapeake Bay, primarily from and through agricultural and forested land. With over 2.1 million head of livestock raised in Pennsylvania's watershed, the state is a critical one in which to address stream exclusion issues.

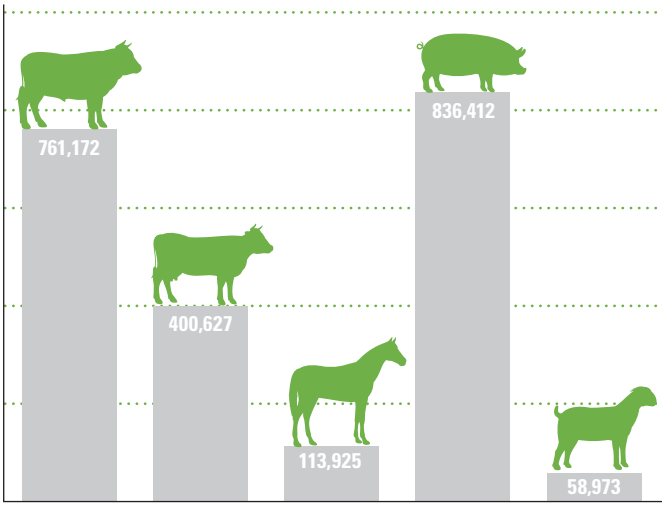
Pennsylvania's Regulatory Framework

Pennsylvania adopted its Clean Streams Law in 1937, pre-dating the Clean Water Act by almost four decades. The Clean Streams Law focuses on water quality protection and improvements. The law includes an explicit provision, adopted in 1980, that *forbids* the Commonwealth or a local government from requiring a farmer or landowner to erect fences in pastures and fields to keep livestock out of streams. While outdated in thinking, the provision remains on the books to this day despite revisions to the law.

While Pennsylvania's Manure Management Manual cannot address pastures and fields, the Commonwealth did update it in 2011 to address livestock exclusion in barnyards, feedlots and confinement areas. In these "animal concentration areas" the farmer can only allow livestock access to surface waters through the use of

Livestock in the Watershed: Pennsylvania

LIVESTOCK HEADCOUNTS FROM 2012 USDA CENSUS OF AGRICULTURE



*INCLUDES BEEF CATTLE, CALVES, DRY DAIRY COWS, STEERS AND BULLS.

livestock crossings. In 2014, Pennsylvania expanded its outreach efforts to promote these requirements.

Pennsylvania does require nutrient management plans for any farm classified as a "Concentrated Animal Operation" (CAO) or "Concentrated Animal Feeding Operation" (CAFO), based on animal density or animal numbers, respectively. The nutrient management plan elements do not require stream exclusion fencing.

Pennsylvania's Incentive Programs

Despite the statutory prohibition against mandated fenced livestock exclusion, Pennsylvania began a voluntary statewide exclusion fencing program in 1994. Financial incentives for this effort have come through CREP, complemented by Pennsylvania's Growing Greener, EPA Chesapeake Bay Implementation Grant funds, EQIP, state tax incentives, and non-profit funding.

Pennsylvania has one of the largest CREP programs in the United States and the bulk of its farmer participation occurs in the Chesapeake Bay watershed. With a target of 220,000 acres enrolled — currently at 138,000 acres — CREP supports two conservation practices that address livestock exclusion: Marginal Pastureland Wildlife Habitat and Riparian Forest Buffers.

"Marginal Pastureland Wildlife Habitat" is a practice designed to allow vegetated riparian buffers to naturally reestablish and attract wildlife and insects. A producer receives 50 percent cost-share for installing the BMP, along with annual rental and maintenance payments, and even a bonus sign-up incentive payment. The state provides an additional 50 percent cost-share when the producer establishes a minimum 35-foot riparian buffer and installs fencing adjacent to the stream.

To receive cost-share for the "Riparian Forest Buffer" a farmer must establish forested buffers along the streams; the program does not require, however, fencing the buffer border from livestock access absent a state determination that fencing is necessary on the specific site. The state provides an additional 50 percent cost-share when the landowner establishes a minimum 50-foot riparian forest buffer and agrees to buffer all the streams on the enrolled tract, along with any adjacent parcels. The participant must agree to maintain the vegetation after planting along with protecting any of the existing buffers on site for the life of the contract.

Pennsylvania also has a strong tax credit program called the Resource Enhancement and Protection Program (REAP). By installing exclusion fencing with other BMPs, participants can receive tax credits for 50 to 75 percent of eligible costs, capped at $150,000 per farm. For the 50 percent tax credit, a project must include at least 35-foot riparian buffers with exclusion fencing. For those who operate animal concentration areas and provide a 50-foot forested riparian buffer with exclusion fencing, 75 percent cost-share is available. Because producers often owe little, if anything, in state taxes, a producer can sell the tax credit or use it for up to 15 years.

Pennsylvania's TMDL Implementation

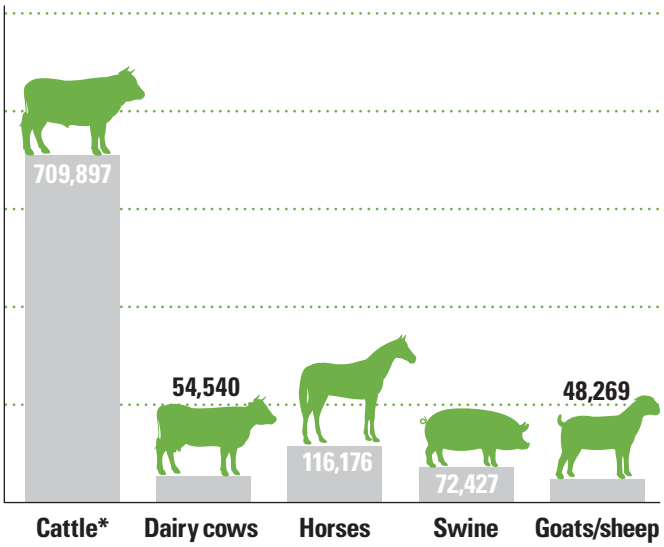
Pennsylvania's plan to achieve the Chesapeake Bay TMDL depends on reducing all nutrient and sediment loads coming from the agriculture sector by 75 percent. Livestock exclusion is slated to achieve 3 percent of the nitrogen, 14 percent of the phosphorus, and 20 percent of the sediment reductions needed. Currently, Pennsylvania is on track to meet both its livestock exclusion fencing and riparian buffer commitments.

Despite being on track, there may be far more to gain. Pennsylvania has targeted five times the acreage for "Off Stream Watering without Fencing" than for "Stream Protection with Fencing, despite the fact that fencing reduces 4 to 5 times more phosphorus and sediment than alternative practices. It makes sense to promote fencing, particularly given its added benefits to stream health and livestock productivity.

Eliminating the outdated legislative prohibition for excluding livestock from streams in pastures would also help, sending a strong message to farmers that every tool is available for those who want to promote livestock exclusion. Finally, it would allow changes to other state laws, regulations and incentive programs that could more directly support exclusion of livestock from state waters.

Livestock in the Watershed: Virginia

LIVESTOCK HEADCOUNTS FROM 2012 USDA CENSUS OF AGRICULTURE



*INCLUDES BEEF CATTLE, CALVES, DRY DAIRY COWS, STEERS AND BULLS.

VIRGINIA

Given its large number of livestock, widespread adoption of livestock exclusion practices is critical for Virginia to achieve its commitments to restore and protect the Chesapeake Bay. Of the more than one million livestock in the Commonwealth's Chesapeake Bay watershed, over three quarters are dairy cows, beef and other cattle. Virginia also has the greatest number of horses of any of the three states.

Virginia's Regulatory Framework

Livestock exclusion requirements are narrowly applied to large livestock operations with over 300 beef cattle or 200 dairy cows that handle liquid manure. The requirements prohibit direct stream access in heavy-use areas. However, livestock in pastures are not required to be excluded from streams. Virginia allows the use of state funding to help producers install fencing when the practice is required.

The "Agricultural Stewardship Act" supplements these regulatory requirements by providing a complaint-driven process for addressing other on-farm water quality problems. The law covers numerous agricultural activities that involve nutrients, sediment, and toxins, which may include livestock loitering in streams. The process begins when a complaint is investigated. If a water quality problem is found, the producer may correct the problem voluntarily, or may be subject to fines.

Virginia's Incentive Programs

Virginia has been the most generous of the watershed states when it comes to incentives for livestock exclusion. Virginia's Agricultural BMP Cost-Share Program provides financial assistance via two key practices: Stream Exclusion with Grazing Land Management and Livestock Exclusion with Reduced Setback. Within these, there are multiple options. Fifty-percent cost-share is available when a farmer installs fencing with a 10-foot setback. One hundred percent reimbursement is available if the farmer installs fences with a 35-foot buffer, maintains the fence and buffer for 10 years, provides alternative watering, and implements a grazing plan.

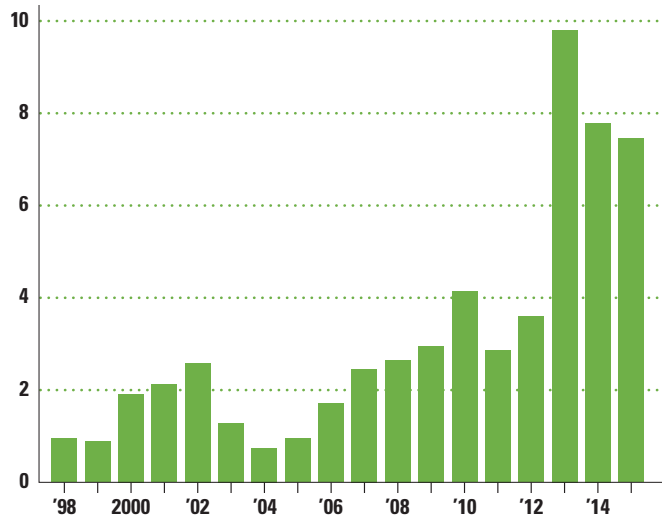
Cost-share at 100 percent is available to all who sign up between December 2013 and July 1, 2015; by March 2015, Virginia had either spent or obligated over $44 million for stream exclusion, with $25 million for practices in the Chesapeake Bay watershed. Still, signup for the practice exceeded available funds by over $16 million dollars statewide, though the majority of sign-ups were outside the Chesapeake Bay watershed.

Virginia's CREP partnership has also provided one of the state's most active water quality efforts ever, setting a target of 40,000 acres statewide with 25,000 of those acres in the Bay watershed. Cost-share payments under CREP, when combined with incentive payments, can actually exceed 100 percent. Cost-share on pasture covers exclusion fencing, buffer plantings, and alternative water sources. These practices come with significant contractual requirements. To date over 1,800 CREP contracts have been recorded within Virginia's Bay watershed, restoring 21,164 acres of buffers and wetlands and protecting 652 acres with perpetual easements.

The Resource Management Plan (RMP) program is designed to promote BMP adoption by providing producers nine years of protection from any new

Virginia's Livestock Stream Exclusion Funding in the Chesapeake Bay Watershed

Millions of dollars



or changed agricultural regulation in exchange for implementing specific BMPs tailored to their farms. Livestock producers who voluntarily sign up and develop the RMP are required to provide permanent, year-round exclusion from perennial streams.

Virginia also has a tax credit program for producers who implement livestock exclusion (both fencing and watering) as well as setback and buffer practices. Producers can earn a 25 percent tax credit for the total out-of-pocket expenses (capped at $70,000), not to exceed $17,500. If it exceeds their tax liability for that year, the producer can receive a refund for that excess amount.

Finally, Virginia has a program that focuses on small, unregulated operations. Called the "Virginia's Small Animal Feeding Operation Evaluation and Assessment Strategy," farmers who choose to participate can access state-provided technical assistance and/or cost-share grants as a result, including assistance or dollars for livestock exclusion.

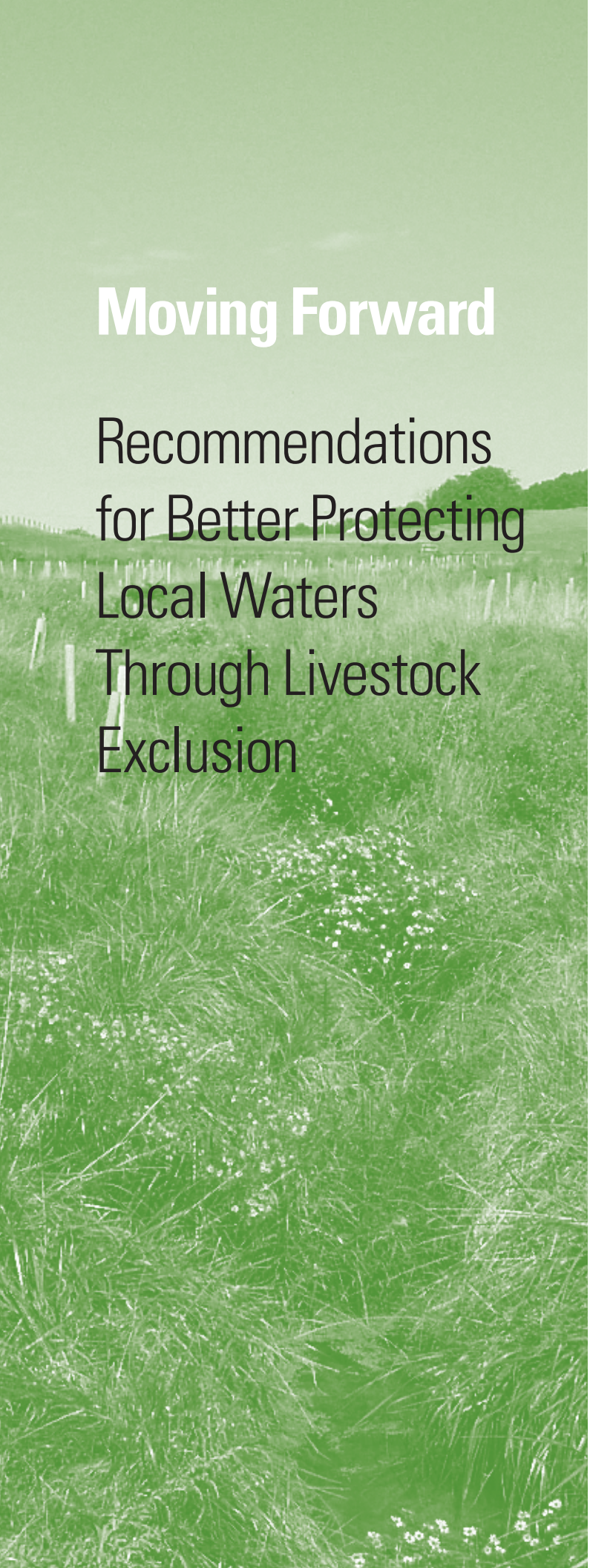
Virginia's TMDL Implementation

Virginia has incorporated keeping livestock out of its streams as part of its Chesapeake Bay TMDL commitment. It relies upon 95 percent livestock exclusion to achieve 4 percent of nitrogen, 14 percent of the phosphorus, and 24 percent of the sediment reductions required of the agricultural source sector. Anecdotal information suggests only 25–35 percent of pastured livestock have actually been excluded.

The Commonwealth's TMDL plan offers a number of options if the livestock exclusion goals are not met. One option is local government adoption of ordinances to require riparian buffers and livestock exclusion fencing. Another suggestion calls upon the legislature to grant counties the authority to "require certain best management practices to be used on land enrolled in local use value assessment and taxation programs." A third option is to explicitly require stream exclusion through state regulation. Each of these would clearly move the current program beyond voluntary.

Like every state, Virginia faces the challenge of how best to track voluntary exclusion. There is currently no mechanism to validate the 95 percent exclusion goal. Without a better tracking system, not only is validation difficult, so is targeting resources and outreach.

Farmers and policy makers are learning that widespread livestock exclusion is critical to achieve protective water quality standards in local streams and the Bay.



Moving Forward

Recommendations for Better Protecting Local Waters Through Livestock Exclusion

Isn't it enough for you to drink clear water for yourselves? Must you also muddy the rest with your feet? Why must my flock eat what you have trampled down and drink water you have fouled?

—Ezekiel 34:18–19

Helping producers reach the long-term goal of getting all livestock out of the Chesapeake Bay's tributary streams must be our focus. Achieving this goal will require that we direct our policy actions toward:

1. Better addressing farmers' concerns and winning their trust.
2. A more thorough understanding of the gaps that currently exist in our regulatory and voluntary programs.
3. Better verification of installed practices and concurrent better accounting as we track state by state progress in achieving the Bay TMDL pollution reduction goals.
4. Providing BMP options that reduce unnecessary requirements and over-engineering concerns.
5. Increasing engagement of stakeholders to promote livestock stream exclusion and protect riparian buffers.

On the following pages are our recommendations to ensure success of this effort.

RECOMMENDED STATE ACTION: MARYLAND, PENNSYLVANIA AND VIRGINIA

Each state, along with its federal cost-share partners and conservation districts, should consider convening a workgroup to determine what it would take to keep all livestock out of the streams and maximize protection of our riparian buffers. Each state workgroup should:

1 Match Incentive Programs to Needs

Taking the priority concerns of farmers into consideration, each state should compare its suite of regulatory and incentive programs with concerns raised by farmers and stakeholders to determine appropriate improvements. Additional programs to promote forested riparian buffers should be considered. Outreach levels and methods, education materials and technical assistance quality and availability should also be considered.

2 Increase Resources for Incentive Programs

Each state, working with its federal government NRCS and FSA partners, should review the history of incentive funding applied to livestock exclusion practices and riparian buffers, looking at opportunities to ensure reliable funding sources for incentive programs; reliability, predictability, and steadily increasing funding will be necessary if reduction targets are to be achieved. Where funding relies on fluctuating sources, other more reliable funding mechanisms should be suggested to the proper decision-making body.

3 Explore Conservation Compliance Concepts

Each state should explore whether livestock stream exclusion practices should be required for eligibility for land use tax breaks, grants, loans or other programs in which livestock operators participate.

4 Address Absentee Landlord/Tenant Farmer Issues

Each state should identify geographic regions with the greatest number of rented farm acres that pasture livestock and work with the conservation districts to develop special outreach tools targeted to both operators and landowners. States should determine if practice adoption on rented lands is lagging and consider policy changes to accelerate adoption.

5 Repeal, Modify and Set Stream Fencing Policies

Each state, again in partnership with USDA, NRCS, and FSA, should examine existing federal and state statutory and regulatory frameworks. Where legislative changes are necessary, the state should prepare modification concepts for consideration by the Chesapeake Bay Commission for state action or to address with its colleagues in the U.S. Congress.

6 Keep it Simple

Each state should examine its programs to determine if further simplification of practices and communication is possible to reduce both real and perceived bureaucracy and unnecessary requirements. Farmer participation can be improved if programs are seen as making common sense and being relatively easy to follow.

RECOMMENDED FEDERAL ACTION: USDA – NRCS AND FSA

Since the 1930s, the U.S. Farm Bill has affected everyone who eats, sells, buys or grows food. At its origin, it was designed to make sure that everyone had enough to eat, farmers earned a living, and our soil and water stayed healthy. To this day, support for conservation provided through the Farm Bill offers critical support to our states and their farmers. To expand its support to farmers who want to exclude livestock from streams, the federal agencies should:

1 Evaluate 2019 Farm Bill Needs

Livestock exclusion practices are supported by the CREP and EQIP programs; states rely heavily upon these for both financial and technical assistance. The next Farm Bill, likely in 2019, provides the last opportunity to alter federal programs for agricultural conservation practices before reaching the critical Chesapeake Bay TMDL end date of 2025. NRCS and FSA state offices should jointly meet with each state's key agencies to project what can be accomplished through 2018 and what more will be needed in the 2019 Farm Bill.

2 Develop Justification Package

Present a compiled list of programmatic improvements needed along with justification to the Chesapeake Bay Commission, in time to be part of the next Farm Bill negotiation process.

RECOMMENDED CHESAPEAKE BAY PROGRAM ACTION

The Bay model has been used for many years to forecast our progress in meeting water quality goals. Improving the predictions of the model starts with accurate data inputs for the number and quality of reported practices. Just as important, the model must be able to apply the data appropriately across the available land uses and then predict changed pollution loads. To improve the reported data and its use by the model the Bay Program Partnership should:

1 Standardize Definitions

Within the year, develop a methodology to compare practices among the states to enable enhanced accounting, tracking and verification of installed livestock exclusion BMPs. Variability of practices must be considered in order to fully account for efforts underway.

2 Correct State Reporting and Crediting Problems

Resolve state reporting issues in time for the Chesapeake Bay Program's model midcourse correction in 2017 in order to expand the states' ability to report on all types of stream fencing practices and receive credit for all treated acreage (currently there is a model assumption that only 10 percent of the pasture in a county can be fenced).

ACKNOWLEDGMENTS

Thirty-five years ago, the declining health and productivity of the Chesapeake Bay prompted the General Assemblies of Maryland, Pennsylvania and Virginia to create the Chesapeake Bay Commission to develop and coordinate policy actions to save the Bay. This report is the most recent of a long series of Commission studies that analyze critical Bay issues and recommend specific policy solutions. It is issued for the purpose of guiding our members, policy makers and the concerned public.

This report was written by Commission staff. We sincerely appreciate the many individuals and institutions who shared their knowledge and talents in the development of this report. A few deserve special credit:

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