CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

Closing Pennsylvania's Pollution-Reduction Gap

Investing for Performance: "The 3 Ps"

The Chesapeake Bay and its rivers and streams are a national treasure draining parts or all of six states and the District of Columbia. Its 64,000-square-mile watershed is home to more than 17 million people and thousands of species of plants and animals.

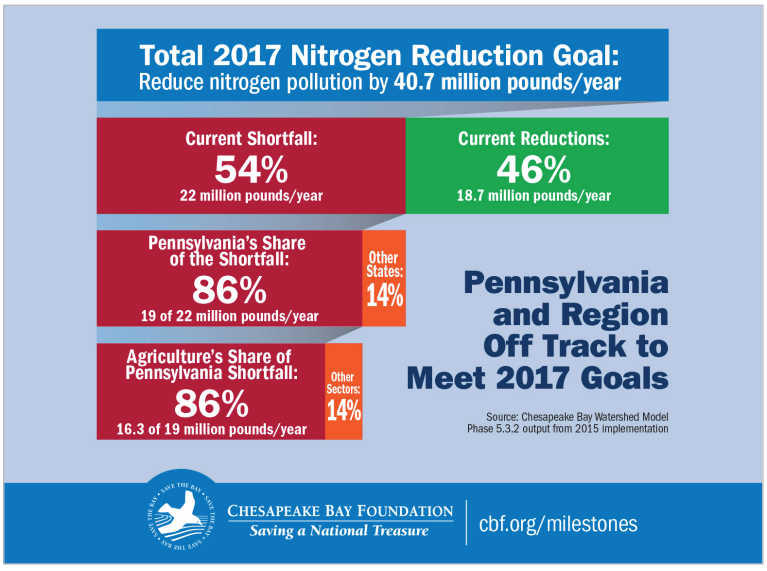
The birthplace of our nation, the Bay has a long history and legendary beauty. But that beauty has been marred. Much of the Bay system is fouled by nitrogen, phosphorus, and sediment pollution. All of us who live here suffer the consequences of pollution. Fish advisories, algal blooms, and warnings to stay out of the water after heavy rains are dramatic reminders that all is not right.

Throughout the region, citizens, businesses, and governments recognize the problem, understand the solutions, and are committed to changing the status quo.

In fact, since 1983 the region has tried to reverse the downward trend. While there has been real progress, the Bay is far from saved.

The good news is that in 2010 Washington D.C., the six Bay states, and the federal Environmental Protection Agency (EPA) established a Chesapeake Clean Water Blueprint, a precedent-setting cooperative effort to restore the nation's most productive estuary.

The Blueprint includes nitrogen, phosphorus, and sediment pollution-reduction goals for each of the seven jurisdictions, state-written watershed implementation plans (WIPs) to achieve those limits, and two-year milestones to track progress toward long-term goals. EPA and the jurisdictions agreed to have practices in place by 2017 to achieve 60 percent of the pollution reduction and by 2025 to achieve 100 percent.



In June of this year, EPA evaluated progress toward achieving the 2017 mid-point goals and found that while progress has been made, overall, the multi-state region is not on track to achieve its nitrogen pollution reduction targets. In particular, Pennsylvania is significantly off track, responsible for roughly 86 percent of the current nitrogen pollution reduction gap. This shortfall, largely due to slow implementation of plans to reduce agricultural pollution, threatens to undermine the entire restoration effort.

A Plan to Get Pennsylvania on Track

Pennsylvanians rightly take great pride in their state's natural resources, including its 86,000 miles of rivers and streams. Chief among them and running through the heart of Pennsylvania is the mighty Susquehanna, which, alone, provides 50 percent of the Bay's fresh water and about the same amount of the pollution degrading the Bay proper.

The river and the rest of the Commonwealth's waterways are a source of drinking water; an economic engine; and places to paddle, fish, or swim.

However, roughly 19,000 miles of rivers and streams in Pennsylvania are formally listed by the Pennsylvania Department of Environmental Protection as impaired. Pollution from agricultural activities is identified as the leading source of stream impairment. The Commonwealth's slow progress toward its Clean Water Blueprint commitments also threatens these local waterways and the communities they support.

Earlier this year, Pennsylvania Governor Tom Wolf's administration recognized the problem and committed to a "reboot" of Pennsylvania's efforts to reduce pollution. A key component of the reboot is enhanced compliance with state regulations governing manure management and sediment and erosion control on farms, with 10 percent of farms inspected annually.

> **"If Pennsylvania does not succeed, we're not going to succeed. It's as simple as that."**
>
> ***—Nick DiPasquale***
> *Director of the EPA's Chesapeake Bay Program Office*

The task seems daunting, with more than 33,600 farms in the Pennsylvania portion of the Bay watershed. And to date, although the Commonwealth has begun implementation of the "reboot" strategy, there have been no meaningful increases in funding to put practices on the ground, compounded by concerns and resistance from a few conservation districts tasked with on-farm inspections.

Investing for Performance: "The 3 Ps"

In March, the Penn State College of Agricultural Sciences and other partners hosted the Pennsylvania in the Balance conference in Hershey. More than 120 diverse stakeholders attended the event, where leaders in agriculture and the environment discussed solutions that could help increase a culture of conservation, including compliance; achieve water-quality goals for Pennsylvania's rivers, streams, and the Chesapeake Bay; and ensure profitable and productive agriculture.

One of the conference's conclusions was that limited resources should be used wisely and consider "the 3 Ps"—place, practices, and people. The conference also highlighted the need for additional investment of public and private funding. The "3 P" approach would ensure strategic use of funds to achieve the greatest nutrient and sediment reductions to benefit both local water quality and the Chesapeake Bay.

PLACE

Building on the "3 Ps" prioritizing concept, the Chesapeake Bay Foundation used existing modeling tools—the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST)[1] and the U.S. Geological Survey surface water-quality modeling tool known as SPARROW[2]—to identify the Pennsylvania counties where investments can be most wisely prioritized to achieve the greatest pollution-reduction return.

1 casttool.org
2 cida.usgs.gov/sparrow/map.jsp?model=54

CBF used CAST to estimate county-level nitrogen loads and potential reductions from agriculture if Pennsylvania's 2025 plan were fully implemented. SPARROW was used to evaluate counties and watersheds that deliver the largest amounts of nitrogen from agriculture on a per-acre basis. CBF used SPARROW in a way that allowed us to assess contributions of nitrogen to the Bay generated by agriculture within a particular area.

Although nitrogen was chosen as the parameter for examination in this analysis, it is important to note that excess phosphorus and sediment also pollute the Chesapeake Bay and significantly degrade Pennsylvania's rivers and streams. In fact, according to the Commonwealth's Department of Environmental Protections, sediment is the leading cause of stream impairment in Pennsylvania. Fortunately, many agricultural conservation practices reduce all three pollutants.

Of the 42 Pennsylvania counties within the Chesapeake Bay watershed, CBF identified five that contribute the highest loads of pollution from agriculture and also represent substantial opportunities for pollution reductions.

Ag Pollution in the Susquehanna Basin: Challenges and Opportunities

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	Rank	County	2025 Ag Nitrogen Reduction Goal (millions of pounds/year)	Nitrogen Pollution from Ag** (millions of pounds/year)	Miles of Waterways Impaired by Ag	Acres in Ag	Key Points
TIER ONE	1	Lancaster	6.17	13.71	647	385,306	■ Annual value of agricultural commodities produced in Lancaster County exceeds that of the state of Delaware and is 65% of the value in Maryland ■ Home to much of the states Amish population, which is second in size only to Ohio ■ More farms than any other county in Pennsylvania, with over 5,600 and an average size of 78 acres
TIER TWO	2	York	2.89	6.54	166	221,910	■ More than 250,000 acres in agriculture, or roughly 45% of the county ■ Ranks 17th in NRCS 2009-15 PA Bay expenditures ■ More than 2,000 farms averaging about 120 acres in size
	3	Franklin*	2.02	3.96	260	240,184	■ Ranks fourth in the state in overall cash receipts for crops ■ Roughly 53% of the county's land use is in agriculture, most of which is cropland ■ Second only to Lancaster County in the number of acres in agriculture
	4	Cumberland	1.68	3.76	102	138,777	■ Ranks fourth in the state for the number of cows and calves ■ Ranks 22nd in NRCS 2009-15 PA Bay expenditures ■ Fastest growing county in Pennsylvania
	5	Adams*	1.36	2.72	238	138,521	■ Ranks first in Pennsylvania in the production of fruits, tree nuts, and berries ■ Ranks first in the number of horses, ponies, mules, burros, and donkeys ■ About 30% of the county's nearly 1,200 farms are less than 50 acres in size

*Some water in these counties flows to the Potomac River.
**Source: Chesapeake Bay Program CAST model

(Chart attached and available at cbf.org/PAtop5)

Drilling down further, our analysis demonstrates that focused investment in the five key counties—Lancaster, York, Franklin, Cumberland, and Adams—could dramatically accelerate efforts to get Pennsylvania back on track to meet the Chesapeake Clean Water Blueprint in the near term.

For decades, many of these counties' governments, farmers, and businesses have been leaders in the planning and implementation of preservation, conservation, and restoration efforts. This is particularly true in Lancaster County.

These five priority counties together include 20 percent of the Commonwealth's farms, 34 percent of total agricultural product sales, and 40 percent of livestock product sales, according to the 2012 Census of Agriculture.[3] They also contribute more than 30 million pounds per year of nitrogen pollution from agriculture to Pennsylvania's rivers and streams, nearly half of the Commonwealth's entire annual load of 63 million pounds.

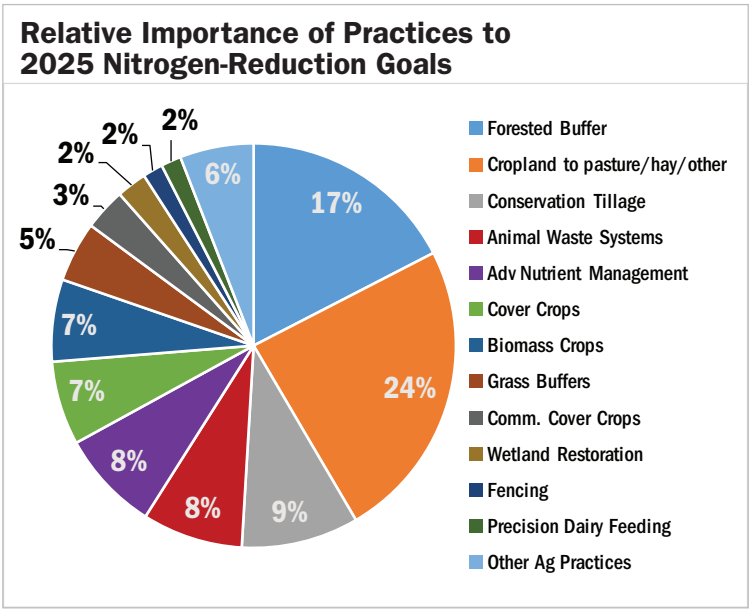
CBF's analysis of agency data indicates that if the five priority counties met their 2025 Blueprint pollution-reduction commitments, the Commonwealth would achieve roughly a 14.1 million pound nitrogen reduction. That reduction would represent more than half of the entire state's 2025 nitrogen-reduction goal. Fast action in these counties would also help the Commonwealth make significant progress against its most immediate challenge, the projected 2017 nitrogen-reduction shortfall of 16 million pounds, and would also result in reductions of phosphorus and sediment pollution, with substantial benefits to local water quality.

For these five counties, we also present SPARROW model pollution estimates (on pound per acre per year basis) on a watershed scale. (County maps attached and available at cbf.org/PApriority) Focusing conservation in these areas would likely lead to even greater efficiencies, as would the use of "precision conservation"[4] techniques such as flow path analysis and Geographic Information Systems (GIS) technology to identify priority areas for the placement of particular practices on farms.

Furthermore, these areas correspond to areas with high levels of agriculturally impaired streams, according to the Pennsylvania Department of Environmental Protection. By focusing on these areas, local streams will also be improved.

PRACTICES

In addition to geographic focus, any new resources should also be invested in the pollution reducing practices that will most effectively accelerate progress toward water-quality goals and bring farmers into compliance with state regulations. Based on Pennsylvania's WIP, there are six conservation practices that, if fully implemented, will achieve more than 70 percent of the necessary nitrogen pollution reductions from agriculture.[5] Importantly, these practices will also reduce the phosphorus and sediment runoff that damages local streams and rivers.



These practices include: conservation tillage; advanced nutrient management; cover crops; animal waste storage systems; forested buffers; and cropland conversion to pasture, hay, or other vegetation. There is also evidence that many of these practices are among the most cost-effective. For example, U.S. Department of Agriculture (USDA) economists[6] found that implementation of a combination of cover crops, nutrient management, and erosion controls (which includes strip cropping and riparian buffers) on Pennsylvania land that is vulnerable to nutrient losses and is adjacent to water would meet the Blueprint goals at a quarter of the cost of implementing the full suite of management practices on all cropland.

3 agcensus.usda.gov/Publications/2012/Full_Report/Census_by_State/Pennsylvania

4 chesapeakeconservancy.org/precision-conservation

5 Presentation by Jeff Sweeney, Environmental Protection Agency Chesapeake Bay Program Office, to the Verification Committee, Annapolis, MD March 13, 2013 entitled "WIP Relative Load Reductions Source Sectors BMPs"

6 Ribaudo, Marc, Jeffrey Savage, and Marcel Aillery. An Economic Assessment of Policy Options To Reduce Agricultural Pollutants in the Chesapeake Bay, ERR-166, U.S. Department of Agriculture, Economic Research Service, June 2014.

PEOPLE

The successful focusing of geography and practices will depend on strategic coordination and collaboration among existing federal, state, local, non-governmental, and private partners, as well as more efficient delivery of conservation programs. Increased support for outreach and technical assistance capacity—areas that are currently insufficient to keep up with existing demand in some locations—will also be crucial. Furthermore, implementation of the "reboot" strategy will also increase demand for more specialists to provide on-the-ground support for the implementation of conservation practices.

Meeting the unique needs of each county's agricultural producers will also be essential. For example, many in the Plain Sect communities do not participate in government cost-share programs. Having private sources of funding available for financial assistance may be critical to engaging these communities and expanding the implementation of key conservation practices. Other local audiences may need similarly tailored outreach approaches.

Call for Action

At this time when resources are limited and pollution-reduction goals are not being met, it is critical that restoration funds are invested as efficiently as possible to achieve meaningful results.

CBF calls on all stakeholders in Pennsylvania—federal, state, and local governments; nonprofit organizations; and private sector partners—to invest new restoration funds in the people, places, and practices that will achieve the greatest pollution reductions. By focusing additional outreach, technical assistance, and investment in producers in the five key counties and on the six practices identified in this analysis, new investments will jumpstart clean-up efforts in these locations and help get Pennsylvania back on track in meeting its Clean Water Blueprint commitments.

This prioritizing effort will require new funds and programs and coordination and collaboration at all levels. CBF calls on federal partners, particularly USDA, to provide an initial, immediate commitment of $20 million to demonstrate the cost-efficiencies possible through this approach and urges state and local governments to provide additional outreach, technical assistance, and funding.

The new funding will not complete the job, but it is an important start.

The anticipated pay-off will be an opportunity for Pennsylvania to get on a more positive trajectory regarding its pollution-reduction commitments, resulting in cleaner local rivers and streams, and progress on restoring the Chesapeake Bay. These new investments also will create jobs and benefit local economies.

If Pennsylvania fully meets its commitments across the watershed, a peer-reviewed economic analysis commissioned by CBF found that implementing the Blueprint would increase nature's benefits in the Commonwealth by $6.2 billion annually through cleaner water, cleaner air, hurricane and flood protection, improved recreational opportunities, and more.

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TIER TWO	**2**	**York**	2.89	6.535	166	221,910	■ More than 250,000 acres in agriculture, or roughly 45% of the county ■ Ranks 17th in NRCS 2009–15 PA Bay expenditures ■ More than 2,000 farms averaging about 120 acres in size
	3	**Franklin***	2.02	3.954	260	240,184	■ Ranks fourth in the state in overall cash receipts for crops ■ Streams drain into the Potomac or Susquehanna river basins ■ Second only to Lancaster County in the number of acres in agriculture
	4	**Cumberland**	1.68	3.759	102	138,777	■ Ranks fourth in the state for the number of cows and calves ■ Ranks 22nd in NRCS 2009–15 PA Bay expenditures ■ Fastest growing county in Pennsylvania
	5	**Adams***	1.36	2.716	238	138,521	■ Ranks first in Pennsylvania in the production of fruits, tree nuts, and berries ■ Ranks first in the number of horses, ponies, mules, burros, and donkeys ■ Streams flow to the Potomac or Susquehanna river basins

*Some water in these counties flows to the Potomac River.
**Source: Chesapeake Bay Program CAST model

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Lancaster County
Priority Watersheds

Hammer Creek
Lititz Run
Middle Creek
Cocalico Creek/Conestoga River
Little Cocalico Creek/Cocalico Creek
Little Muddy Creek
Muddy Creek
Upper Conestoga River
Middle Conestoga River
Headwaters Pequea Creek
Muddy Run/Mill Creek
Eshlemen Run/Pequea Creek
Pine Creek
Valley Creek/ East Branch Octoraro Creek
Muddy Run/ East Branch Octoraro Creek
West Branch Octoraro Creek
Tweed Creek/Octoraro Creek
Millers Run/Little Conestoga Creek
Upper Chiques Creek
Lower Chiques Creek
Little Chiques Creek
Conoy Creek
Donegal Creek
Hartman Run/Susquehanna River
Cabin Creek/Susquehanna River
West Branch Little Conestoga Creek/ Little Conestoga Creek
Green Branch/Susquehanna River
Lower Conestoga River
Climbers Run/Pequea Creek
Fishing Creek/Susquehanna River
Big Beaver Creek
Conowingo Creek
City of Lancaster

Locally Generated Ag Nitrogen Pollution
(pounds/acre/year)

- 35.00–45.00
- 25.00–34.99
- 10.00–24.99
- 5.00–9.99
- 0.00–4.99

Map Created by The Chesapeake Bay Foundation
Data from USGS SPARROW Model (2011)
cida.usgs.gov/sparrow

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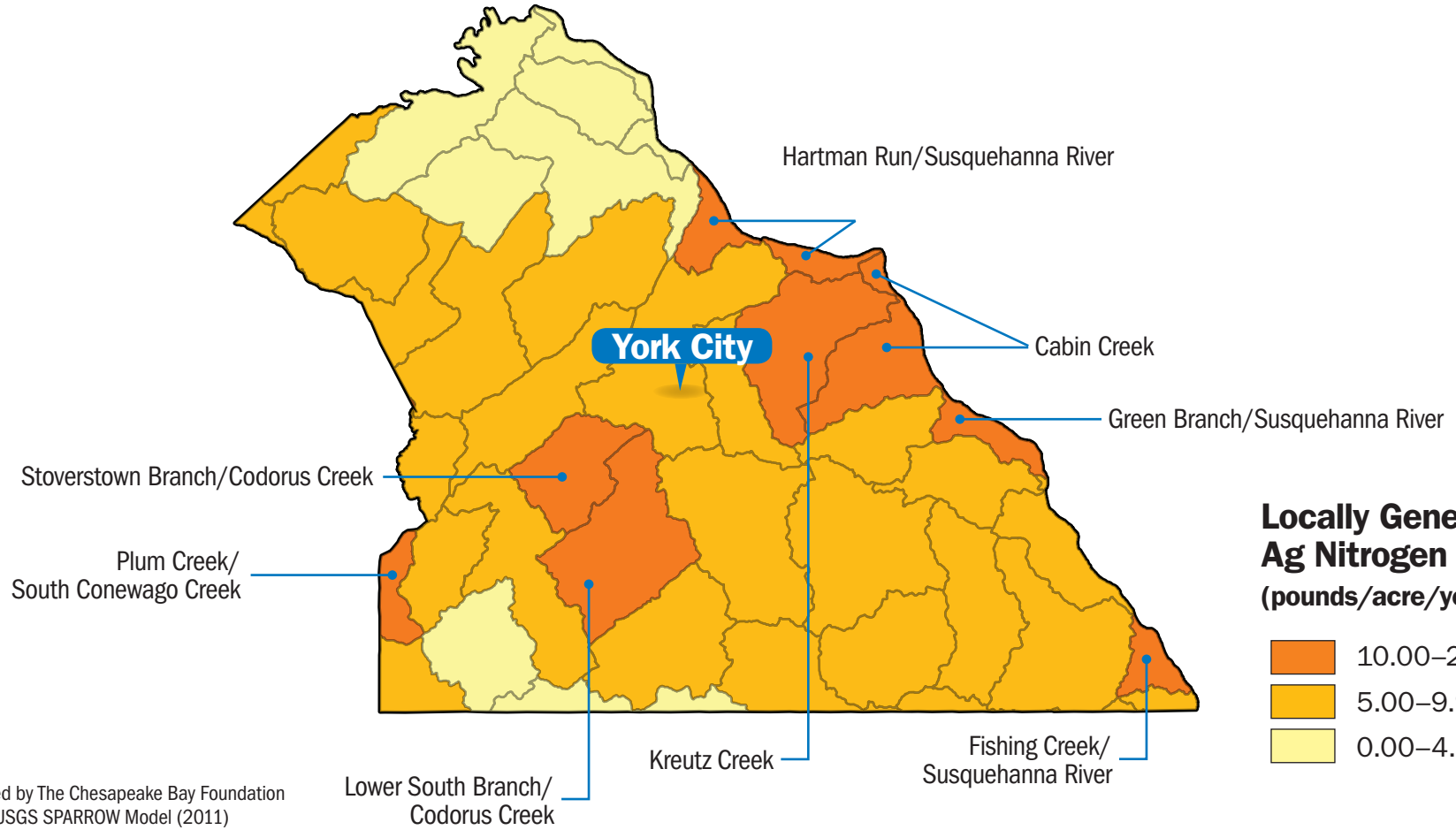
York County
Priority Watersheds



Locally Generated Ag Nitrogen Pollution
(pounds/acre/year)

- 10.00–24.99
- 5.00–9.99
- 0.00–4.99

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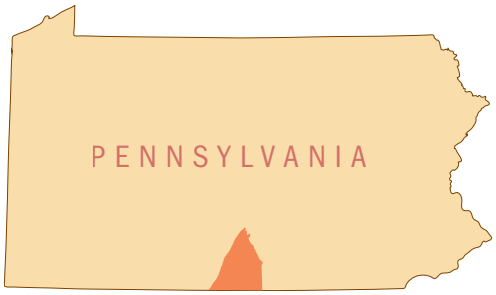

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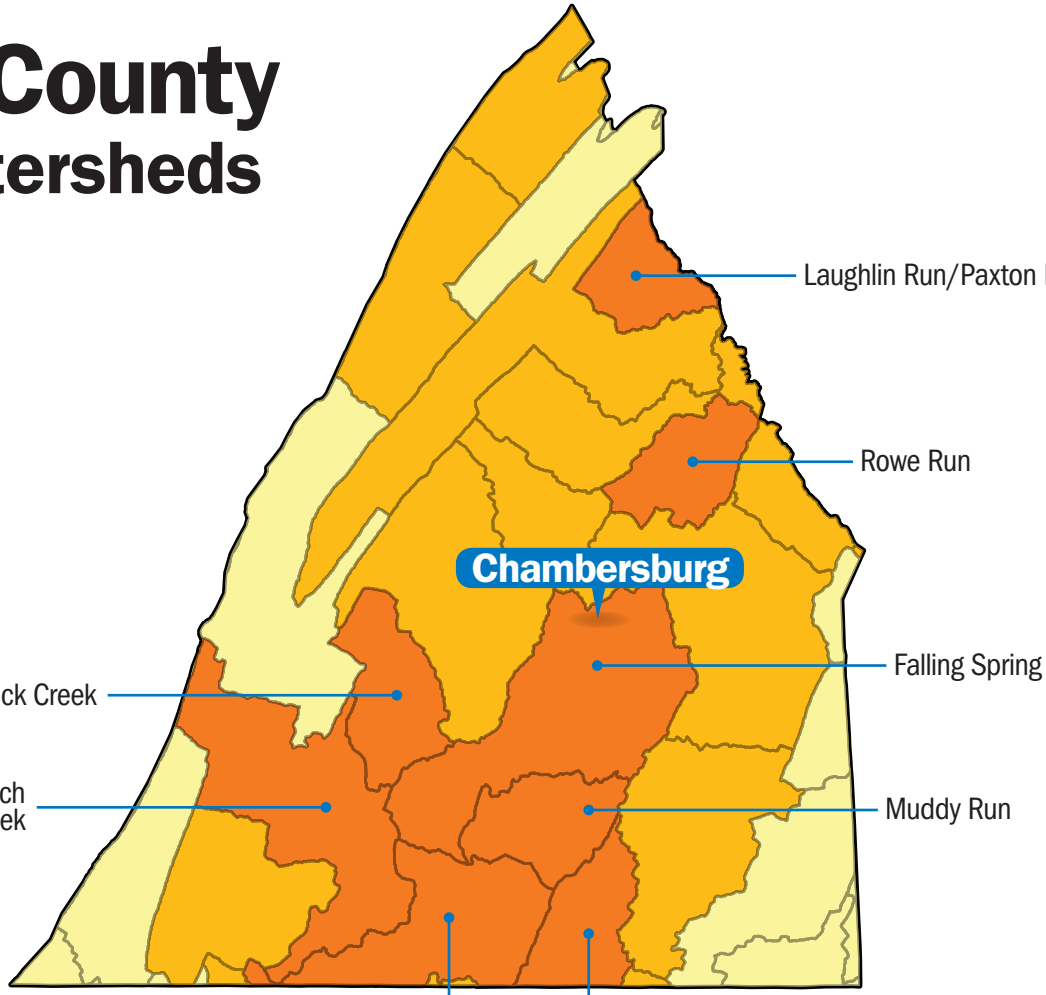
Franklin County
Priority Watersheds



Laughlin Run/Paxton Run

Rowe Run

Falling Spring Branch/Conococheague Creek

Campbell Run/Back Creek

Lower West Branch Conococheague Creek

Muddy Run

West Branch Marsh Run/Marsh Run

Rockdale Run/Conococheague Creek

Locally Generated Ag Nitrogen Pollution
(pounds/acre/year)

- 10.00–24.99
- 5.00–9.99
- 0.00–4.99

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Data from USGS SPARROW Model (2011)
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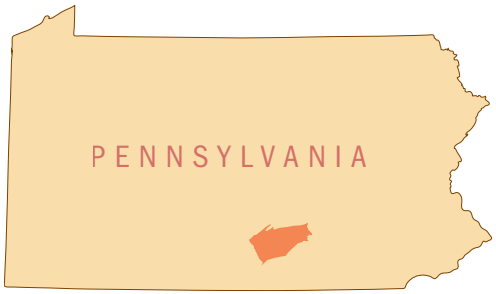

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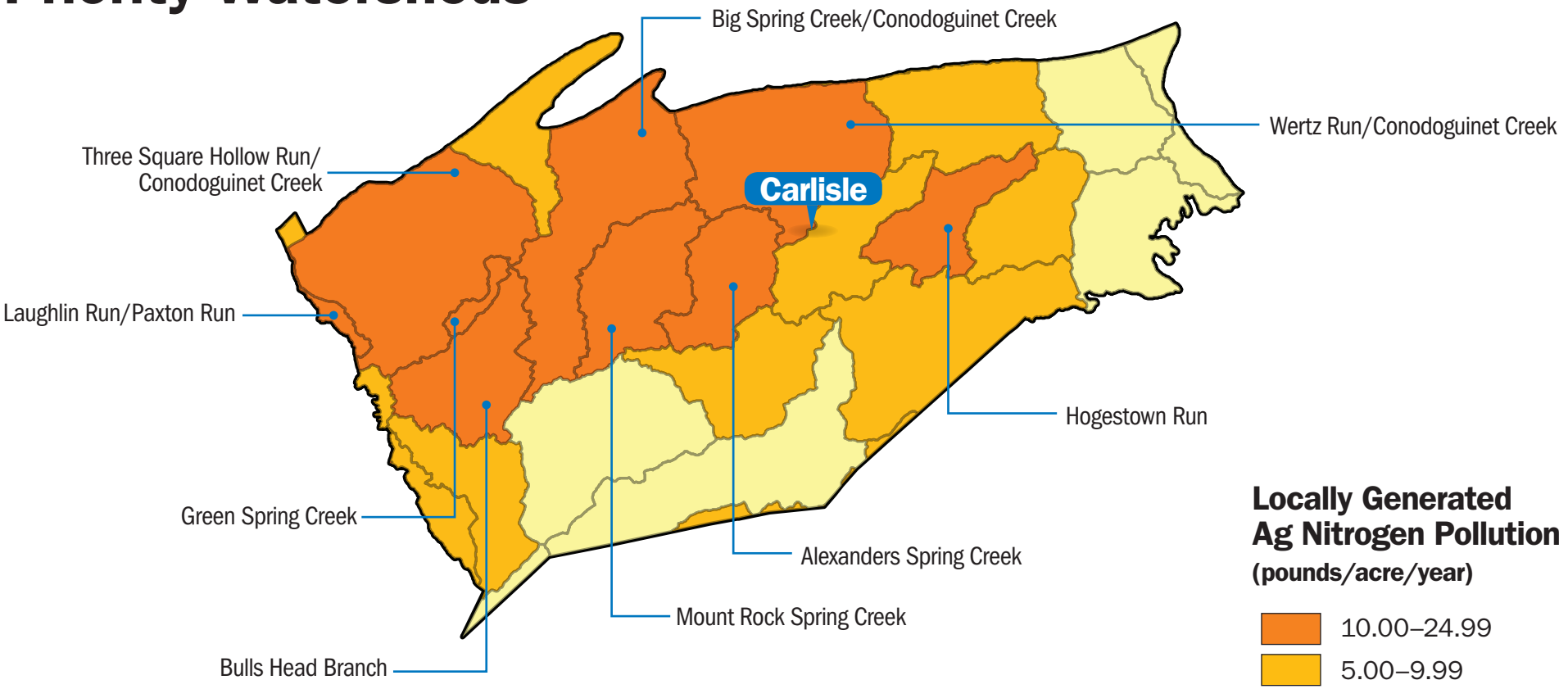
Cumberland County
Priority Watersheds



Locally Generated Ag Nitrogen Pollution
(pounds/acre/year)

- 10.00–24.99
- 5.00–9.99
- 0.00–4.99

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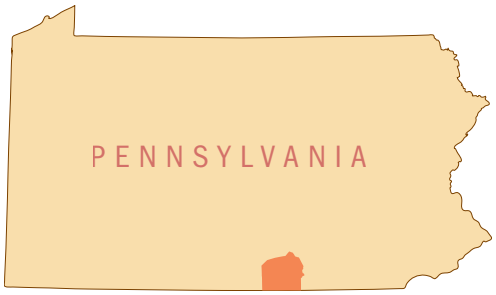

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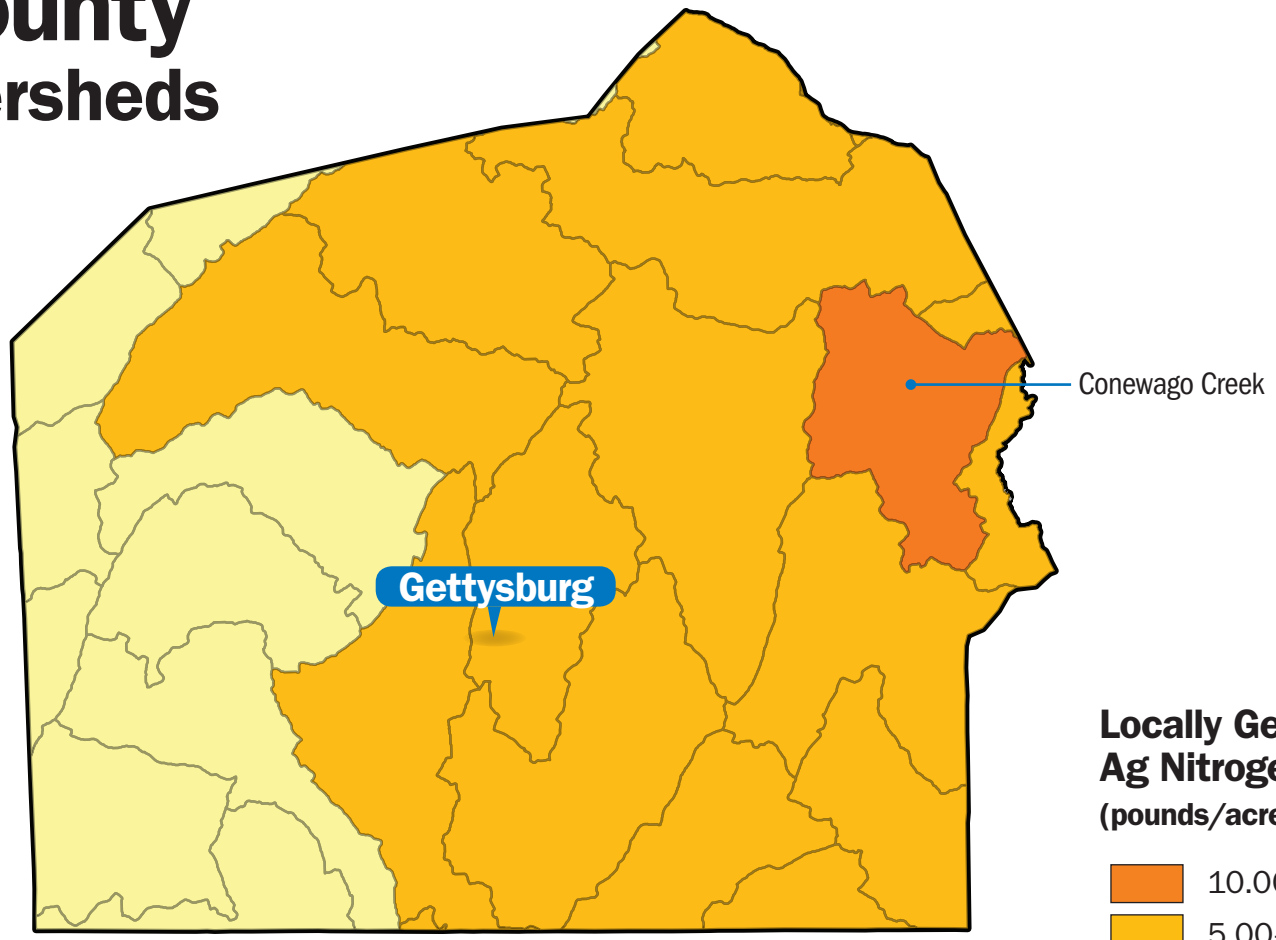
Adams County
Priority Watersheds



Locally Generated Ag Nitrogen Pollution
(pounds/acre/year)

- 10.00–24.99
- 5.00–9.99
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