

Maryland's TMDL Process and the Role for Agriculture

WIP Phase II Summary



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Resource Conservation Operation



Nutrient Loadings in Maryland



	NITROGEN			PHOSPHOROUS			SEDIMENT		
	Total N (lbs) 2008	Total N from Farms	% N from Farms	Total P (lbs) 2008	Total P from Farms	% P from Farms	Total Sediment (tons) 2008	Total Sediment From Farms	% S from Farms
Maryland Bay Watershed			35%			41%			69%
Choptank	3,647,488.35	2,480,382	68%	340,259.26	217,113	64%	46,937.07	38,916	83%
Lower Eastern	6,589,602.57	3,615,162	55%	501,598.41	279,994	56%	61,508.66	42,397	69%
Lower Potomac	2,669,658.52	990,661	37%	194,729.20	79,198	41%	67,080.64	44,222	66%
Lower Western	1,655,732.52	116,742	7%	134,127.99	6,523	5%	16,053.23	8,783	55%
Middle Potomac	6,325,749.79	726,022	11%	299,659.93	40,547	14%	70,696.60	30,505	43%
Patapsco/Back	11,408,933.88	345,325	3%	583,538.40	23,127	4%	45,035.63	13,949	31%
Patuxent	3,659,947.51	673,045	18%	280,586.47	55,230	20%	123,643.78	61,822	50%
Upper Eastern	6,038,739.87	4,290,812	71%	525,503.34	361,492	69%	96,405.22	83,052	86%
Upper Potomac	8,444,353.90	4,576,367	54%	653,084.22	403,338	62%	331,569.50	266,929	81%
Upper Western	4,342,885.16	1,586,856	37%	259,835.72	83,444	32%	106,757.06	73,999	69%



Development & Implementation of Ag WIPII



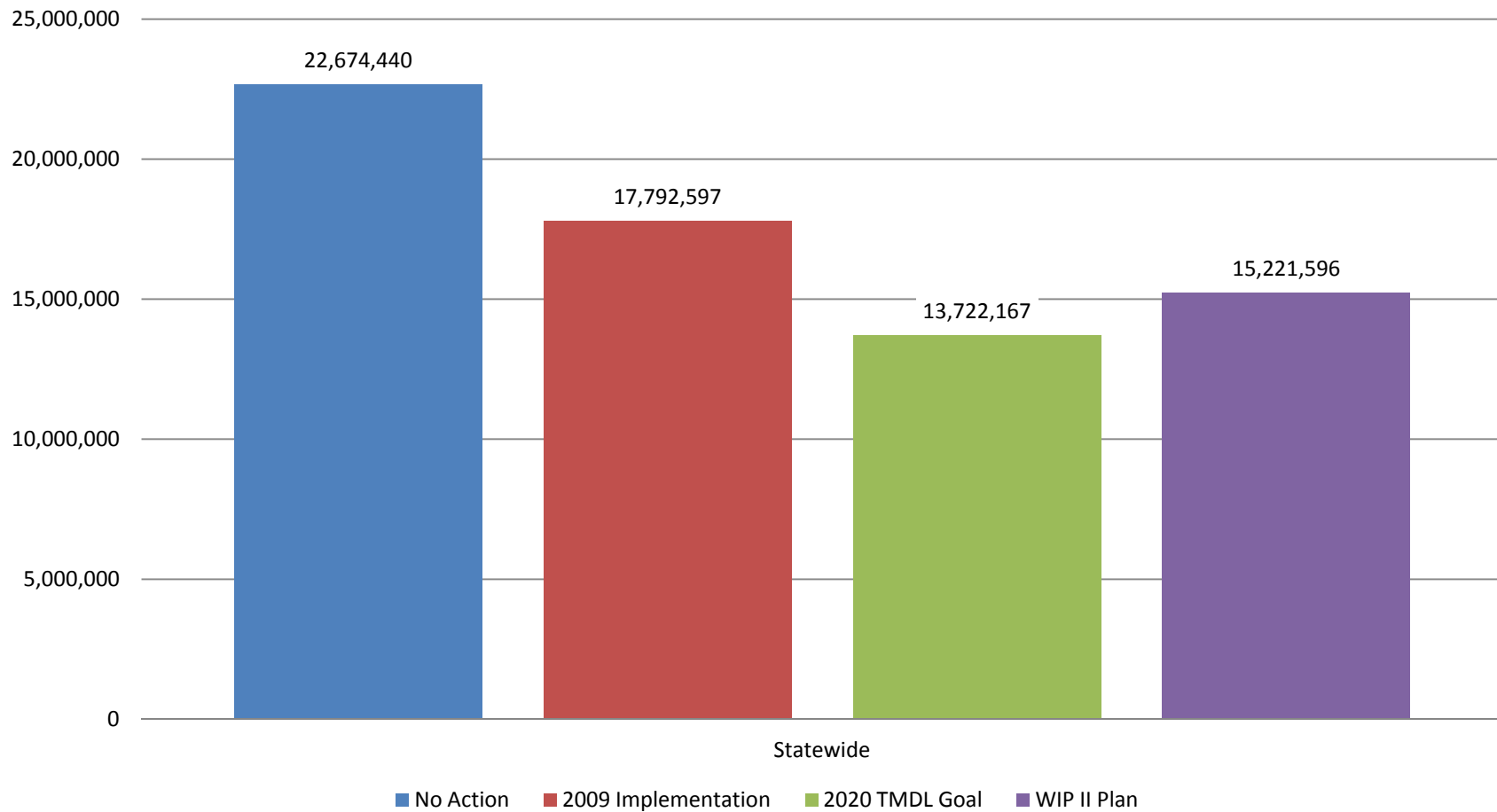
- County based Ag workgroups assigned county load allocation for agriculture
- Each workgroup developed 2020 plan to meet the agricultural targets
- MDA extended implementation rates for some practices to 2025 (SCWQP / pasture practices)
- County plan used to develop 2 year implementation goals
- Utilize ag workgroups,
 - 2 sets of meetings, 2 sets of goals
 - 2 planning tools, 2 strategies (existing, aggressive)
- Tracked & reported through Conservation Tracker

Summary Table															
												Gap	2,537	1,844	
												Current	-	-	
												Goal	2,537	1,844	Goal 634 461
												Remaining	2,537	1,844	
	Units	N Red* lb/unit	P Red* lb/unit	6/30/2009			7/1/2009 - 3/31/2011			2020			2 yr milestone (12-13)		
				Impl	N Red	P Red	Impl	N Red	P Red	Impl	N Red	P Red	Impl	N Red	P Red
6	BMP														
7	Conservation Tillage	acres	4.61	1.13		0	0		0	0		0	0		0
8	Continuous No-Till	acres/yr				0	0		0	0		0	0		0
9	Cover Crops - Commodity	acres/yr	2.88			0	0		0	0		0	0		0
10	Cover Crops - Traditional Private	acres/yr	8.92	0		0	0		0	0		0	0		0
11	Dairy Manure Incorporation	acres	8.8	0		0	0		0	0		0	0		0
12	Decision/Precision Agriculture	acres	7.15	0.48		0	0		0	0		0	0		0
13	Manure Transport	tons/yr	12			0	0		0	0		0	0		0
14	Manure Transport Alt Use Out of Watershed	tons/yr				0	0		0	0		0	0		0
15	Nutrient Mgmt Plan Impl	acres/yr	3.11	0.3		0	0		0	0		0	0		0
16	Poultry Manure Incorporation	acres	5.2	0		0	0		0	0		0	0		0
17	Water Irrigation Mgmt	acres	6.89	0		0	0		0	0		0	0		0
18	Heavy Use Area -Poultry Pad	operation	330	0		0	0		0	0		0	0		0
19	Heavy Use Area -Livestock	acres		0		0	0		0	0		0	0		0
20	Livestock Waste Structures	structures	531	104		0	0		0	0		0	0		0
21	Poultry Waste Structures	structures	210	42		0	0		0	0		0	0		0
22	Retirement of Highly Erodible Land - Private	acres	9.55	0.03		0	0		0	0		0	0		0
23	Runoff Control Systems	systems	69	13		0	0		0	0		0	0		0
24	Soil Conservation & Water Quality Plans	acres/yr	0.93	0.14		0	0		0	0		0	0		0
25	Stream Protection with Fencing	acres	6.79	0.91		0	0		0	0		0	0		0
26	Stream Protection without Fencing	acres	3.4	0.46		0	0		0	0		0	0		0
27	Stream Restoration(Ag) in Non-Coastal Plain	lf	0.02	0.0035		0	0		0	0		0	0		0
28	Streamside Forest Buffers Private	acres	26.72	1.94		0	0		0	0		0	0		0
29	Streamside Grassed Buffers - Private	acres	17.06	0.82		0	0		0	0		0	0		0
30	Water Control Structures	acres/yr	3	0		0	0		0	0		0	0		0
31	Wetland Restoration - Private	acres	28.72	1.94		0	0		0	0		0	0		0
32	Alt crops/switchgrass		17.06	0.82		0	0		0	0		0	0		0
33	Ammonia emission reduction (PLT)	operation				0	0		0	0		0	0		0
34	Animal Mortality Composter	structures													
35	Assmnt Non CS BMPs	acres				0	0		0	0		0	0		0
36	Horse Pasture Management	acres													
37	Loss of Ag Land	acres	11			0	0		0	0		0	0		0
38	Structural, vegetative, & non-structural shore erosion	miles				0	0		0	0		0	0		0
39	Vegetated Open Channels	linear ft				0	0		0	0		0	0		0
40	Vegetative Environmental Buffer	operation	26	0		0	0		0	0		0	0		0
41															
42															
43															
44	Total														

* based on CBP 4.3 model reductions



Statewide Agriculture Plan for Nitrogen (1st Meeting)





Maryland Assessment Scenario Tool

- Scenario List
- Scenario Details
- Urban
- Septic
- Processed Water
- Forest
- Agriculture**
- Animals
- Manure Transport
- Summary
- Log Out

state Agriculture BMPs

Pre-BMP Landuse Acres ▲	Non-Federal	Federal
alfalfa	45551.8	424.5
animal feeding operations	1686.9	17.9
concentrated animal feeding operations	322.2	0.7
degraded riparian pasture	797.7	7.8
hay with nutrients	168827.8	1759.9
hay without nutrients	78044.3	530.7
hightill with manure	963715.6	5170.8
hightill without manure	46655.1	303.1
lowtill with manure	0	0
nursery	6190.4	61.9
nutrient management alfalfa	0	0
nutrient management hay	0	0
nutrient management hitil with manure	0	0
nutrient management hitil without manure	0	0
nutrient management lotil	0	0
nutrient management pasture	0	0
pasture	200299.7	2075.1

[Pre Bmp Landuse Raw Data](#)

Select the BMP you would like to add:

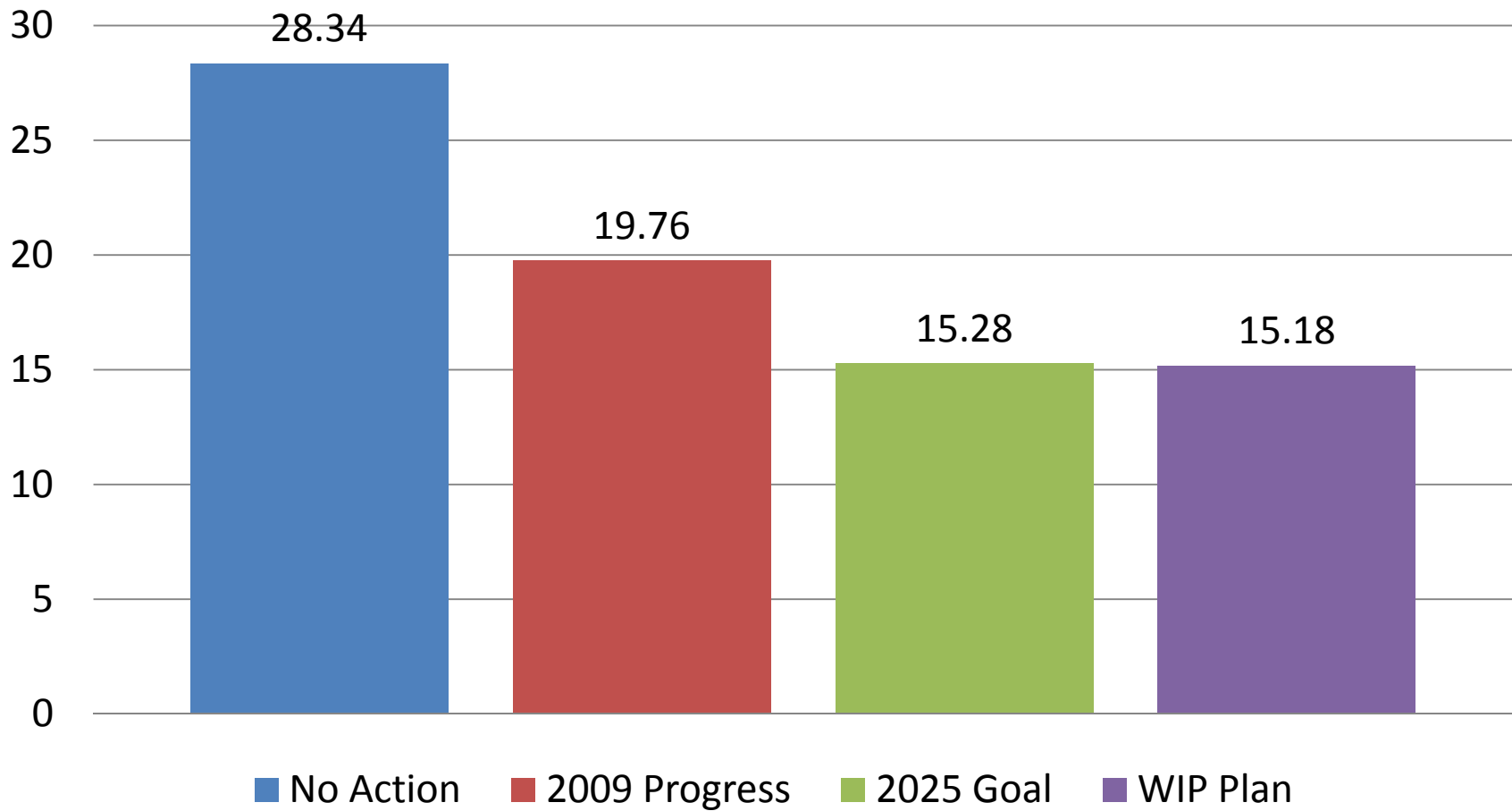
- Please Select a BMP -
- Alternative Crops
- Barnyard Runoff Control
- Commodity Cover Crop Early Drilled Wheat
- Commodity Cover Crop Early Other Rye
- Commodity Cover Crop Early Other Wheat
- Commodity Cover Crop Early-Planting Other Barley
- Commodity Cover Crop Late-Planting Drilled Wheat
- Commodity Cover Crop Standard Other Rye
- Commodity Cover Crop Standard Other Wheat
- Commodity Cover Crop Standard-Planting Drilled Barley
- Commodity Cover Crop Standard-Planting Drilled Wheat
- Commodity Cover Crop Standard-Planting Other Barley
- Conservation Tillage
- Continuous No Till
- Cover Crop Early Drilled Rye
- Cover Crop Early Drilled Wheat
- Cover Crop Early Other Rye
- Cover Crop Early Other Wheat
- Cover Crop Early-Planting Drilled Barley
- Cover Crop Early-Planting Other Barley
- Cover Crop Late Other Wheat
- Cover Crop Late-Planting Drilled Wheat
- Cover Crop Late-Planting Other Rye
- Cover Crop Standard Drilled Barley
- Cover Crop Standard Drilled Rye
- Cover Crop Standard Drilled Wheat
- Cover Crop Standard Other Barley
- Cover Crop Standard Other Rye
- Cover Crop Standard Other Wheat
- Cropland Irrigation Management
- Dairy Manure Injection
- Decision Agriculture
- Dirt & Gravel Road Erosion & Sediment Control - Driving Surface

or the BMP:



Statewide Agriculture Plan for Nitrogen

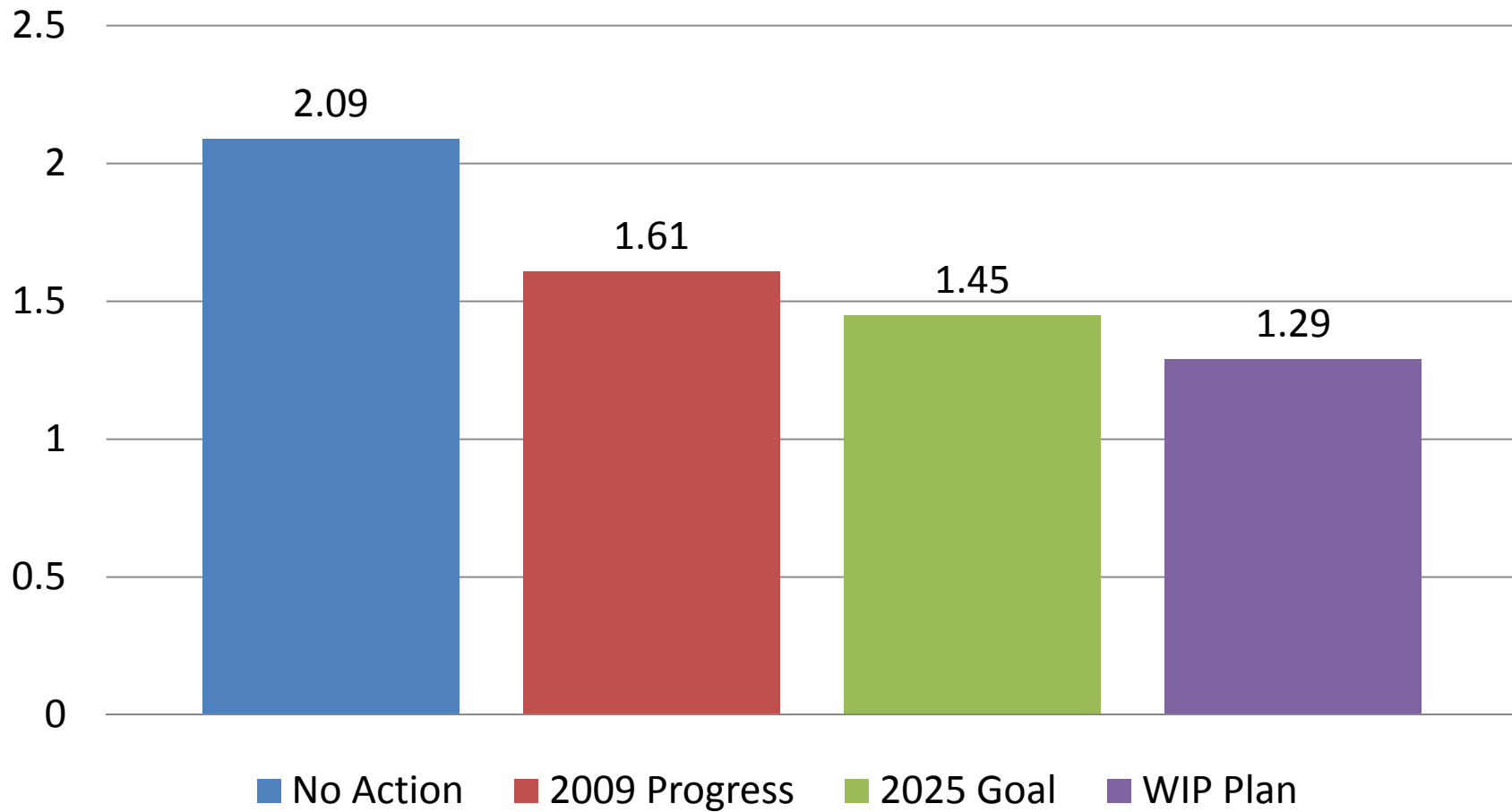
(2nd Meeting)





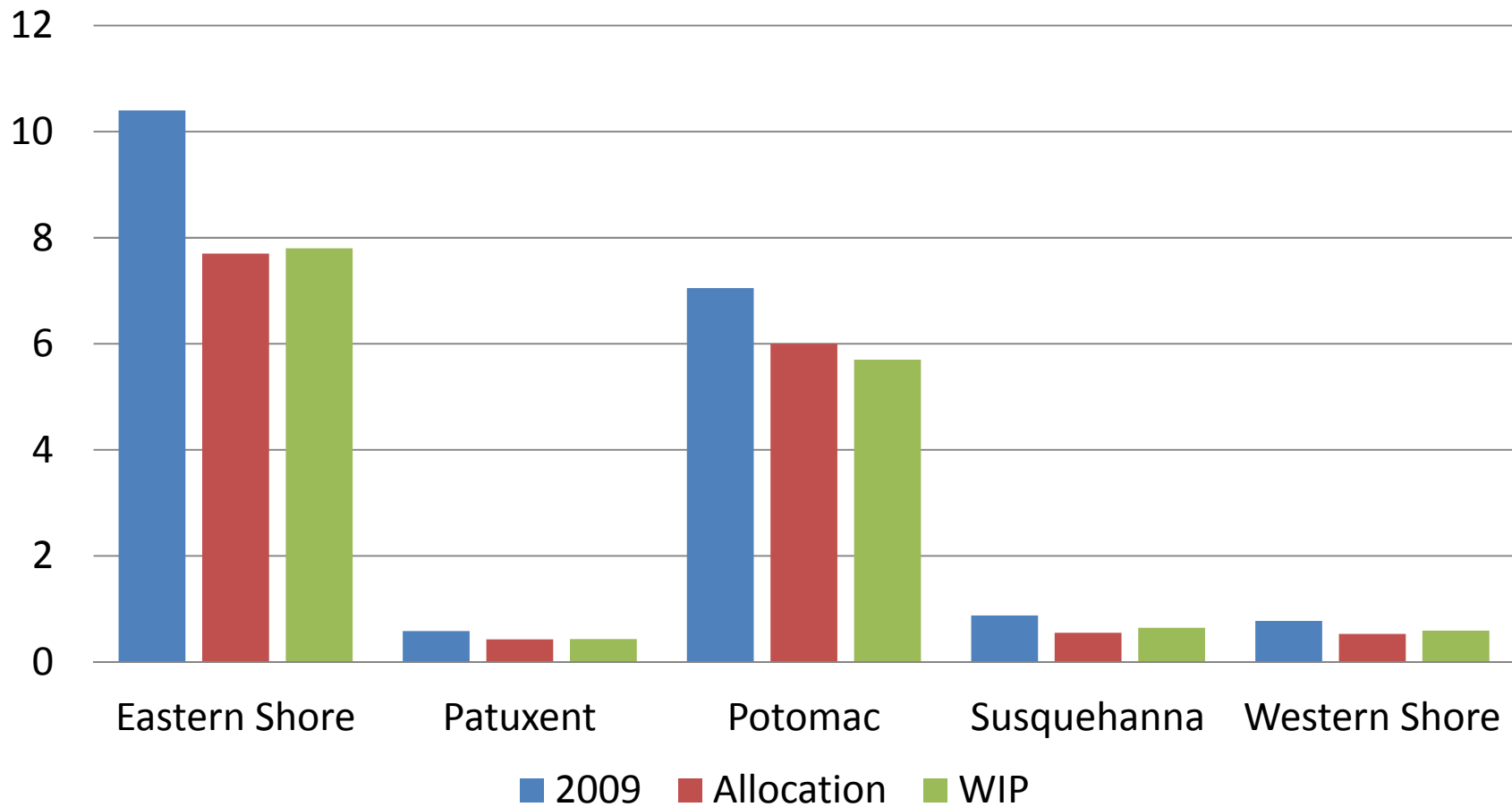
Statewide Agriculture Plan for Phosphorus

(2nd Meeting)



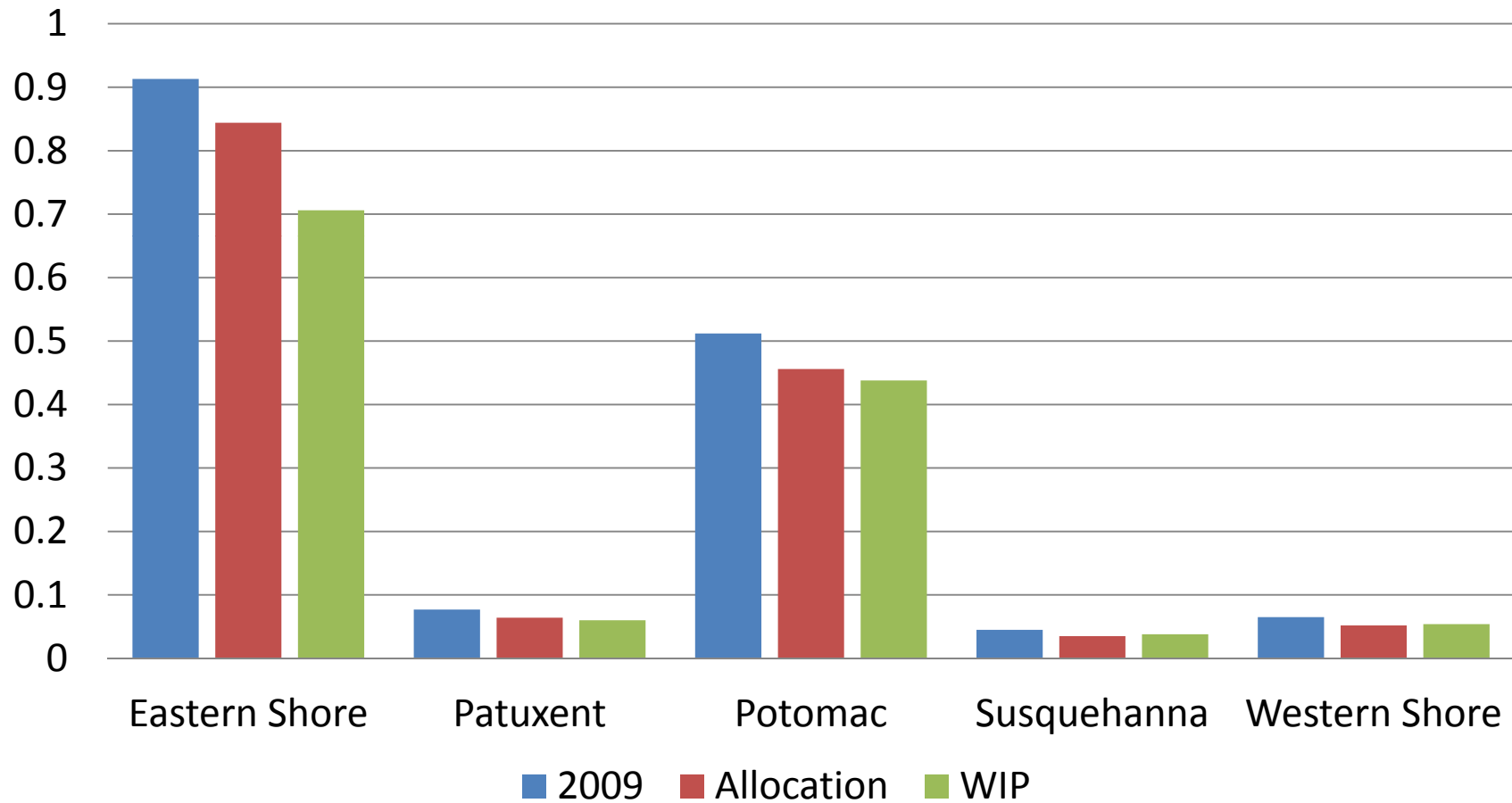


Agriculture Plan for Nitrogen by Basin





Agriculture Plan for Phosphorus by Basin





Agriculture WIPII Plan Goals



BMP	Unit	2013 Milestones	2017 Goal	2025 Goal
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 (cont)



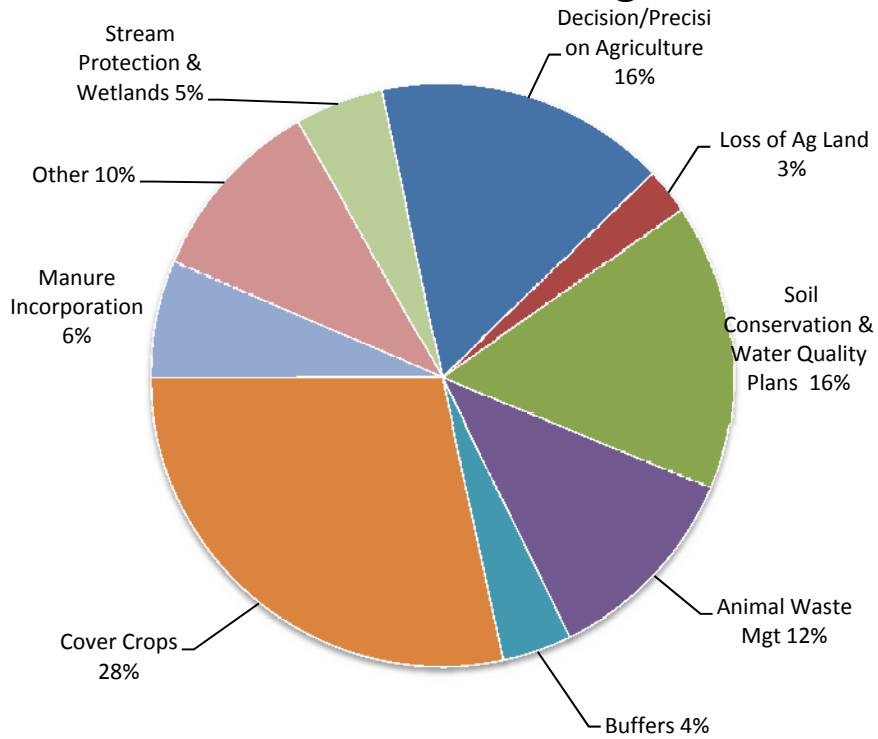
BMP	Unit	2013 Milestones	2017 Goal	2025 Goal
Manure Transport - Out of Watershed	Tons	37,000	51,000	85,000
Mortality Composters	Operations	20	87	145
Non Urban Stream Restoration	Linear Feet	6,919	29,061	48,435
Nutrient Management - Cropland	Acres	685,000	211,036	351,726
Nutrient Management - Hayland	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



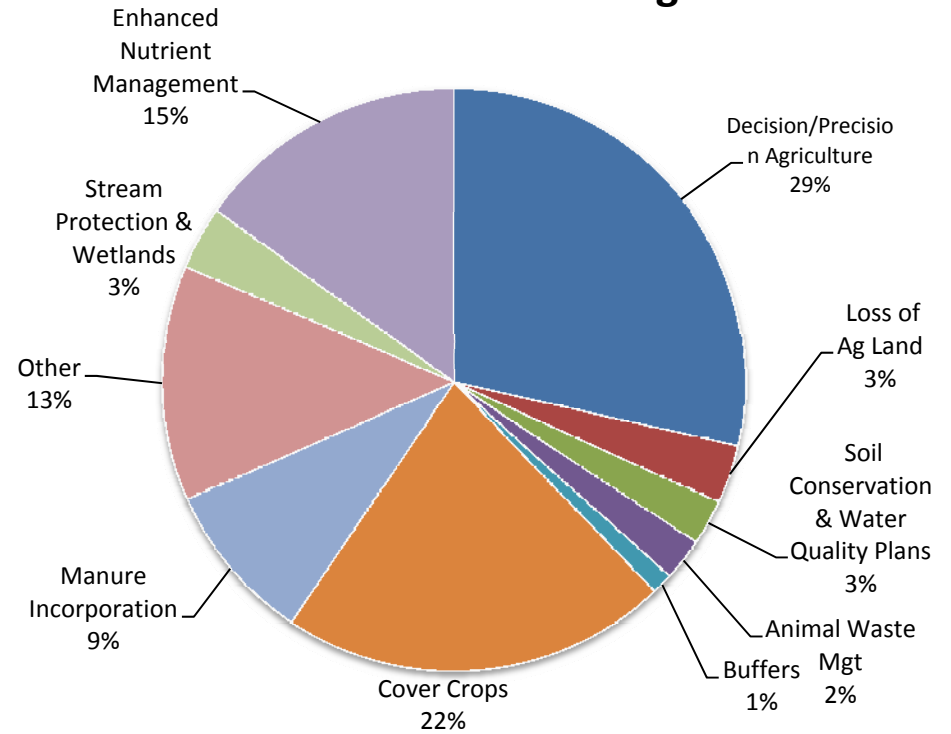
Estimated 2025 N Reduction by BMP



WIP II First Meeting



WIP II Second Meeting





WIP Modeling Summary - Agriculture



- Watershed Model Run
 - All 23 county Agriculture inputs completed by Nov 1st
 - Submitted to EPA CBP on Nov 22nd / Results Resubmitted on Dec 15th & Dec 22nd
 - Need for further confirmation of Agr reduction
- Validation
 - Problems with agriculture loads in some counties
 - Developed “adjusted load” that relates MAST to watershed model (See Next two Slides)
 - Improvement of agriculture loads, animal #s & manure generated



MAST 2009 Progress Validation



Total Nitrogen

County	Total	AFO	conex	Crop	Developed	Forest	Hay	Nursery	Pasture
Allegany, MD	0%	0%	0%	0%	0%	0%	0%	0%	-4%
Anne Arundel, MD	0%	0%	0%	1%	0%	0%	1%	0%	-3%
Baltimore City, MD	0%	0%	1%	0%	0%	0%	0%	0%	0%
Baltimore, MD	0%	-2%	0%	1%	0%	0%	1%	0%	-2%
Calvert, MD	0%	0%	1%	0%	0%	0%	0%	0%	-2%
Caroline, MD	42%	0%	0%	52%	0%	0%	0%	0%	39%
Carroll, MD	-11%	0%	0%	-15%	0%	0%	-12%	0%	-19%
Cecil, MD	1%	0%	0%	2%	0%	0%	2%	0%	-7%
Charles, MD	0%	0%	1%	0%	0%	0%	0%	0%	-11%
Dorchester, MD	-7%	0%	0%	-12%	0%	0%	0%	0%	-7%
Frederick, MD	-1%	-1%	0%	0%	0%	0%	0%	0%	-27%
Garrett, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Harford, MD	0%	0%	0%	0%	0%	0%	0%	0%	-3%
Howard, MD	0%	0%	0%	2%	0%	0%	1%	0%	-3%
Kent, MD	0%	0%	0%	-1%	0%	0%	0%	0%	15%
Montgomery, MD	-3%	0%	0%	-10%	0%	0%	-8%	0%	-16%
Prince Georges, MD	0%	0%	1%	0%	0%	0%	0%	0%	-5%
Queen Annes, MD	-4%	0%	0%	-8%	0%	0%	0%	0%	106%
Somerset, MD	129%	0%	0%	177%	0%	0%	0%	0%	-24%
St. Marys, MD	0%	0%	0%	0%	0%	0%	0%	0%	-6%
Talbot, MD	-6%	0%	0%	-7%	0%	0%	0%	0%	-125%
Washington, MD	0%	-1%	0%	0%	0%	0%	0%	0%	-3%
Wicomico, MD	-25%	0%	0%	-41%	0%	0%	0%	0%	26%
Worcester, MD	-4%	0%	0%	-6%	0%	0%	0%	0%	-14%

Green – Good agreement
Orange – Fair agreement
Red – Poor agreement

Take home message..
 All but three counties have good overall agreement
 Pasture simulation is problematic



MAST 2009 Progress Validation



Total Phosphorus

County	Total	AFO	conex	Crop	Developed	Forest	Hay	Nursery	Pasture
Allegany, MD	0%	0%	0%	0%	0%	0%	1%	0%	-1%
Anne Arundel, MD	0%	1%	0%	0%	0%	0%	21%	0%	0%
Baltimore City, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Baltimore, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Calvert, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Caroline, MD	-5%	-22%	0%	-2%	0%	0%	-16%	0%	-82%
Carroll, MD	-8%	-10%	0%	-15%	0%	0%	2%	0%	-16%
Cecil, MD	0%	6%	0%	0%	0%	0%	1%	0%	1%
Charles, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Dorchester, MD	-19%	-23%	0%	-23%	0%	0%	34%	0%	-1%
Frederick, MD	0%	4%	0%	0%	0%	0%	3%	0%	-1%
Garrett, MD	0%	-1%	0%	0%	0%	0%	2%	0%	0%
Harford, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Howard, MD	0%	2%	0%	0%	0%	0%	0%	0%	-1%
Kent, MD	2%	5%	0%	4%	0%	0%	-8%	0%	-2%
Montgomery, MD	-1%	-6%	0%	-5%	0%	0%	0%	0%	-6%
Prince Georges, MD	0%	1%	0%	0%	0%	0%	-1%	0%	0%
Queen Annes, MD	16%	6%	0%	29%	0%	0%	7%	0%	-92%
Somerset, MD	18%	-23%	0%	27%	0%	0%	-13%	0%	-7%
St. Marys, MD	0%	0%	0%	0%	0%	0%	0%	0%	0%
Talbot, MD	-2%	-4%	0%	-1%	0%	0%	-1%	0%	-84%
Washington, MD	0%	2%	0%	0%	0%	0%	-1%	0%	0%
Wicomico, MD	61%	-21%	0%	107%	0%	0%	38%	0%	1%
Worcester, MD	0%	-23%	0%	5%	0%	0%	107%	0%	0%

Green – Good agreement
 Orange – Fair agreement
 Red – Poor agreement

Take home message..
 Better overall agreement than TN
 All but four counties have good overall agreement
 3 fair and 1 poor



Next Steps



- Agricultural Workgroup has identified over 40 potential areas of concern
- 3 Subcommittees Formed with workplan for 2013
 - Nutrient Management Panel
 - Review Current NM efficiencies / recommendations
 - Decision Ag / Enhanced NM
 - Nursery BMPs
 - Cover Crop
 - Review efficiencies
 - Commodity Cover Crops / No Fall N application
 - Additional species (Forage Radish, Rapeseed etc)
 - Manure Application



Next Steps (cont)



- Conservation Tillage
 - Review efficiencies
 - Model Processing
 - No-Till vs Conservation tillage
 - Manure Incorporation



Accounting for Growth and Agriculture



- Maryland Nutrient Trading Program will define offset for Agriculture
- Ag offset are for new loads and new development not as a mechanism for counties to meet their urban TMDL targets.
- Farms to provide offsets will require assessment, verification, certification and monitoring
- Last year we had over 5,000 hits on website with 160 accounts opened. Approximately 80 assessment have been run to date. Two farms have received credit certification. Approximately 200 farms will be under certification review in 2012.
- Have hired two additional staff to perform credit verification and monitoring
- A few counties are already working with SCDs and aggregators to inventory and assess the potential for future agricultural offset.
- MDA assisting with grants to inventory voluntary BMPs and trading offset potentials



Statewide Results (Final Target)



- Agriculture meets statewide TN target
- Agriculture exceeds TP by 150,000 lbs

Nitrogen Sector	2009 Progress	P5.3.2 Jan 6 th	2025 Allocation
Agriculture	19,764,135	15,180,379	15,215,223
Forest	5,259,099	5,431,962	5,306,179
Municipal-Industrial	13,582,981	10,544,128	10,537,733
Non-Tidal Atm	664,672	664,672	664,672
Septic	2,971,870	1,867,002	1,852,103
Urban	9,705,199	7,322,315	7,594,089
Total	51,947,957	41,010,458	41,170,000

Phosphorus Sector	2009 Progress	P5.3.2 Jan 6 th	2025 Allocation
Agriculture	1,612,749	1,296,277	1,451,036
Forest	150,362	154,877	151,820
Municipal-Industrial	763,255	657,329	657,239
Non-Tidal Atm	39,836	39,836	39,836
Septic	0	0	0
Urban	735,039	510,728	510,068
Total	3,301,242	2,659,047	2,810,000