

# Agriculture's Role in Chesapeake Bay Restoration

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Watershed Implementation Program





# Statewide Results (Final Target)

<b>Nitrogen Sector</b>	<b>2009 Progress</b>	<b>2025 Allocation</b>
Agriculture	19,764,135	15,215,223
Forest	5,259,099	5,306,179
Municipal-Industrial	13,582,981	10,537,733
Non-Tidal Atm	664,672	664,672
Septic	2,971,870	1,852,103
Urban	9,705,199	7,594,089
<b>Total</b>	<b>51,947,957</b>	<b>41,170,000</b>

<b>Phosphorus Sector</b>	<b>2009 Progress</b>	<b>2025 Allocation</b>
Agriculture	1,612,749	1,451,036
Forest	150,362	151,820
Municipal-Industrial	763,255	657,239
Non-Tidal Atm	39,836	39,836
Septic	0	0
Urban	735,039	510,068
<b>Total</b>	<b>3,301,242</b>	<b>2,810,000</b>



# Agricultural BMPs

## **Nutrient Management**

- Nutrient Management
- Precision Agriculture
- Enhanced Nutrient Management

## **Conservation Tillage**

## **Cover Crops**

## **Pasture Grazing BMPs**

- Pasture Fencing
- Precision or Intensive Rotational Grazing
- Horse Pasture Management
- Water Control Structures

## **Interim (tracked, but no credit received)**

- Manure Technologies and Incorporation
- Poultry HUAs
- Cropland Irrigation Management
- Ag Stormwater/Nursery Capture and Reuse
- P-Sorbing Materials

## **Other Agricultural BMPs**

- Forest and Grass Buffers
- Wetland Restoration
- Land Retirement
- Tree Planting
- Carbon Sequestration/Alternative Crops
- Conservation Plans/SCWQP
- Non-Urban Stream Restoration
- Manure Transport
- Animal Waste Management Systems
- Mortality Composters
- Poultry & Swine Phytase
- Dairy Precision Feed and/or Forage Management
- Ammonia Emissions Reductions
- Barnyard Runoff Controls



# Agriculture WIPII Plan Goals

<b>BMP</b>	<b>Unit</b>	<b>2013 Milestones</b>	<b>2017 Goal</b>	<b>2025 Goal</b>
10' Fertilizer Setback	Acres	5,280	3168	5,280
Alternative Crops	Acres	200	498	830
Barnyard Runoff Control	Acres	168	219	1,180
CAFO Manure Application Setback	Acres	2,500	1500	2,500
Conservation Tillage	Acres	764,630	704,198	765,487
Cover Crop	Acres	355,000	424,086	424,086
Cropland Irrigation Management	Acres	92,000	119,728	119,728
Dairy Manure Incorporation	Acres	3,976	16,703	27,838
Decision Agriculture - Cropland	Acres	84,920	356,665	594,441
Enhanced Nutrient Management - Tier I	Acres	14,285	60,000	100,000
Enhanced Nutrient Management - Tier II	Acres	14,285	60,000	100,000
Enhanced Nutrient Management - Tier III	Acres	25,000	105,000	175,000
Forest Buffers	Acres	335	1,406	2,344
Grass Buffers; Vegetated Open Channel - Agriculture	Acres	538	2,258	3,763
Heavy Use Poultry Area Concrete Pads	Operations	19	81	136
Horse Pasture Management	Acres	712	2,994	4,990
Irrigation Water Capture Reuse	Acres	1,000	2,120	3,533
Land Retirement to hay without nutrients (HEL)	Acres	2,030	8,536	14,226
Land Retirement to pasture (HEL)	Acres	5,285	22,200	37,000
Loafing Lot Management	Acres	34	145	241



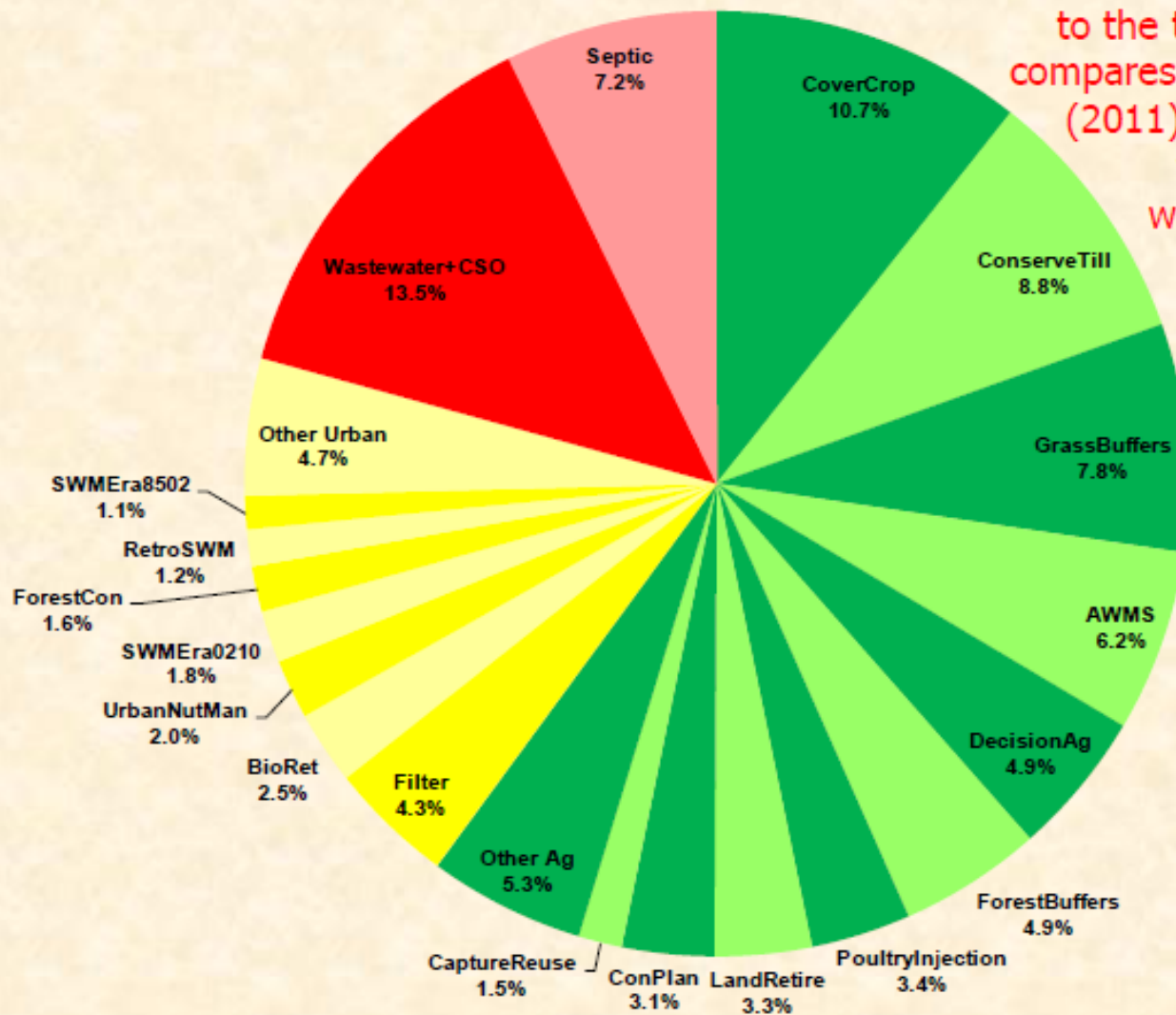
# Agriculture WIPII Plan Goals

BMP	Unit	2013 Milestones	2017 Goal	2025 Goal
Manure Transport - Out of Watershed	Tons	37,000	51,000	85,000
Mortality Composters	Operations	20	87	145
Non Urban Stream Restoration	Linear Feet	6,919	29,061	48,435
Nutrient Management - Cropland	Acres	685,000	211,036	351,726
Nutrient Management - Hayland	Acres	75,000	11,207	18,679
Nutrient Management - Nursery	Acres	1,836	1,836	3,060
Off Stream Watering Without Fencing	Acres	655	2,500	4,167
Poultry Litter Incorporation	Acres	23,876	100,283	167,138
Poultry Litter Treatment	Operations	64	270	450
Precision Intensive Rotational Grazing	Acres	398	1,671	2,785
Prescribed Grazing	Acres	2,614	10,982	18,304
Shallow Wildlife Wetland Habitat Management	Acres	35	150	250
Shoreline Erosion Control	Linear Feet	3,649	15,326	25,543
Soil Conservation and Water Quality Plans	Acres	826,000	1,026,413	1,145,326
Sorbing Materials in Ag Ditches	Acres	737	3,097	5,162
Stream Access Control with Fencing	Acres	5,050	20,956	35,355
Tree Planting; Vegetative Environmental Buffers - Poultry	Acres	118	500	830
Water Control Structures	Acres	2,453	10,289	17,173
Wetland Restoration	Acres	502	2,110	3,516
Phytase	%	24%		
Poultry Waste Structures	Operations	7	31	52
Livestock Waste Structures	Operations	20	87	145



# Nitrogen Relative Load Reductions Maryland

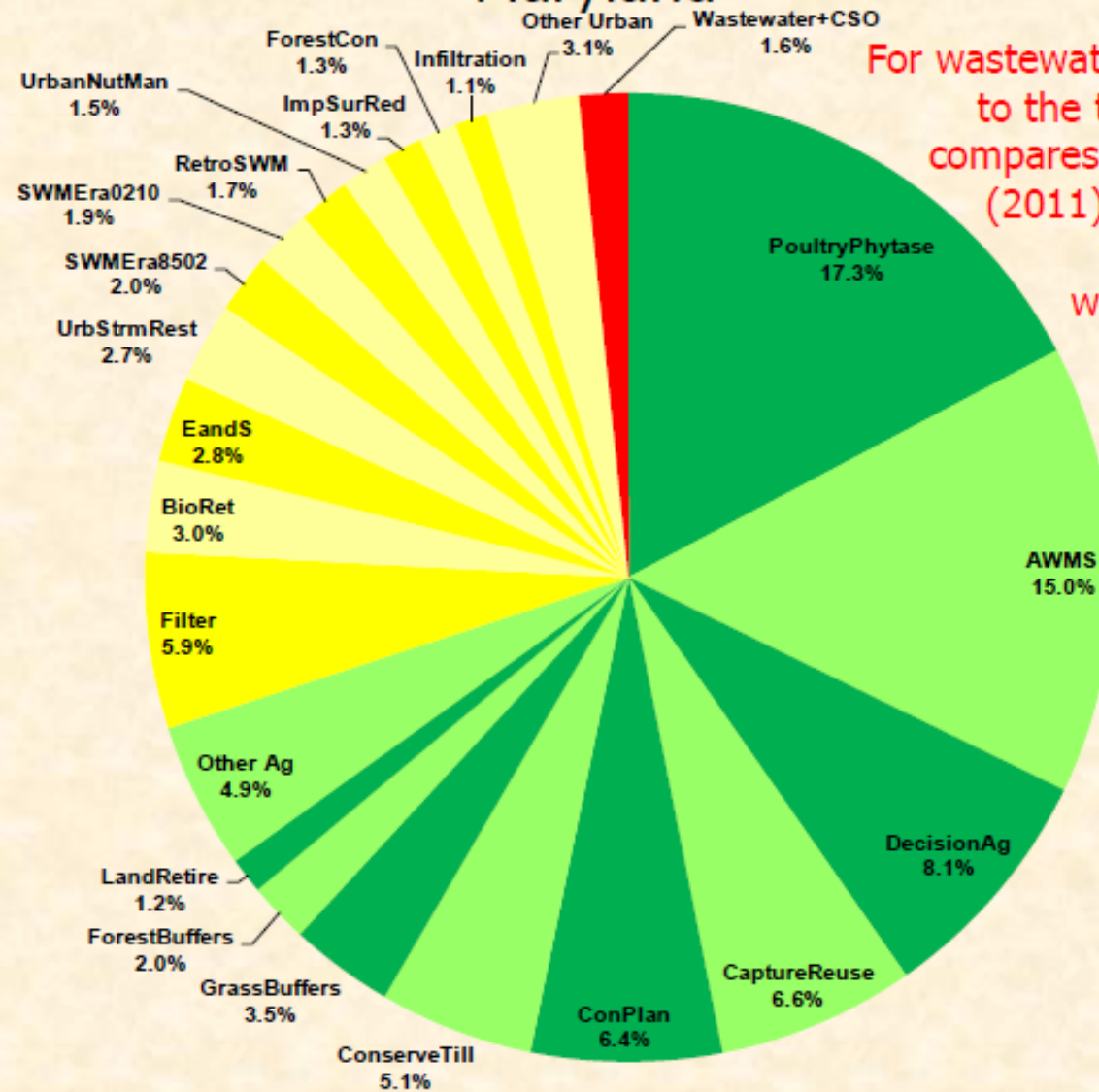
For wastewater, the contribution to the total load reduction compares current discharges (2011) to WIP discharges while BMPs outside wastewater compare No-Action to WIPs.





# Phosphorus Relative Load Reductions

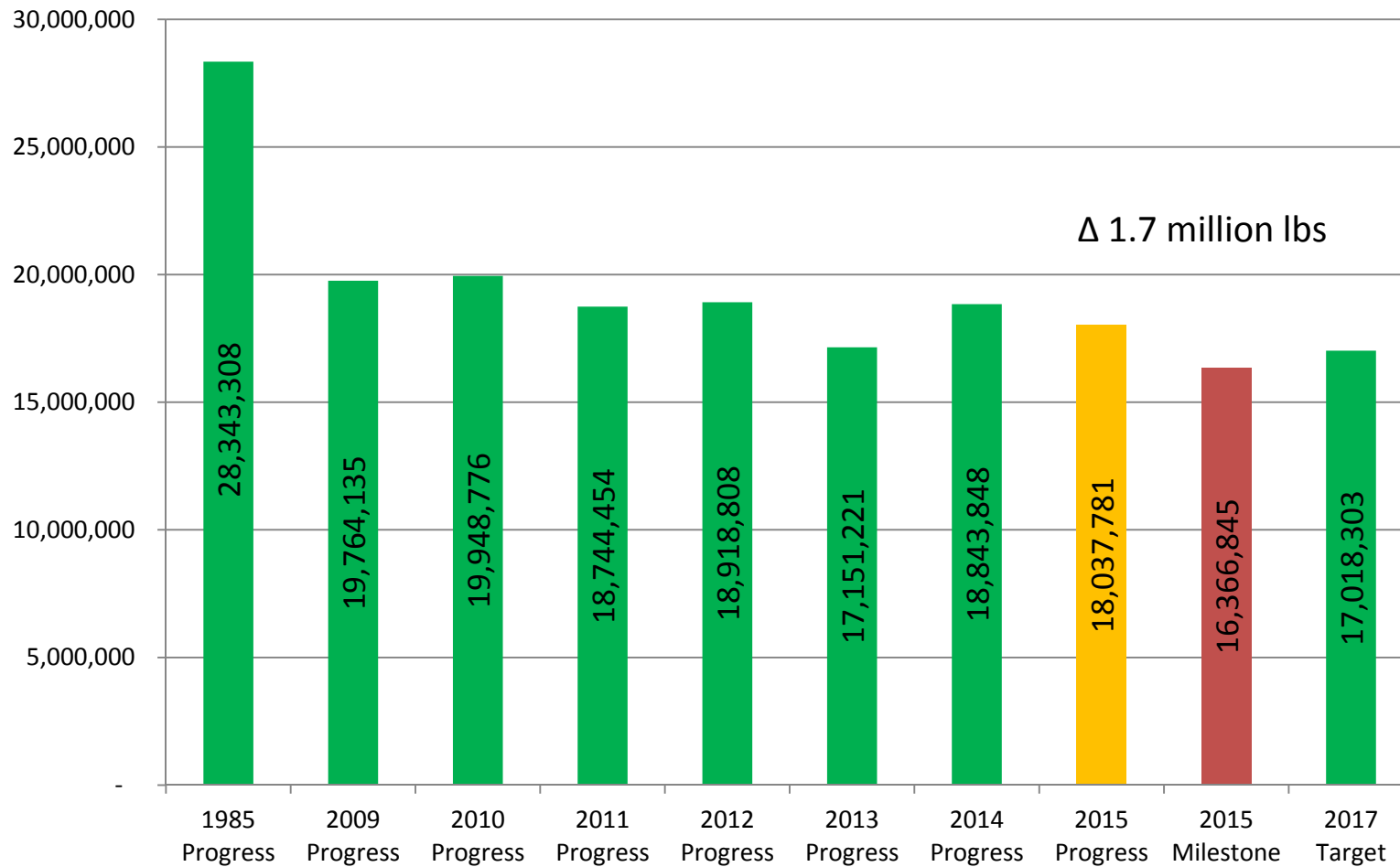
## Maryland



For wastewater, the contribution to the total load reduction compares current discharges (2011) to WIP discharges while BMPs outside wastewater compare No-Action to WIPs.



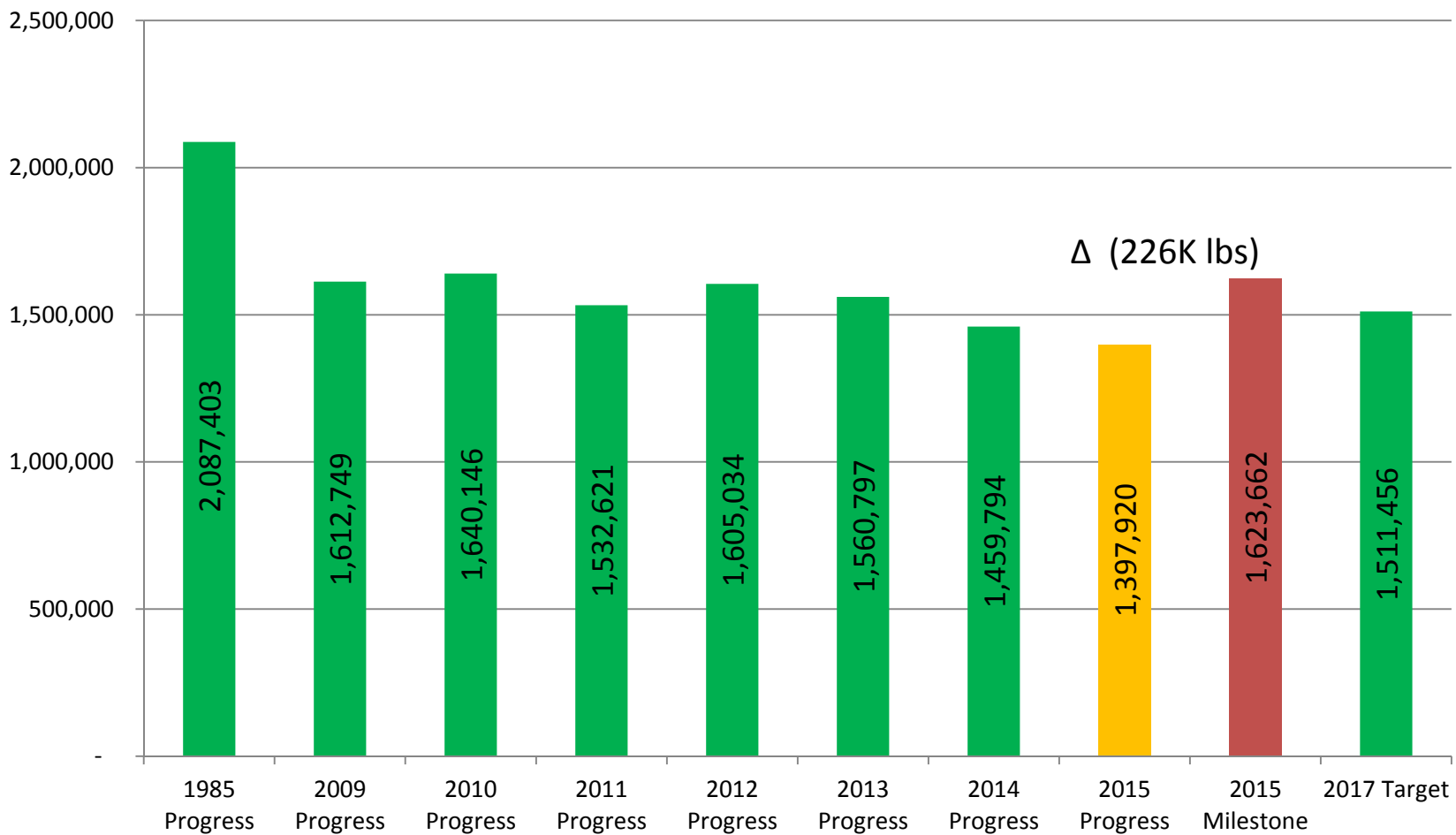
# 2015 Progress Results – Nitrogen (lbs)







# 2015 Progress Results – Phosphorus (lbs)





# Allocation Responsibility & Cost

Source Sector	N Reduction Mil/lbs/yr	Phase II WIP Cost (Mil)	Cost/lb Reduced	% of Total Load Reduction	% of Total Cost
WWTP	5.45	\$2,368	\$400	41%	16%
Agriculture	4.73	\$928	\$200	36%	6%
Urban Retrofits	1.93	\$7,388	\$3,800	15%	51%
Septic Systems	1.15	\$3,719	\$3,200	9%	26%
Total	13.26	\$14,403	\$1,100	100%	100%

Source Sector	P Reduction Mil/lbs/yr	Phase II WIP Cost (Mil)	Cost/lb Reduced	% of Total Load Reduction	% of Total Cost
WWTP	0.177	\$2,368	\$13,400	30%	22%
Agriculture	0.190	\$928	\$4,900	32%	9%
Urban Retrofits	0.220	\$7,388	\$33,600	37%	69%
Total	0.587	\$10.684	\$18,200	100%	100%



# Options for Achieving 2025

## Trading between sectors

- 32 Member Water Quality Trading Advisory Committee
- Issues
  - Amount of credits that can be purchased
  - Geographic restrictions
  - Agricultural assurances
- Draft policy out later this year
- Expected to be a critical tool for Phase III development



# Trading Program Overview

Policy developed in three phases:

- Phase I addresses Point Source-Point Source trading  
Final issued March 2008 by MDE
- Phase II addresses NPS to Point Source trading  
Agricultural Trading Program June 1, 2010 by MDA
- Phase III to address NPS to NPS  
Cross Sector Trading



# Agricultural Nutrient Trading

A program to provide to Maryland farmers a payment for conservation practices.

- A. The practices provide offsets to address new or increased loads associated with a growing population.

WWTP, Development, Industrial Facilities

- B. Private purchase of nutrient reduction projects and practices (retirement credits)

Chesapeake Bay Foundation

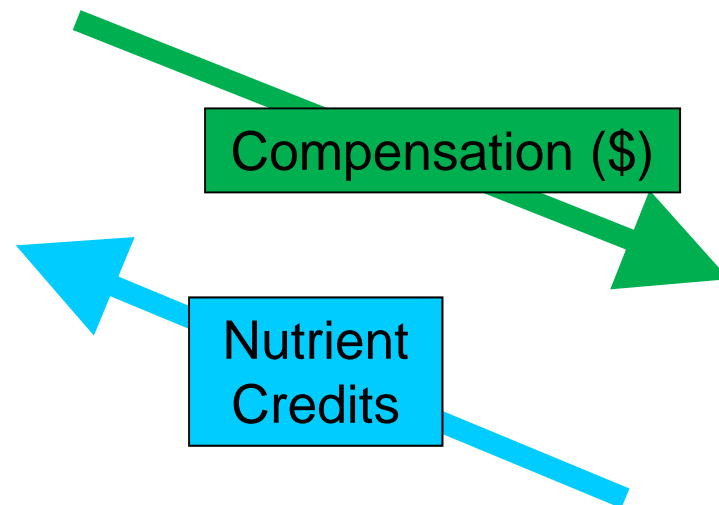
Ducks Unlimited



# Agricultural Nutrient Trading



Buyer



Seller



# Fundamental Trading Principles

- Key Program Principles
- How to Generate Agricultural Credits
  - Eligibility to participate
  - Baseline requirements
  - What is tradable
  - Verification and certification requirements
- How to Exchange Agricultural Credits
  - Finding trading partners
  - How to sell credits
  - Developing Trade Agreements
  - Accountability & Administration



# Key Principles

Establish the foundation of any trading program. They are essential for an equitable, environmentally protectable, yet viable, trading program.

## Key Principle #1

- Any generator of agricultural non-point source credits must first demonstrate they have met the baseline water quality requirements for nitrogen and phosphorus levels in their watershed.





# Baseline Evaluation

## Agricultural Baseline Based on Model Version 5.3.2 (Edge of Segment)

	PTX	POT	SUS	WS	ES
N =	10.3	24.9	17.6	15.9	11.7
P =	1.34	1.78	0.9	1.1	1.0
Sediment =	51.35	552.56	48.58	89.25	117.50

Statewide N = 16.7

Statewide P = 1.3

Statewide Sediment = 171.9



# Bay TMDL vs Local TMDL

Eastern Shore Bay TMDL Nitrogen		Chester River (Middle) Local TMDL Nitrogen
Raw	29.96 lbs/acre	29.96 lbs/acre
TMDL	11.7 lbs/acre	6.91 lbs/acre
% Red	61%	77%
Phosphorus		Phosphorus
Raw	2.01 lbs/acre	2.01 lbs/acre
TMDL	1.03 lbs/acre	0.49 lbs/acre
% Red	49%	73%



## Key Principles (cont.)

- 2) Agricultural generators must be in compliance with all local, state, federal laws, regulations and programs
- 3) BMP's funded by federal or state cost-share can not be used to generate credits during their contract life.
- 4) The Agricultural Trading Program is not intended to accelerate the loss of productive farmland.
- 5) An Agricultural practice can only generate credits once it is installed and verified, or placed in operation.



# What is Tradable

## How to Generate Credits

Once a landowner or operator has determined the tract has achieved the baseline requirements for the watershed additional implementation of water quality improvements can be considered as a tradable credit.

- No partial credits for BMPs utilized to meet baseline.
- Tradable credits can be generated from any planned agronomic, land conversion, or structural practice.
- Some practices (grass buffers/fencing/manure incorporation) are excluded because they are required by nutrient management regulations.



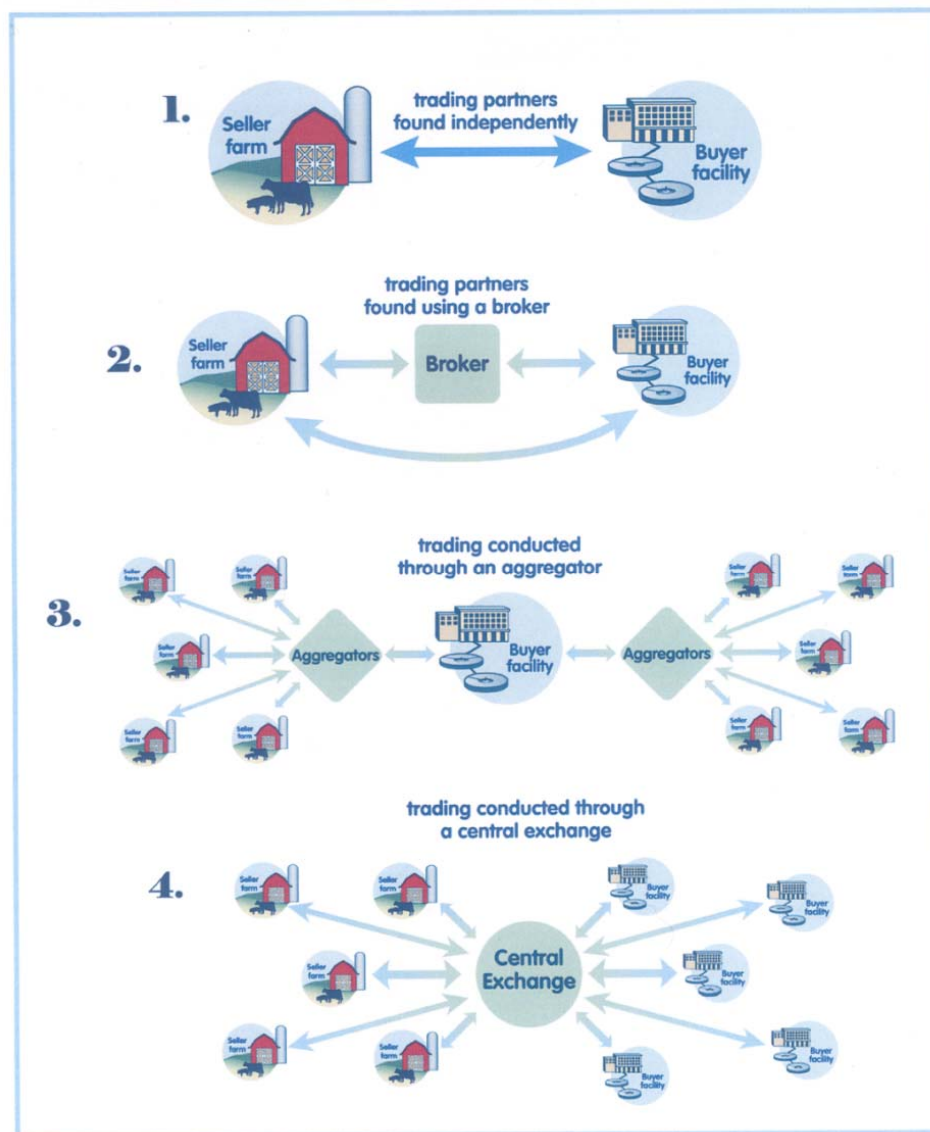
# Agricultural NPS Credit Potential

## Three categories of credit-generating practices

- 1) BMPs with “approved” load reductions (in CBWM and loaded into trading tool)
- 2) BMPs currently in use and requiring technical review
- 3) Other BMPs, practices, or innovative approaches not currently in widespread use and requiring technical review



# Finding a Trading Partner





# Accountability & Administration

- A practice can only generate credits once it is installed and functioning
- An inspection to certify standards and spec were met and the BMP is functional is required
- The full annual credit produced by the practice will not be certified until the year following the year of installation
- Credits are used in the year they are generated
- Credits can not be banked for sale and used in future years
- The Maryland Department of Agriculture (or its designee) will perform annual spot checks on a minimum of 10% of all traded Agricultural credits

Chesapeake Bay Nutrient  
Trading/Tracking  
Tool (CBNTT)  
[www.mdnutrienttrading.com](http://www.mdnutrienttrading.com)





# Trading Tool Recap

- Based on the World Resources Institute (WRI) NutrientNet platform as modified to reflect the Chesapeake Bay Watershed Model land use loads, calculations, and BMP efficiencies
- Tool revised to incorporate the USDA/NRCS Nutrient Tracking Tool (NTT) – APEX Model
- New multi-state platform, the Chesapeake Bay Nutrient Trading/Tracking Tool or CBNTT, that incorporates state-specific tools for Maryland, Virginia, and Pennsylvania



# Web-Based Tool Components

- Calculator to determine eligibility as well as assess nitrogen, phosphorus, and sediment credit potential from agricultural sources
- Registry to register credits and track trades and other pertinent information
- Marketplace for buyers and sellers to post and exchange information on credit availability and price
- Administrative module to manage data and prepare required reports



# Nutrient Tracking Tool (NTT)

- Created by USDA from APEX to provide access to environmental outcomes, such as changes in nutrients, sediment, and yields at the field scale
- Applies parameters (weather, evapotranspiration, crop growth models, temperature, slope, soils) to inputs
- Agronomic options include application methods and type of fertilizer, planting method, harvesting method, cover crops, tillage, irrigation, drainage, etc.
- Calculates the change in N, P, sediment, and yield based upon an initial condition and the adoption of agronomic conservation practices



## Welcome to the Maryland Nutrient Trading Program . . .

### Please Read This Notice before Using the Maryland Nutrient Trading Tool

As of May 1, 2014, the Maryland Nutrient Trading Program launched the latest version of its online tools. The World Resources Institute (WRI), which partners with the Maryland Department of Agriculture (MDA) and the Texas Institute for Applied Environmental Research (TIAER), has utilized the Maryland trading platform as the template for a new multistate platform that can be accessed by users in Maryland, Pennsylvania, and Virginia. WRI and TIAER have transferred all existing accounts from the Maryland platform to the new multistate platform. They are also in the process of transferring the 253 farm worksheets for users who met the April 16 deadline for transfer requests.

To enter the new site, you can continue to use [www.mdnutrienttrading.com](http://www.mdnutrienttrading.com) or alternately you can switch to [www.cbntt.org](http://www.cbntt.org). However, it is recommended that you continue to use the former web address so that you can find specific information and/or learn about activities related to Maryland's program. **For those who had an existing account established before May 1, your account can be found under your current username, but you will have to change your password in order to access your worksheets.**

Because the latest version of the calculation tool incorporates any needed modifications since the last update, as well as changes required by current Maryland Nutrient Management regulations, there have also been some changes



[View Nitrogen and Phosphorous Credits](#)

[Login to CBNTT](#)

[Login to Market \(Under Construction\)](#)

[Technical References & Guidelines](#)

- [Guidelines for Agricultural Credit Sellers](#)
- [Guidelines for Agricultural Credit Buyers](#)
- [Policy for Point Source Buyers & Sellers](#)
- [NRCS BMP List \(PDF\)](#)



# CHESAPEAKE BAY NUTRIENT TRADING

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## AGRICULTURAL PROJECT WORKSHEETS

[Home](#) » [Projects](#) » [My Farm4](#) » [Edit location](#)

[Summary](#) [Details](#) [Edit Location](#) [Fields](#) [Review](#) [Submit](#)



### Map Navigation

Use the map, address search or county and ZIP code lists below to find your area.

location search...

Zoom to a County:

Zoom to a ZIP Code:

### Farm Field Tools

To add a new parcel or field, click the **New** button to enter field name and then click on the map to draw the parcel or field boundary.

To edit a parcel or field, first select it using the **Editing Options**. Then drag the vertices to edit the boundary.

Click the **Submit** button to start your nutrient credit calculation.

### Editing Options:

Parcel  
 Fields:

[New](#) [Remove](#) [Submit](#)



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## AGRICULTURAL PROJECT WORKSHEETS

[Home](#) » [Projects](#) » [My Farm4](#) » [Fields](#) » 2

[General](#) | [Soil](#) | [Current Crop Management](#) | [Current BMPs](#) | [Current Nutrient Load](#) | [Future Crop Management](#) | [Future BMPs](#) | [Future Nutrient Load](#)

### FIELD INFORMATION

Enter field information.

**Watershed:** Chapel Branch-Choptank River

**Land river segment:** A24011EM3\_4321\_0000

**Major basin:** Eastern Shore

**TMDL watershed:** N/A

**Field number:\***

**Field type:\***

**Field is adjacent to stream/water body\***  
The term adjacent refers to land that is physically part of your land parcel.

**Notes:**

## COMMERCIAL FERTILIZER APPLICATIONS

Enter all commercial fertilizer applications used on this field. Please enter the total nitrogen and total phosphorus values (not ammonium or phosphate).

Add a Commercial Fertilizer Application

## MANURE FERTILIZER APPLICATIONS

Enter animal manure applications for the given year. If pasture, manure generated by livestock is automatically accounted for based on the information entered in the grazing livestock section.

Click [here](#) to see typical manure values.

Add a Manure Fertilizer Application

## OTHER TILLAGE OPERATIONS

Enter tillage operations here. Tillage operations for incorporated fertilizer entered in the previous two sections are already accounted for, so do not enter fertilizer incorporation tillage operations here.

Add a Tillage Operation

## HARVEST / END OF SEASON OPERATIONS

Enter the end-of-season harvest and/or termination date(s) for this crop. For annual crops such as corn, you should select 'Harvest and Terminate Crop.' Generally, a termination date should occur before the plant date of any subsequent crop in this rotation, though in some instances aerial seeding might be used to plant a subsequent crop before the final harvest and kill dates of an existing crop in which case the harvest and kill dates of the existing crop would come after the plant date of the subsequent crop.

End Of Season 1 ✖

End of season operation type:\*

- Select end of season operation type
- Select end of season operation type
- Terminate Crop (No Harvest)
- Harvest Only
- Harvest and Terminate Crop

Date:\*

Harvest as silage:

Add End Of Season

## COVER CROP

Please indicate whether a conservation (i.e., non-commodity) cover crop will be planted following this crop. For commodity cover crops, please add a crop to your rotation.

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## AGRICULTURAL PROJECT WORKSHEETS

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[General](#) [Soil](#) [Current Crop Management](#) [Current BMPs](#) [Current Nutrient Load](#) [Future Crop Management](#) [Future BMPs](#) [Future Nutrient Load](#)

The crops in this field's current crop rotation are listed below. You may add a crop to the rotation or click on a specific crop to edit it.

Crop	Grazing Livestock	Commercial Fertilizer	Manure Fertilizer	Tillage Operations	Harvest Operations	Cover crop	Actions
<input type="text" value="Add a crop to rotation"/>							

Copy data into



Forest buffer:

Grass buffer:

### FERTILIZER APPLICATION SETBACK

Setback in place:

Average width of setback:\*  ft

Linear feet of setback:\*  ft

Area of setback:\* N/A ac

Planned:

### WETLAND

Wetland in place:

### OTHER LAND USE CONVERSION

Please indicate any non-riparian land conversion in place or planned on this field.

Acres converted:  ac

Converted to:

Planned:

### OTHER BEST MANAGEMENT PRACTICES

BMP 1

BMP type:\*

- Planned:
- Select BMP type
  - Decision/Precision Agriculture
  - Sorbing Materials in Ag Ditches
  - Water Control Structures
  - Soil Conservation and Water Quality Plans

Add BMP

### STREAMBANK RESTORATION

Streambank restoration in place:

### PLANNED CHANGES TO CROP MANAGEMENT

## FUTURE BMPs

All additional BMPs not captured under the Current Crop Management tab should be listed here.

Click [here](#) to show BMP descriptions (PDF format).

If current BMPs will remain in place, click on the 'Import Current BMPs' button below. Then, add additional BMPs and/or expand existing BMPs.

Import current BMPs

## RIPARIAN/CONSERVATION BUFFER BMPs

Enter information if you have a riparian/conservation buffer BMP in place. Note: If the nitrogen load reduction calculated for alternative watering facility is greater than that for buffers, it will be used instead.

Forest buffer:

Grass buffer:

## FERTILIZER APPLICATION SETBACK

Setback in place:

## WETLAND

Wetland in place:

## OTHER LAND USE CONVERSION

Please indicate any non-riparian land conversion in place or planned on this field.

Acres converted:  ac

Converted to:

Planned:

## OTHER BEST MANAGEMENT PRACTICES

Add BMP

## STREAMBANK RESTORATION

Streambank restoration in place:

State: Maryland  
 County: Caroline  
 Watershed: Chapel Branch-Choptank River  
 Major basin: Eastern Shore  
 TMDL: none

**N LOAD INFORMATION**

<b>Farm meets N baseline:</b>	Yes	<b>Future N load for animal HQ (EOS):</b>	0.00 lbs/yr
<b>Baseline N load fields (EOS):</b>	2,310.00 lbs/yr	<b>Delivery Ratio:</b>	1.0
<b>Current N load fields (EOS):</b>	1,043.81 lbs/yr	<b>Total Reductions (EOS):</b>	271.52 lbs/yr
<b>Future N load fields (EOS):</b>	772.30 lbs/yr	<b>Eligible reductions:</b>	271.52 lbs/yr
<b>Current N load for Animal HQ (EOS):</b>	0.00 lbs/yr	<b>Credits:</b>	272

**P LOAD INFORMATION (EOS)**

<b>Farm meets P baseline:</b>	Yes	<b>Future P load for animal HQ:</b>	0.00 lbs/yr
<b>Baseline P load fields (EOS):</b>	189.00 lbs/yr	<b>Delivery Ratio:</b>	1.0
<b>Current P load fields (EOS):</b>	45.62 lbs/yr	<b>Total Reductions (EOS):</b>	1.96 lbs/yr
<b>Future P load fields (EOS):</b>	43.66 lbs/yr	<b>Eligible reductions:</b>	1.96 lbs/yr
<b>Current P load for Animal HQ (EOS):</b>	0.00 lbs/yr	<b>Credits:</b>	2

**SEDIMENT LOAD INFORMATION**

<b>Farm meets sediment baseline:</b>	Yes	<b>Future sediment load for animal HQ (EOS):</b>	0.00 t/yr
<b>Baseline sediment load fields (EOS):</b>	16.32 t/yr	<b>Delivery Ratio:</b>	1.0
<b>Current sediment load fields (EOS):</b>	2.72 t/yr	<b>Total Reductions (EOS):</b>	1.41 t/yr
<b>Future sediment load fields (EOS):</b>	1.31 t/yr	<b>Eligible reductions:</b>	1.41 t/yr
<b>Current sediment load for Animal HQ (EOS):</b>	0.00 t/yr	<b>Credits:</b>	1



# Partners





# Questions

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410-841-5879

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