Developing Local Goals (Numbers Hypothetical)
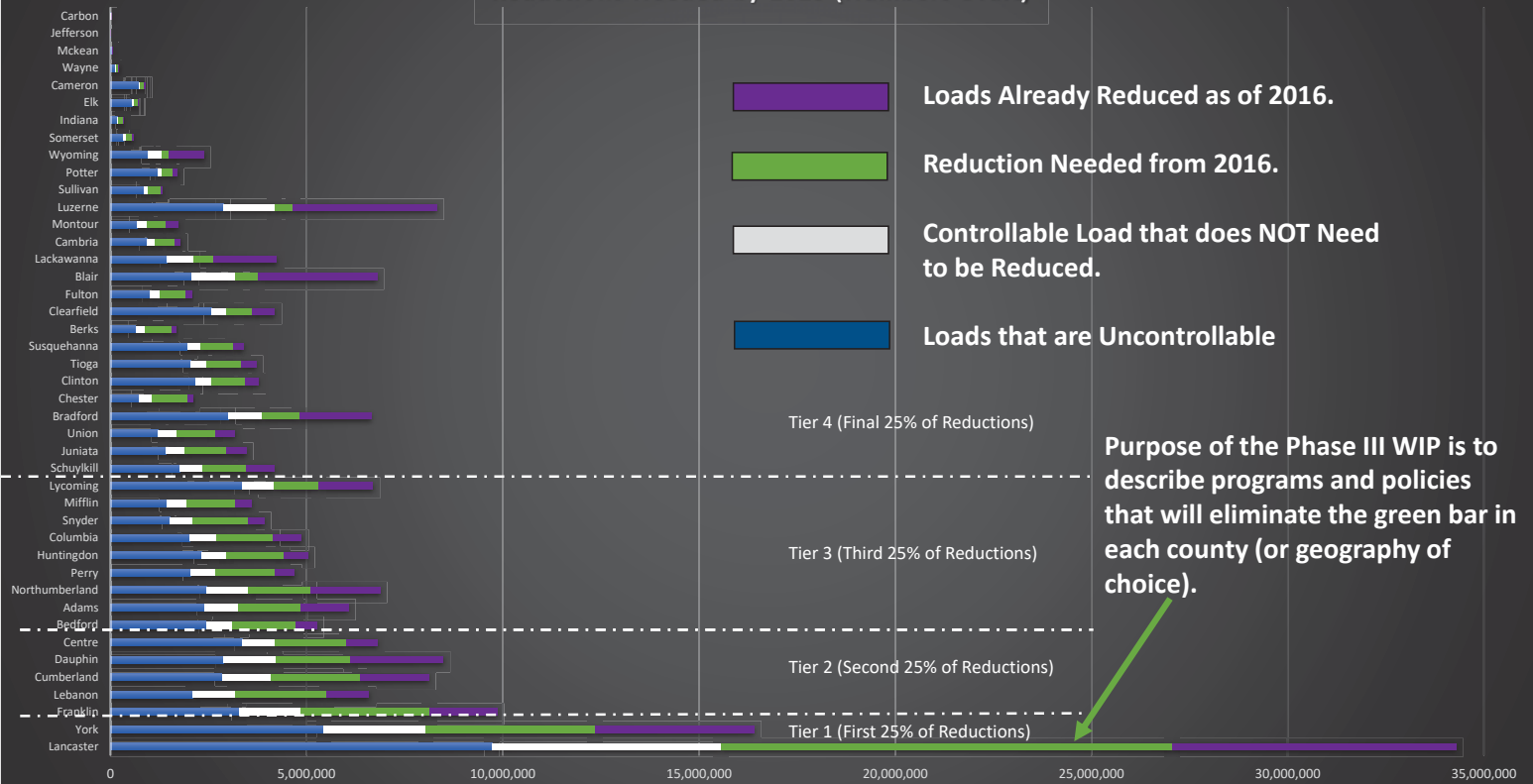
Step 1: Receive Statewide Bay Goal from Partnership

Pollution Diet by River · **Pollution Diet by State**

73 M Lbs N (Bay)

Step 2: Convert Bay Goal to Local Streams Goal for State
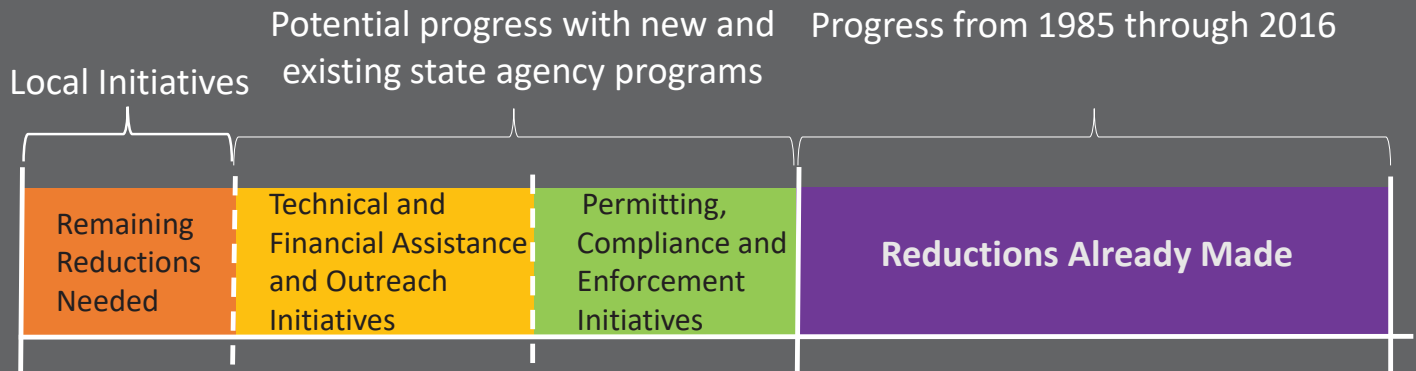
111 M Lbs N (Local Streams)

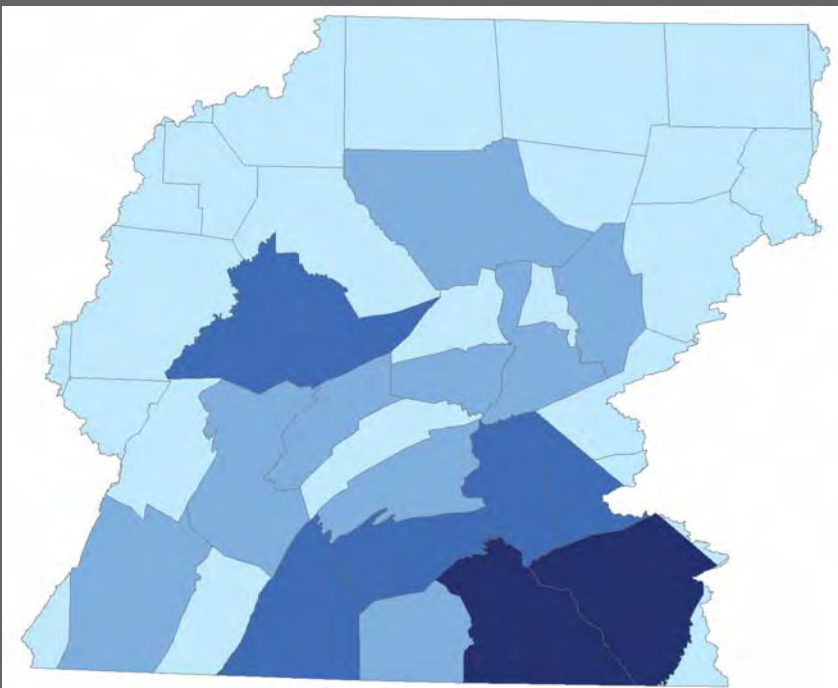### Step 3: Convert Statewide Local Streams Goal to Goals for Local Geographies

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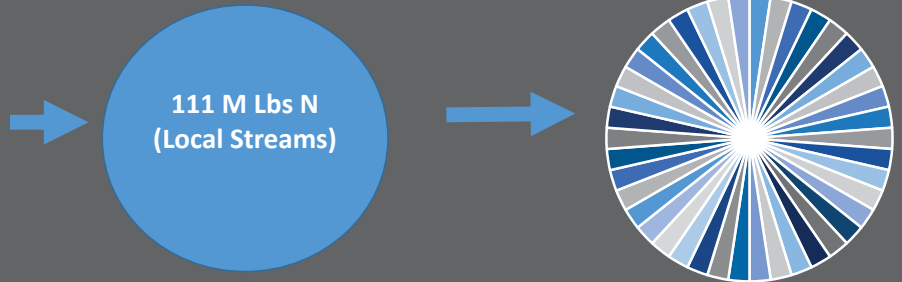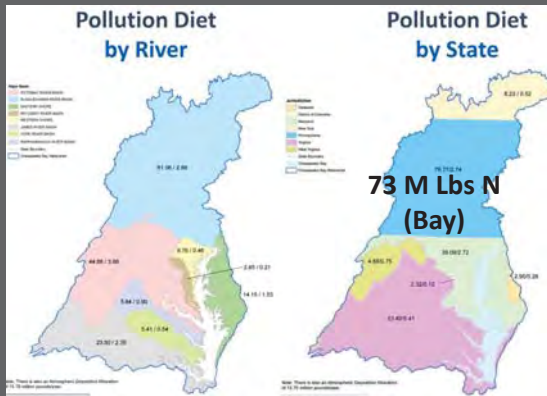
Estimated Reductions in Lbs of Nitrogen Delivered to PA Streams as of 2016, and Additional Reductions Needed by 2025 (Numbers Draft)

Loads Already Reduced as of 2016.

Reduction Needed from 2016.

Controllable Load that does NOT Need to be Reduced.

Loads that are Uncontrollable

Tier 4 (Final 25% of Reductions)

Tier 3 (Third 25% of Reductions)

Tier 2 (Second 25% of Reductions)

Tier 1 (First 25% of Reductions)

Purpose of the Phase III WIP is to describe programs and policies that will eliminate the green bar in each county (or geography of choice).

Counties (top to bottom): Carbon, Jefferson, Mckean, Wayne, Cameron, Elk, Indiana, Somerset, Wyoming, Potter, Sullivan, Luzerne, Montour, Cambria, Lackawanna, Blair, Fulton, Clearfield, Berks, Susquehanna, Tioga, Clinton, Chester, Bradford, Union, Juniata, Schuylkill, Lycoming, Mifflin, Snyder, Columbia, Huntingdon, Perry, Northumberland, Adams, Bedford, Centre, Dauphin, Cumberland, Lebanon, Franklin, York, Lancaster

X-axis: 0, 5,000,000, 10,000,000, 15,000,000, 20,000,000, 25,000,000, 30,000,000, 35,000,000

Hypothetical Journey to a County Goal

Local Initiatives

Potential progress with new and existing state agency programs

Progress from 1985 through 2016

| Remaining Reductions Needed | Technical and Financial Assistance and Outreach Initiatives | Permitting, Compliance and Enforcement Initiatives | Reductions Already Made |

Where Should Efforts be Targeted?

Tier 1 - First 25% of Reductions

Tier 2 - Second 25% of Reductions

Tier 3 - Third 25% of Reductions

Tier 1 - Last 25% of Reductions

TN yield delivered to streams

- USGS estimates Lancaster County has the highest nitrogen yield to local streams or any area in the Chesapeake Bay Watershed.

- While there are many other isolated catchments/watersheds that deliver significant amounts of nitrogen to streams, most if not all of Lancaster County's catchments/watersheds deliver high nitrogen levels.

- The Chesapeake Bay Program Model estimates that Lancaster County delivered more nitrogen to local streams the Bay drainages of West Virginia, Delaware and DC combined in 2016.

Ator, S. et al, 2011.

Total nitrogen yield to local waters in lbs/acre
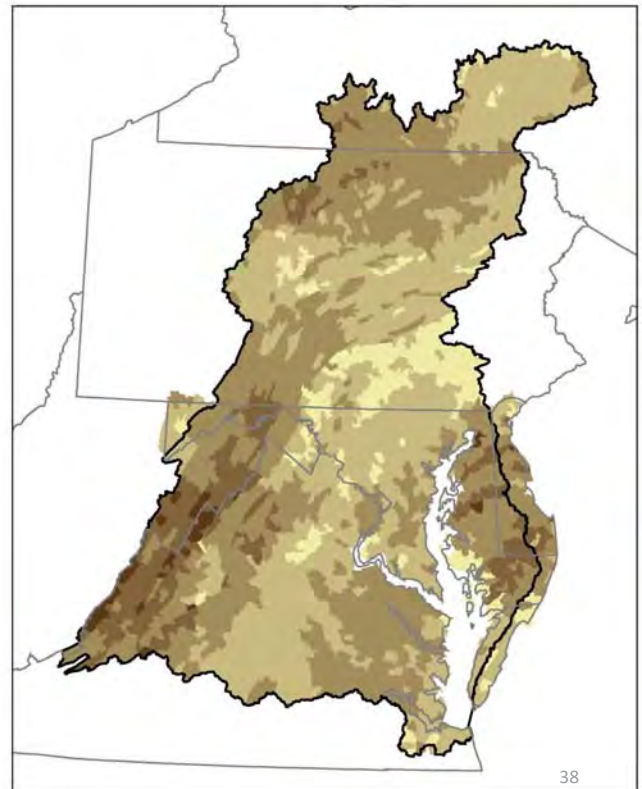- <5
- 5 to 10
- 10 to 15
- 15 to 20
- 20 to 25
- >25
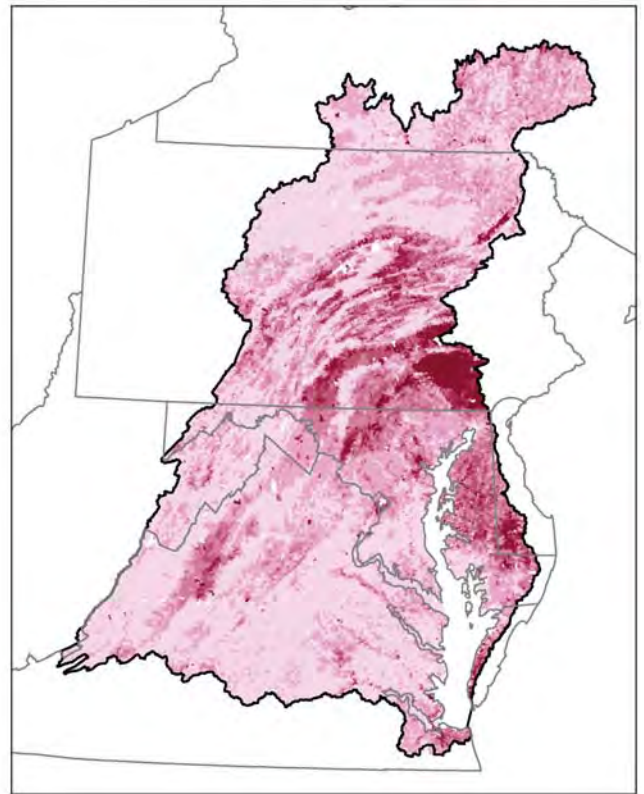
Median groundwater age

- Chesapeake Bay Program estimates the median groundwater age across Lancaster County is between 1 and 10 years, with much of the groundwater being less than 5 years old.

- This means we expect very little "lag time" between when a practice is implemented and when that practice's impact can be seen in local streams. That presents a unique opportunity for quick, verifiable results that does not exist across most of the watershed.

CBP Phase 6 WSM estimates. Ghopal Batt.

Estimated median age of groundwater, in years
- 1 to 5
- 6 to 10
- 11 to 20
- 21 to 30
- 31 to 45

Where are the trees?

ESRI base imagery available at
https://chesapeake.usgs.gov/phase6/map/

Phase 6 forest land use coverage available at
https://chesapeake.usgs.gov/phase6/map/

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Percent of Land Area within Chesapeake Bay Watershed Covered by Forest
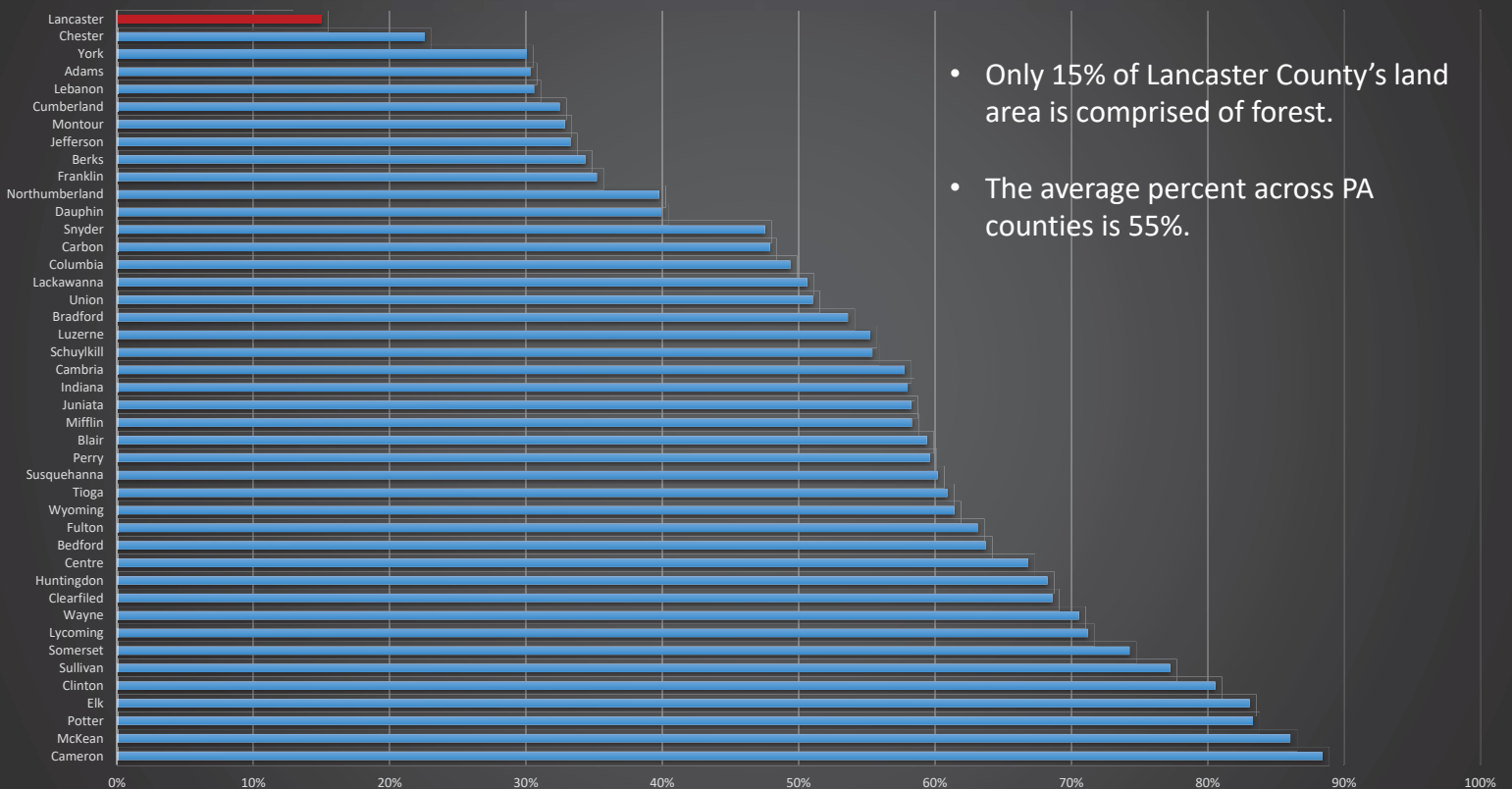
- Only 15% of Lancaster County's land area is comprised of forest.

- The average percent across PA counties is 55%.

Lancaster, PA 2016 Nitrogen Delivery to Streams by Sector

- Agriculture
- Developed
- Wastewater
- Septic
- Natural

71%, 16%, 7%, 1%, 5%

41
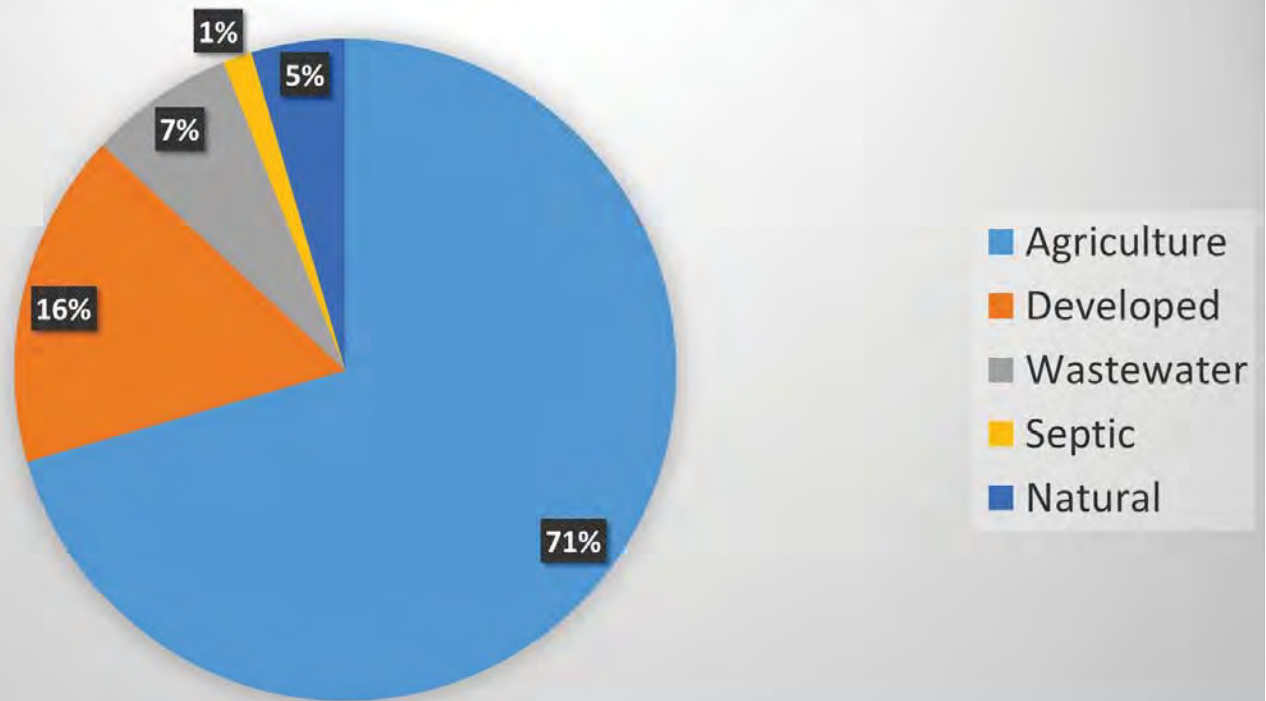
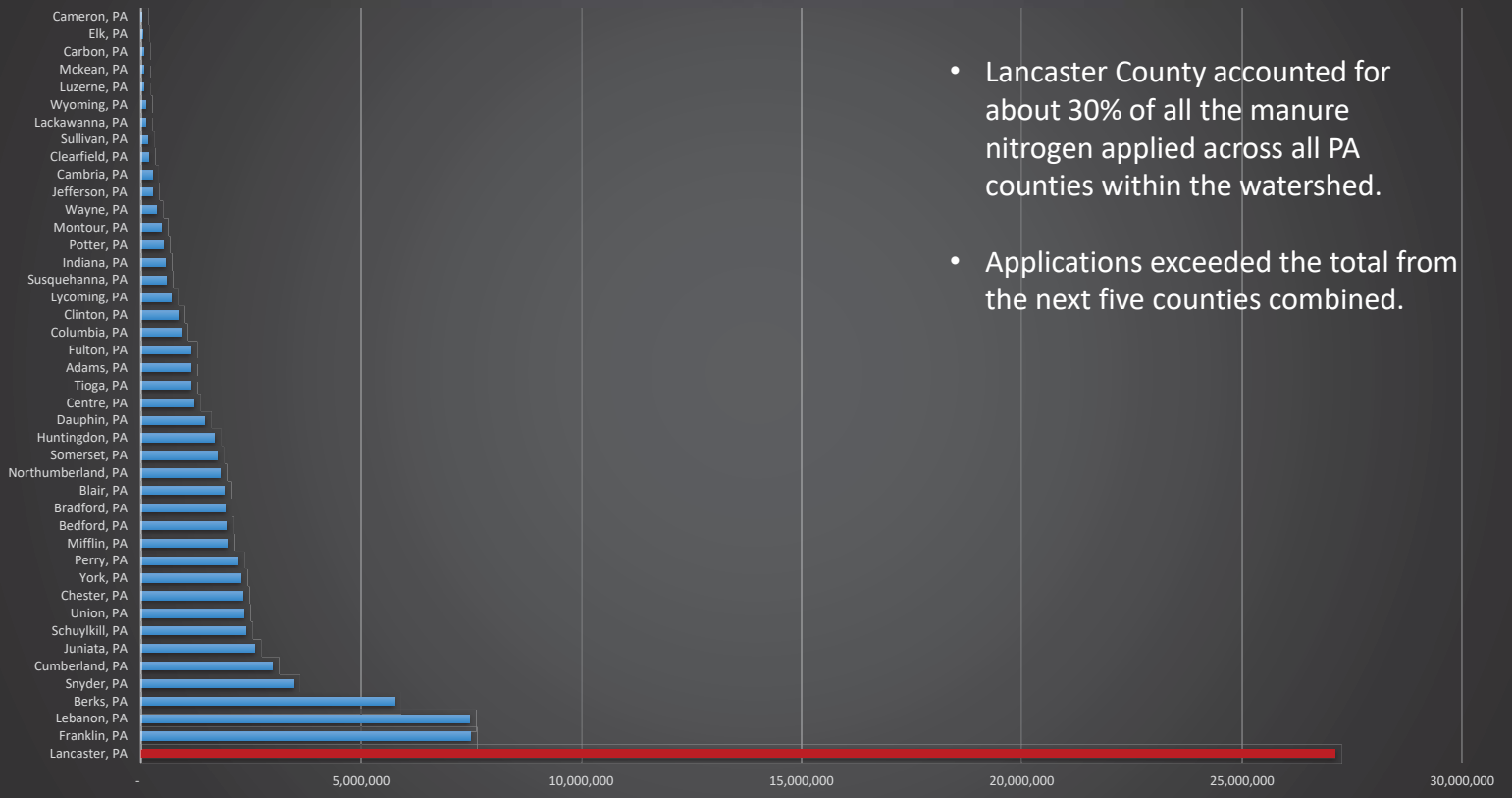# Estimated Share of Nitrogen Applied to Agricultural Land in Lancaster County in 2016 by Main Source
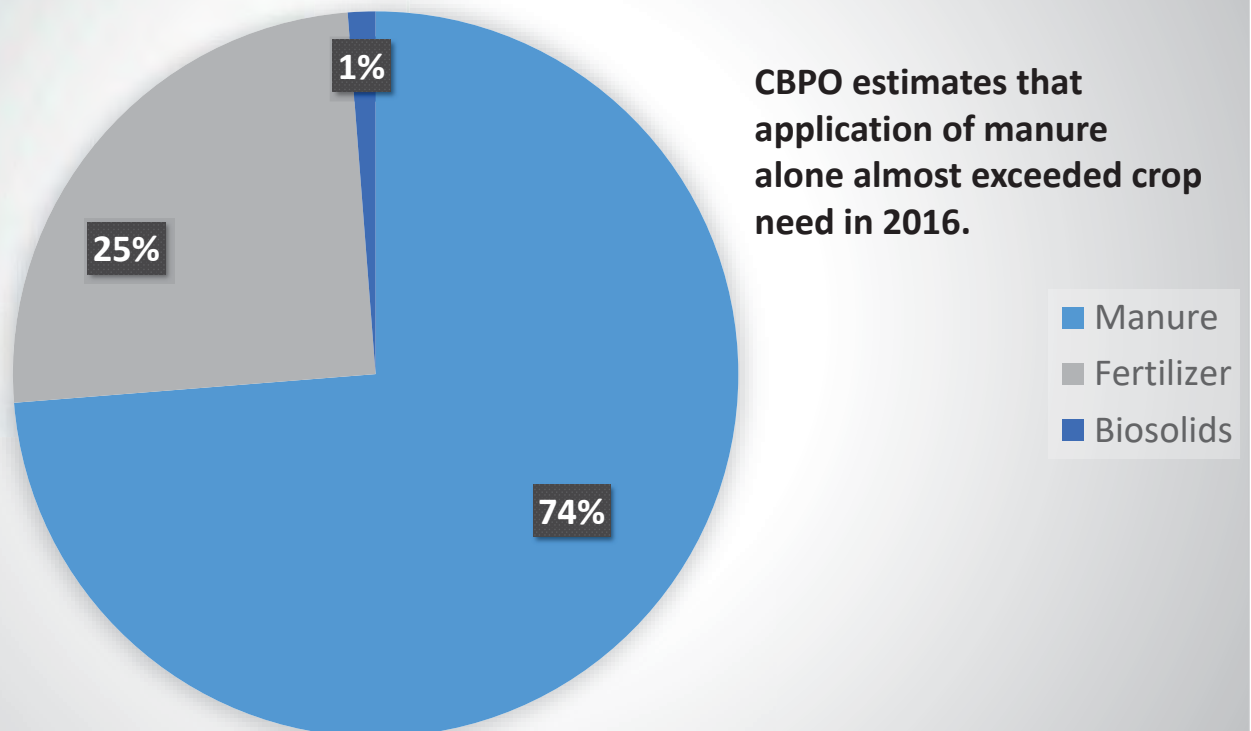
CBPO estimates that application of manure alone almost exceeded crop need in 2016.

- Manure
- Fertilizer
- Biosolids

74%, 25%, 1%

Estimated Pounds of Manure Nitrogen Applied to Land in 2016 by County

- Lancaster County accounted for about 30% of all the manure nitrogen applied across all PA counties within the watershed.

- Applications exceeded the total from the next five counties combined.

Estimated Share of Manure Nitrogen Applied to Agricultural Land in Lancaster County in 2016 by Animal Source
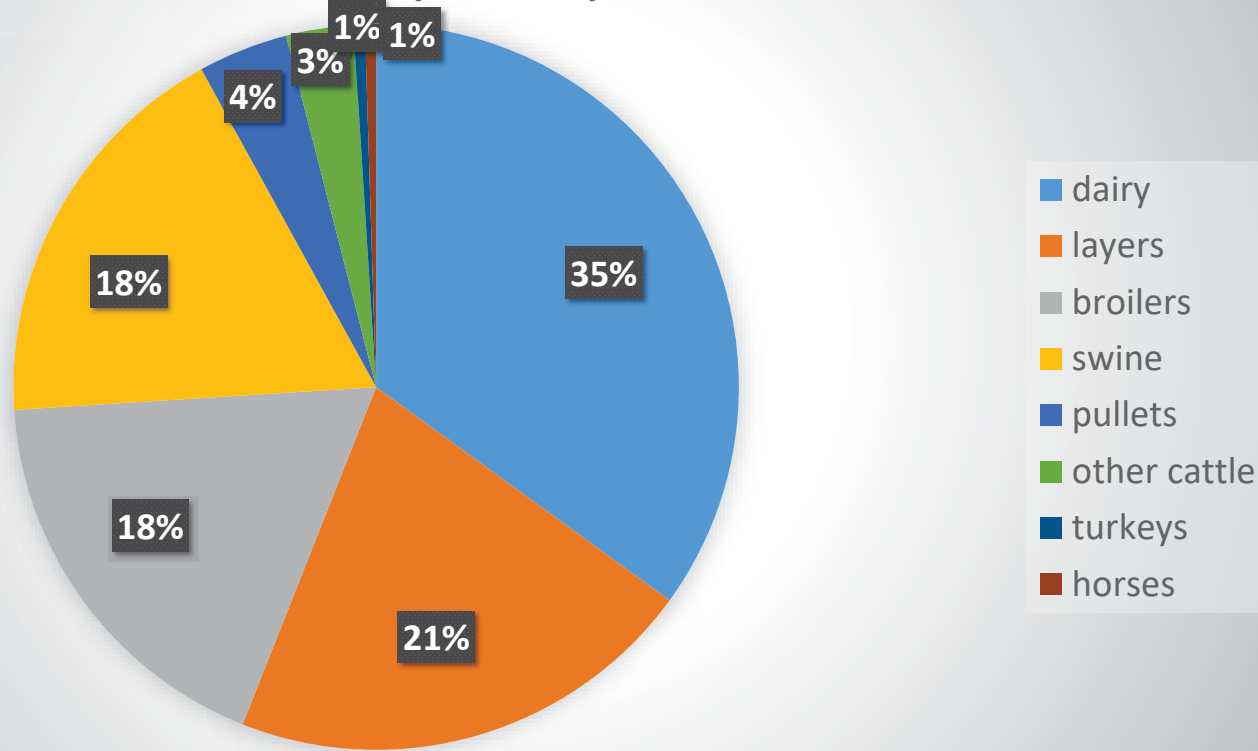
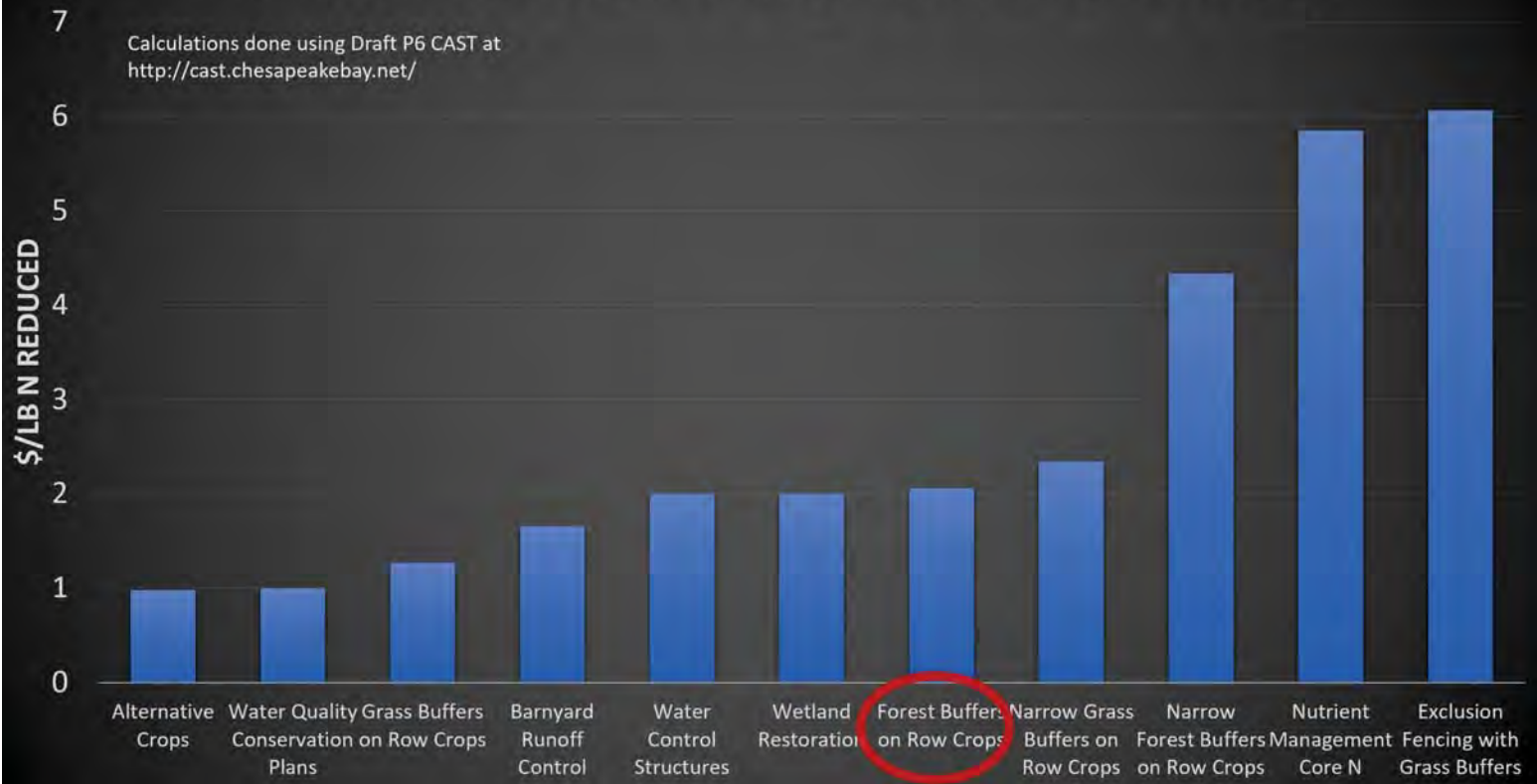# Remaining Agricultural Nitrogen Loads (2016 Progress to E3)
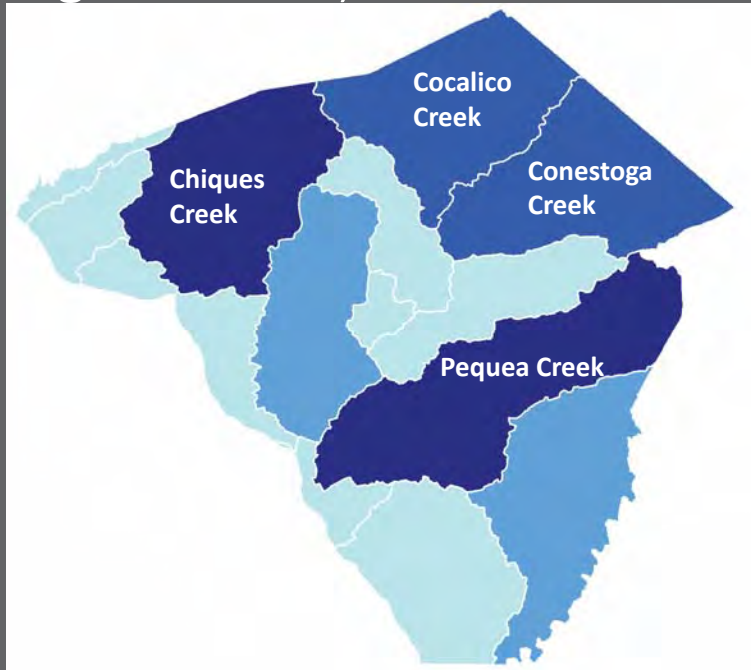
- PA WIP Steering Committee has approved the concept of "tiers" to target restoration efforts

- 50% of the remaining agricultural nitrogen loads exist in just four well-known watersheds in Lancaster County.

Tier 1 (25%)

Tier 2 (50%)

Tier 3 (75%)

Tier 4 (100%)
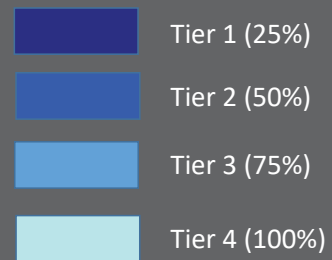
What is my opportunity?
Or, what is not already implemented?

Practice	Current Percent Implementation	Acres Remaining
Basic Nutrient Management	21%	241,286
Conservation Tillage	44%	112,976
Cover Crop	32%	138,385
Prescribed Grazing	7%	41,532
Forest Buffers	NA	24,000

Most Cost-Effective Practices to Reduce N to Bay

Calculations done using Draft P6 CAST at http://cast.chesapeakebay.net/

Y-axis: $/LB N REDUCED (0 to 7)

Categories: Alternative Crops | Water Quality Conservation Plans | Grass Buffers on Row Crops | Barnyard Runoff Control | Water Control Structures | Wetland Restoration | Forest Buffers on Row Crops | Narrow Grass Buffers on Row Crops | Narrow Forest Buffers on Row Crops | Nutrient Management Core N | Exclusion Fencing with Grass Buffers

Determining "Opportunity" (Available Acres) for BMP

Acres of Land Use within 100 ft of Streams in County
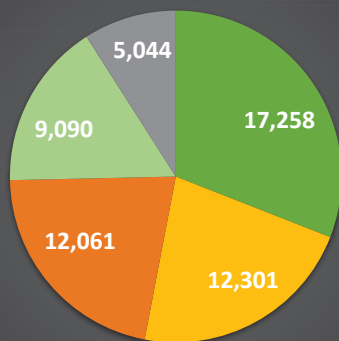
5,044 — Turf Grass
17,258 — Forest
9,090 — Mixed Open
12,061 — Crop
12,301 — Pasture

Legend: Forest | Pasture | Crop | Mixed Open | Turf Grass

- CBPO used high resolution land use data to estimate acres of land uses within 30 meters of streams everywhere in the watershed.

- This analysis indicates there are approximately 12,000 acres of Cropland within 30 meters of streams in this county.

- Opportunity for Forest Buffers on Cropland = 12,000 acres

- **Phase III WIP efforts should describe how much of opportunity is feasible, and how programs and policies will achieve that goal.**

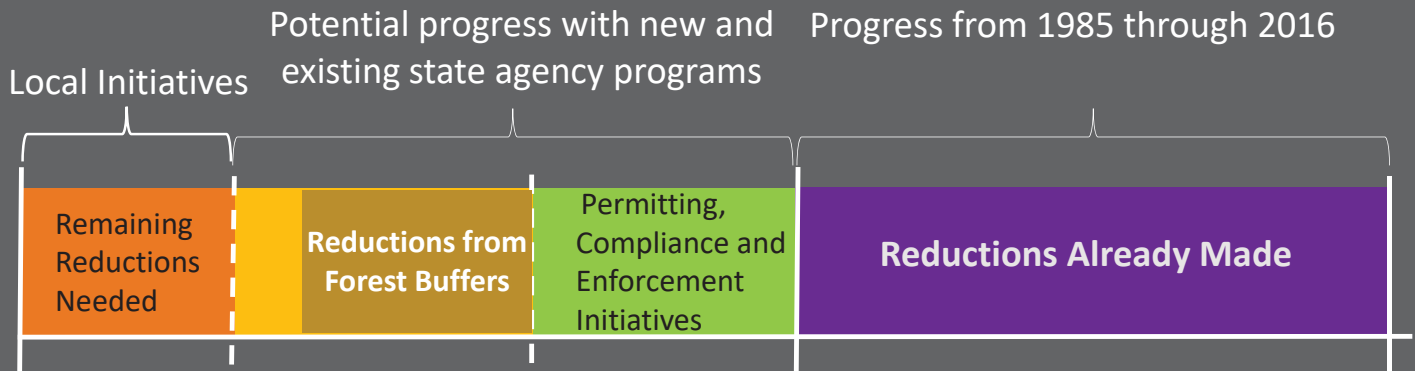# Where can Buffers be Planted (Targeted)?

- CBPO is developing a data tool that will allow users to visualize data from the Phase 6 Model, including potential areas for riparian forest buffers.

- Other organizations could use the data as well to develop even more specific targeting tools.

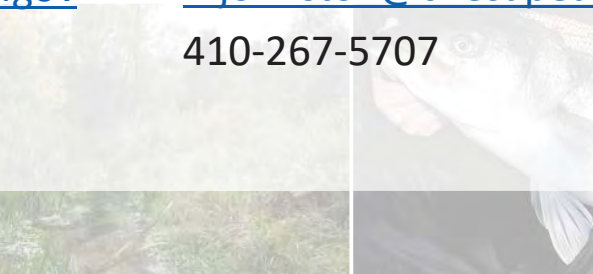- **Stakeholders determine 5,000 acres out of 12,000 available could be planted.**

Estimating Benefits of Buffer Initiative

- Stakeholders enter 5,000 acres of forest buffers in CAST. (http://cast.chesapeakebay.net/)

- CAST estimates about 1 M lbs reduction in nitrogen from 5,000 acres (-200 lbs/acre)

Hypothetical journey to a county goal

Local Initiatives

Potential progress with new and existing state agency programs

Progress from 1985 through 2016

| Remaining Reductions Needed | Reductions from Forest Buffers | Permitting, Compliance and Enforcement Initiatives | Reductions Already Made |

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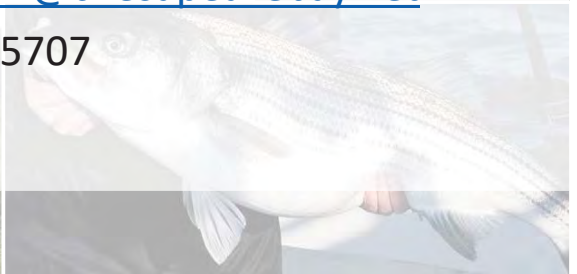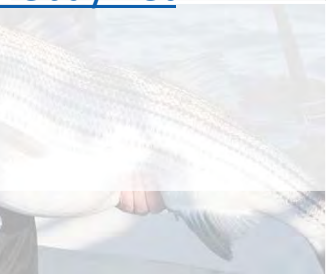
The opinions expressed in this technical presentation are those of the author and do not necessarily reflect the views of US EPA.

* References & descriptions of data analyses are described at the end of these slides.

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