Milestone Base Conditions & Portraying Load Changes

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Milestones Workgroup Call
Chesapeake Bay Program
November 5, 2012

Milestone Base Conditions

Issue

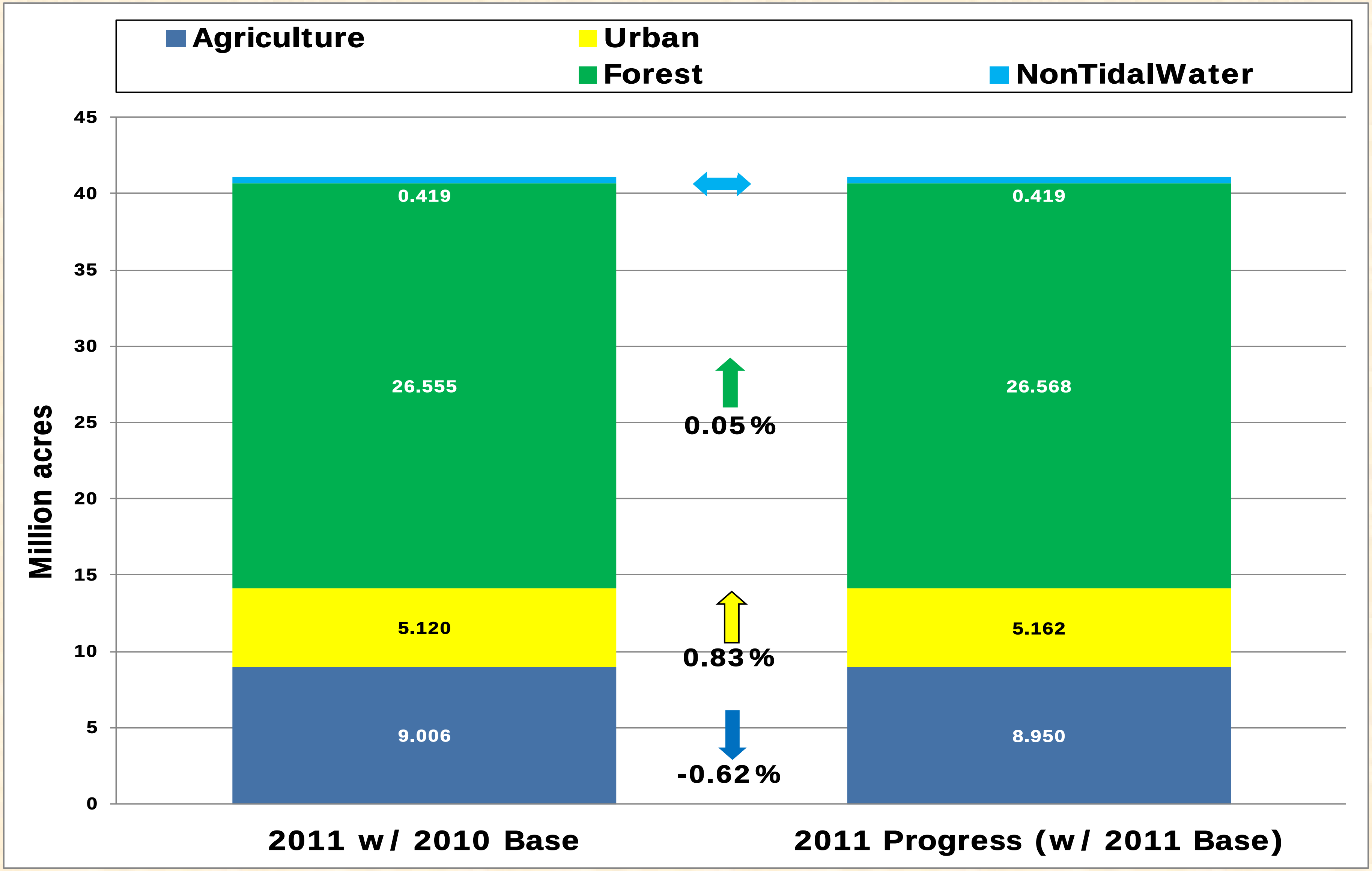
- 2013 Milestones (and WIPs) were developed on 2010 base conditions (land uses, animal population, septic systems) but will be assessed on 2013 base conditions for these parameters.

Milestone Base Conditions

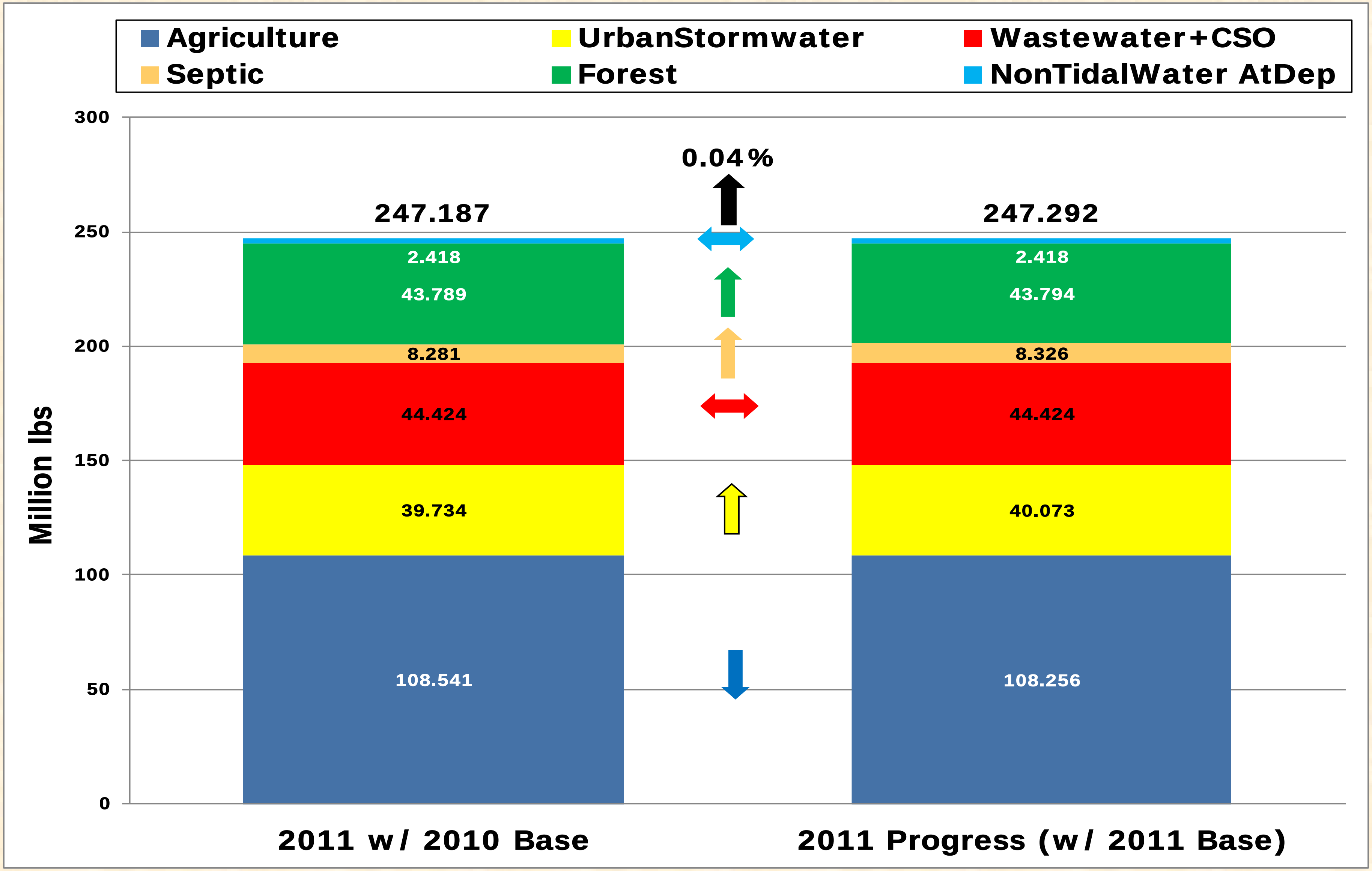
Issue

- Two versions of the 2011 model assessment were run:
  - 2011 Progress = 2011 base conditions
  - 2011 with 2010 base conditions (same as Milestones & WIPs)

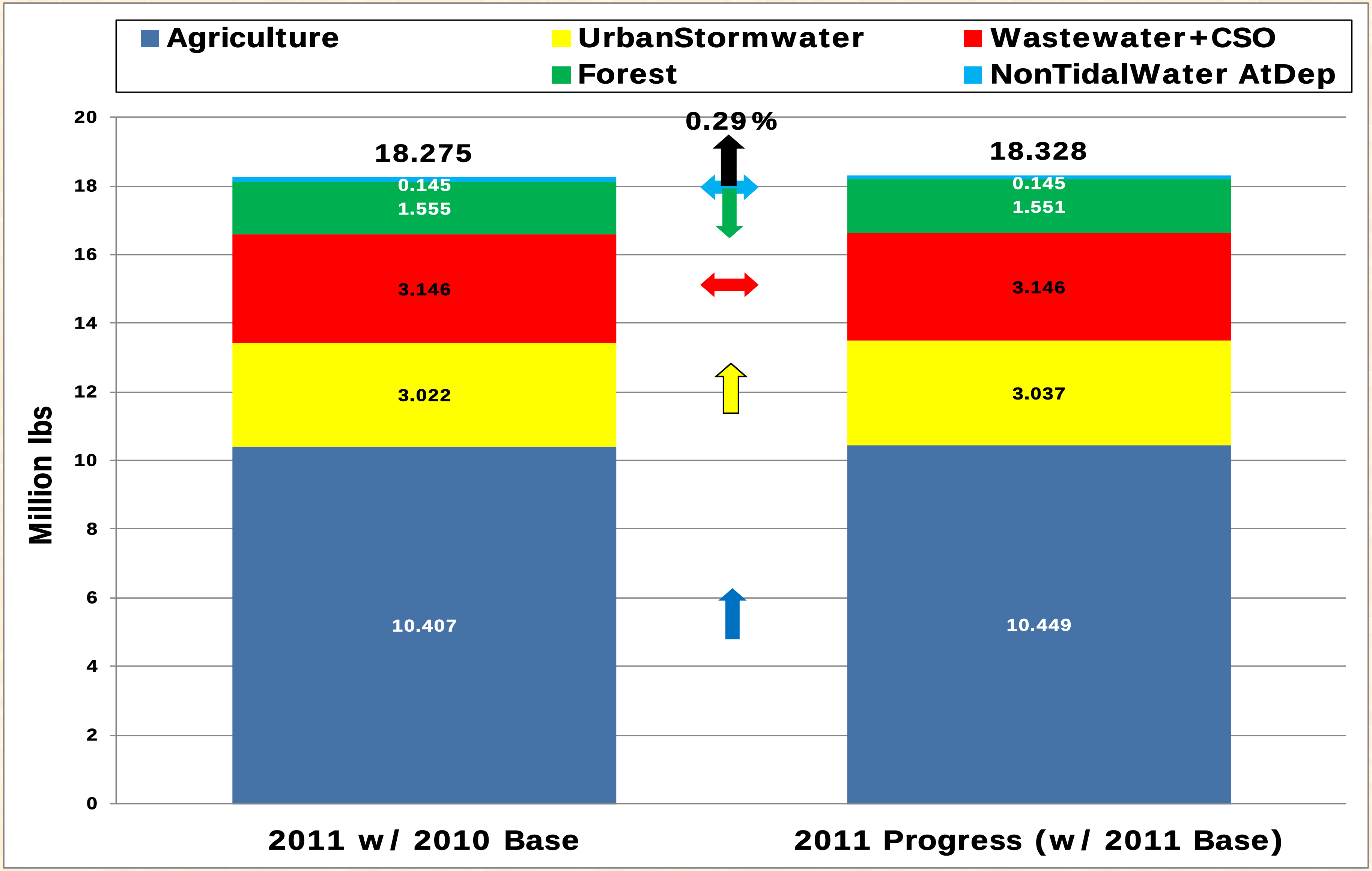
Land Area
CB Watershed-Wide Post-BMP



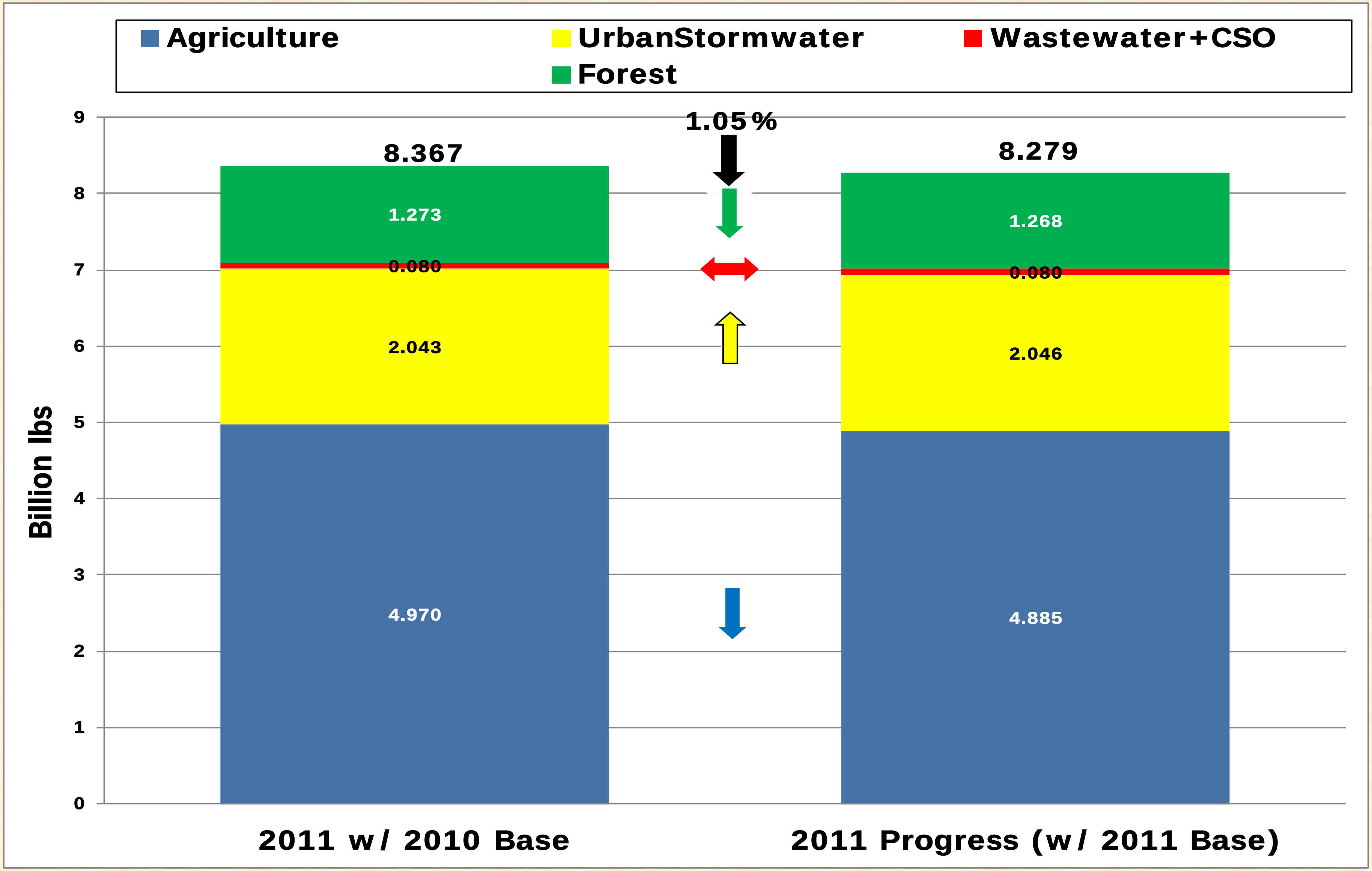
Nitrogen Loads
CB Watershed-Wide Delivered



Phosphorus Loads
CB Watershed-Wide Delivered



Total Solids Loads
CB Watershed-Wide Delivered



2011 with 2010 Base → 2011 Base
VA Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	-79,908	-0.39%	30,700	0.61%
UrbanStormwater	103,531	1.00%	6,972	0.54%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	22,346	0.90%	0	0.00%
Forest	-18,259	-0.15%	-4,039	-0.52%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	27,711	0.04%	33,634	0.41%

2011 with 2010 Base → 2011 Base
MD Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	-158,009	-0.84%	-1,599	-0.10%
UrbanStormwater	111,374	1.18%	4,115	0.57%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	26,067	0.87%	0	0.00%
Forest	-1,948	-0.04%	-576	-0.38%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	-22,515	-0.04%	1,940	0.06%

2011 with 2010 Base → 2011 Base
PA Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	41,054	0.07%	6,906	0.27%
UrbanStormwater	99,191	0.57%	1,938	0.26%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	-3,577	-0.17%	0	0.00%
Forest	12,819	0.06%	287	0.07%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	149,487	0.13%	9,132	0.19%

2011 with 2010 Base → 2011 Base DE Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	23,041	0.70%	1,861	0.63%
UrbanStormwater	6,058	1.59%	313	1.51%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	2,087	1.33%	0	0.00%
Forest	753	0.23%	8	0.10%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	31,939	0.76%	2,182	0.67%

2011 with 2010 Base → 2011 Base WV Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	-30,491	-1.20%	5,996	1.20%
UrbanStormwater	18,820	2.27%	1,443	1.39%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	2,911	1.64%	0	0.00%
Forest	-1,587	-0.10%	-397	-0.35%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	-10,347	-0.19%	7,042	0.87%

2011 with 2010 Base → 2011 Base NY Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	-80,662	-1.90%	-1,912	-0.40%
UrbanStormwater	-912	-0.07%	-161	-0.14%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	-4,492	-1.40%	0	0.00%
Forest	13,567	0.44%	475	0.43%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	-72,499	-0.70%	-1,598	-0.18%

2011 with 2010 Base → 2011 Base DC Load Difference

	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference	2010-2011 Base Difference
	del_TOTN (lbs/year)	%	del_TOTP (lbs/year)	%
Agriculture	0	0.00%	0	0.00%
UrbanStormwater	747	0.36%	84	0.50%
Wastewater+CSO	0	0.00%	0	0.00%
Septic	0	0.00%	0	0.00%
Forest	-131	-1.56%	-2	-1.43%
NonTidalWaterAtDep	0	0.00%	0	0.00%
AllSources	616	0.03%	82	0.10%

Milestone Base Conditions

Decisions

- Need to make decision on which baseline to use in progress for measuring against 2013 Milestones (that were developed on 2010 baseline).
- For future Milestones (post-2013):
  - Decision for which baseline to use when measuring status against goals should be uniform through time, i.e., Milestones and WIPs.
  - 2017 Progress will be weighed against 2017 Milestones (and 2017 WIPs).
  - Decision for which baseline to use when measuring status against goals should be uniform among jurisdictions.

Milestone Base Conditions

Discussion

- Growth Offsets – TMDL clearly states that jurisdictions need to offset any new or increased loads resulting from growth. This includes any increased loads associated with land use changes, populations, septic, etc.
  - Jurisdictions’ decision to develop TMDL with 2010 background conditions (landuse, animal population, septic) – with some understanding of pros and cons of doing so.
  - Did not have projected conditions for all parameters for Phase II WIPs and 2013 Milestones.
  - Currently projecting one year at a time for progress.

Milestone Base Conditions
Discussion

- Need to communicate exactly what “progress” represents.
  - “Allocation air” or current atmospheric deposition
  - Constant delivery factors
  - With or without inclusion of tidal water atmospheric deposition

Milestone Base Conditions

Discussion

- Accountability – It has always been the prerogative of jurisdictions to change practices and programs from those in current plans, but must maintain assurance that goals will be met.
  - Accountable for loads and meeting water quality standards
  - EC accountability for all practices on the ground (that would meet water quality standards) by 2025

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Portraying Load Changes

Issue

- Chesapeake Bay Program indicators featured on the ChesapeakeBay.net website
  - N, P and S Pollution Indicators using Nitrogen as an Example

- Issue from last MSWG meeting is portraying progress using current hydrology – with the model.


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1 2 3 4 5
Life in the Chesapeake Bay
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Chadwick the Crab
Priscilla Cummings
Fishes of Chesapeake Bay
Chesapeake Bay of Light
Chesapeake Bay
Chesapeake Bay News
October 04, 2012
Fewer incentives, boost in commodity prices mean decline in on-farm forest buffer restoration
Streamside trees are critical to the Bay, but planting rates continue to drop.
Critter of the Month
How is the Bay Doing?
Underwater Bay Grass (SAV) Abundance
Bay Grass Abundance

What Guides Us

Health

Restoration

Tracking Tools

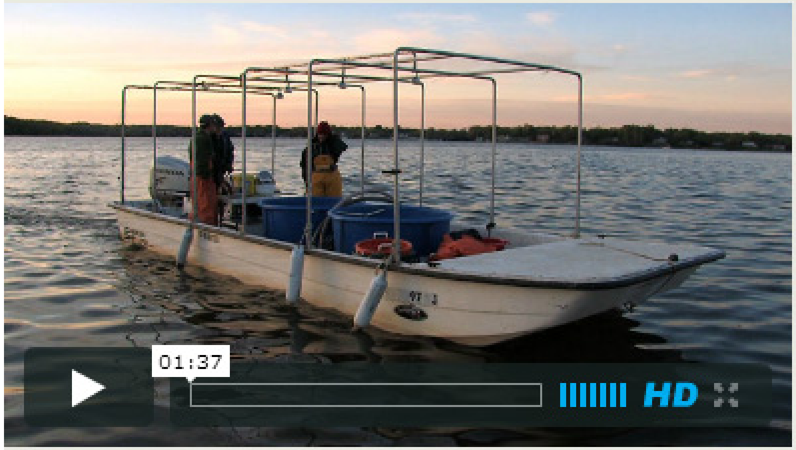
Track Our Progress

The Chesapeake Bay Program tracks the progress in the restoration of the Chesapeake Bay watershed. We track Bay Health, which provides information about the status of Bay water quality, habitats and lower food web, and fish and shellfish abundance as well as restoration and protection efforts.

What Guides Us

The Chesapeake Bay Program has developed a series of commitments over its history to its Bay restoration and protection efforts. These science-based goals help Bay Program partners track critical health measures and implementation of restoration activities. Goals are updated each year to reflect the previous year's health status and restoration efforts.

Latest Video



Bay 101: American Shad

May 08, 2012

What are American shad and why are they so important in the Chesapeake Bay?

More videos related to the Bay Barometer report.

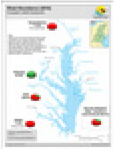
Tracking Tools

Chesapeake Bay Program partners use several tools to track progress toward Bay restoration goals. These tools help Bay Program partners and other stakeholders visualize data to help identify priorities and reveal funding gaps. Learn more about these tools and how they help Bay Program partners lead the restoration of the Chesapeake Bay.

Indicators A-Z

American Shad Abundance

American shad form an important link in the Bay food web. Shad feed on zooplankton and are preyed upon by larger fish, including bluefish, weakfish and striped bass. Historically, local economies flourished from the annual shad run in the spring, when the fishes' upriver migration begins. But shad populations were decimated in the 1970s by overfishing, pollution, and dams and other blockages that prevent the fish from reaching their upstream spawning grounds. (**Read More**)



Bay Watershed Forest Cover

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Health

Bay Health

Watershed & River Health

Factors Impacting Bay Health

Restoration

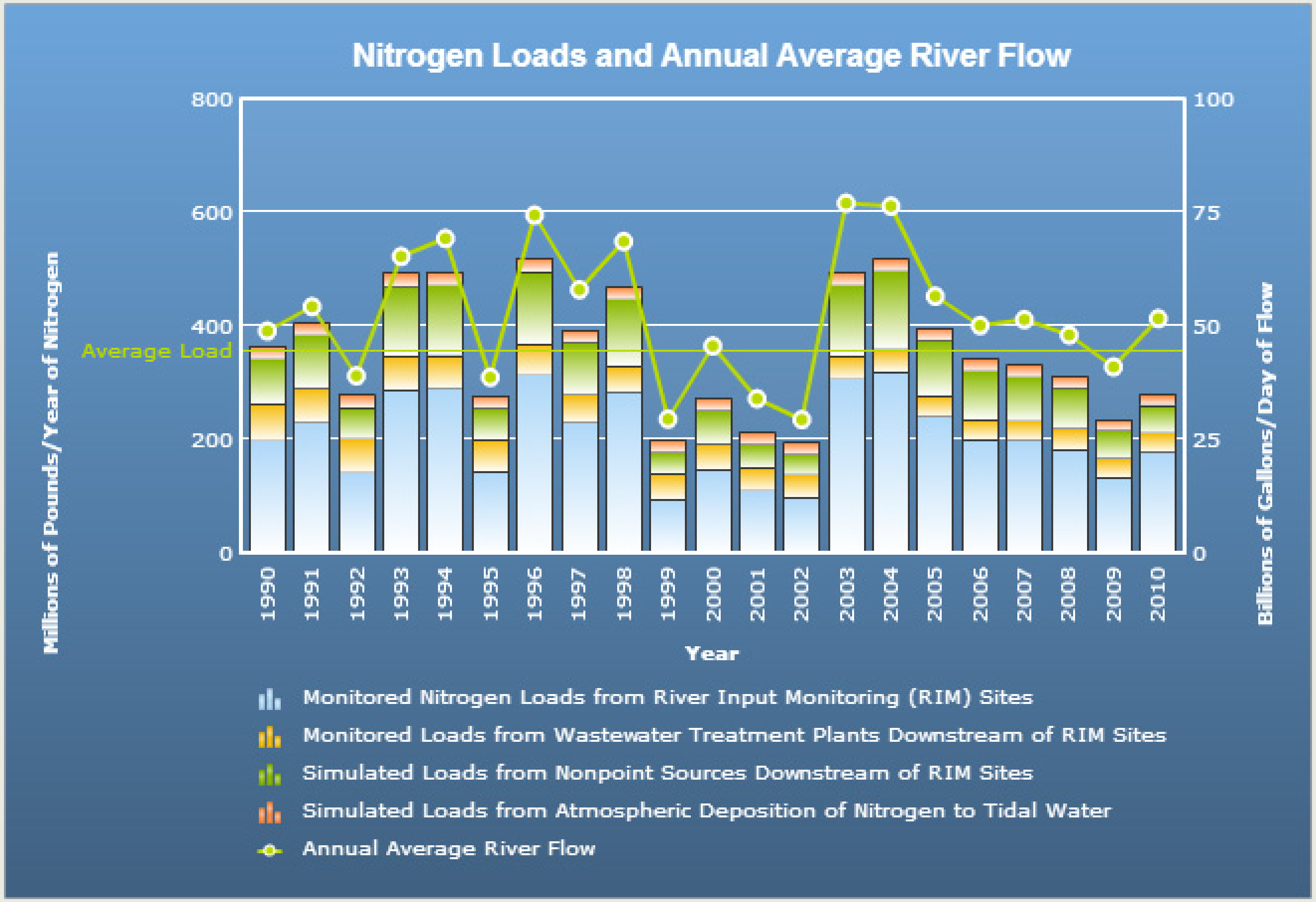
Tracking Tools

Nitrogen Loads and River Flow to the Bay

Preliminary estimates show that approximately 278 million pounds of nitrogen reached the Bay during the 2010 water year (October 2009-September 2010). This is 43 million pounds more than the revised loads in 2009 and 78 million pounds less than the 356 million pound average load from 1990-2010.

Annual average river flow to the Bay during the 2010 water year was 52 billion gallons per day (BGD). This is 11 BGD more than 2009 and close to the 53 BGD average flow from 1990-2010.

Annual



Analysis & Methods (103 KB)

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Health

Bay Health

Watershed & River Health

Factors Impacting Bay Health

Restoration

Tracking Tools

Nitrogen in Rivers Entering Chesapeake Bay: Long-Term Flow-Adjusted Concentration Trends

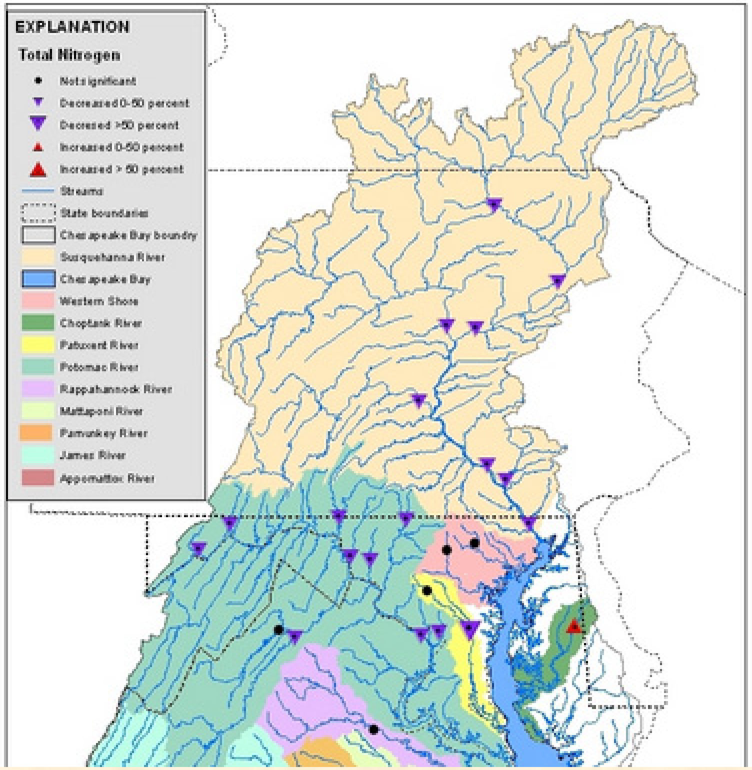
The majority of long-term stream monitoring sites show trends indicating decreasing flow-adjusted concentrations of nitrogen.

Between 1985 and 2010:

- 21 out of 31 sites showed downward flow-adjusted trends for nitrogen concentrations
- Two sites showed upward trends
- Eight sites showed no or small trends that are not statistically significant

Maps

Long-Term Flow-Adjusted Trends for Nitrogen (31 Sites in the Chesapeake Bay Watershed) 1985-2010



What Guides Us

Health

Restoration

Reducing Nitrogen Pollution

Reducing Phosphorus Pollution

Reducing Sediment Pollution

Planting Bay Grasses

Restoring Wetlands

Reopening Fish Passage

Restoring Oyster Reefs

Blue Crab Fishery Management

Planting Forest Buffers

Developing Watershed Management Plans

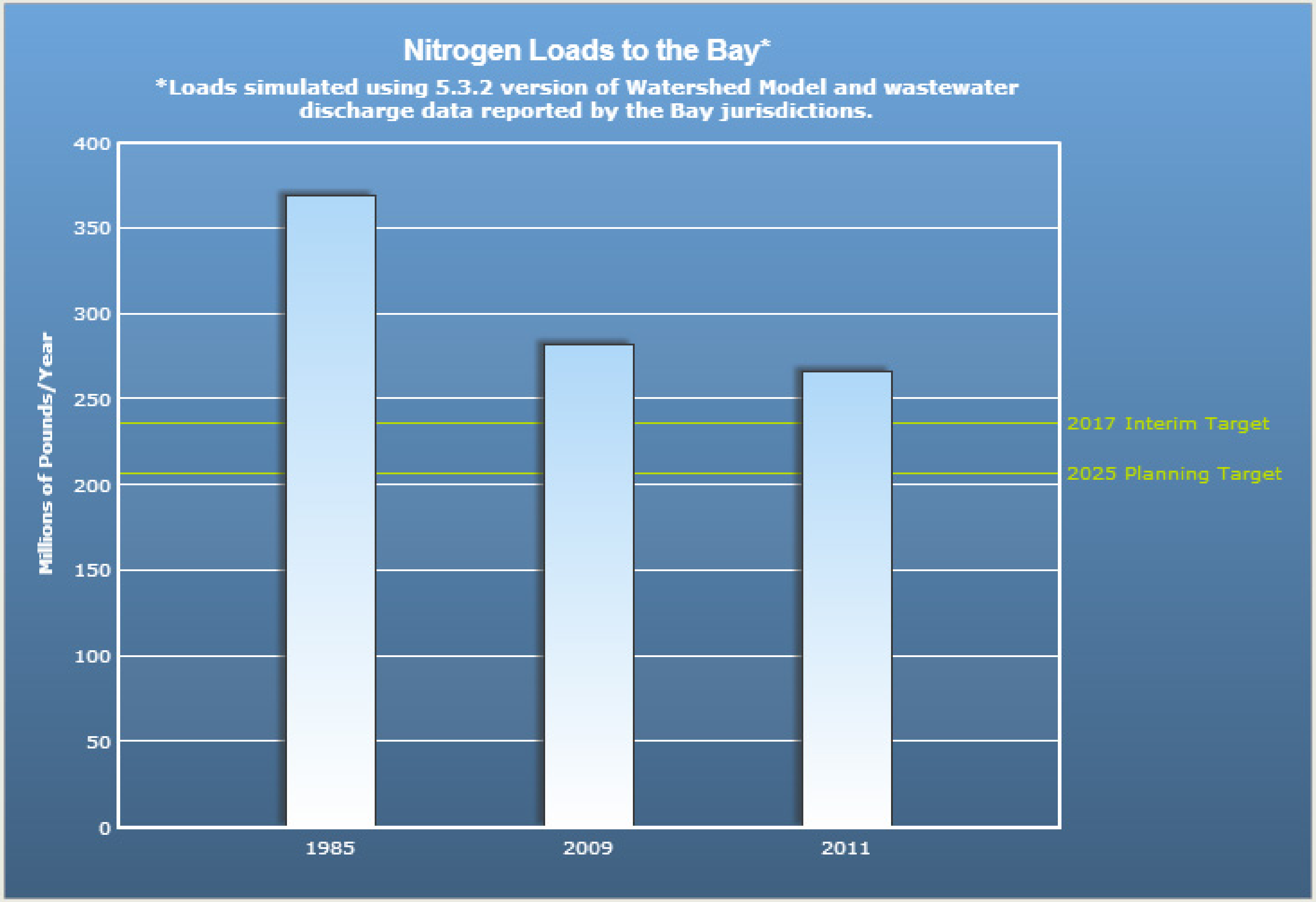
Preserving Lands

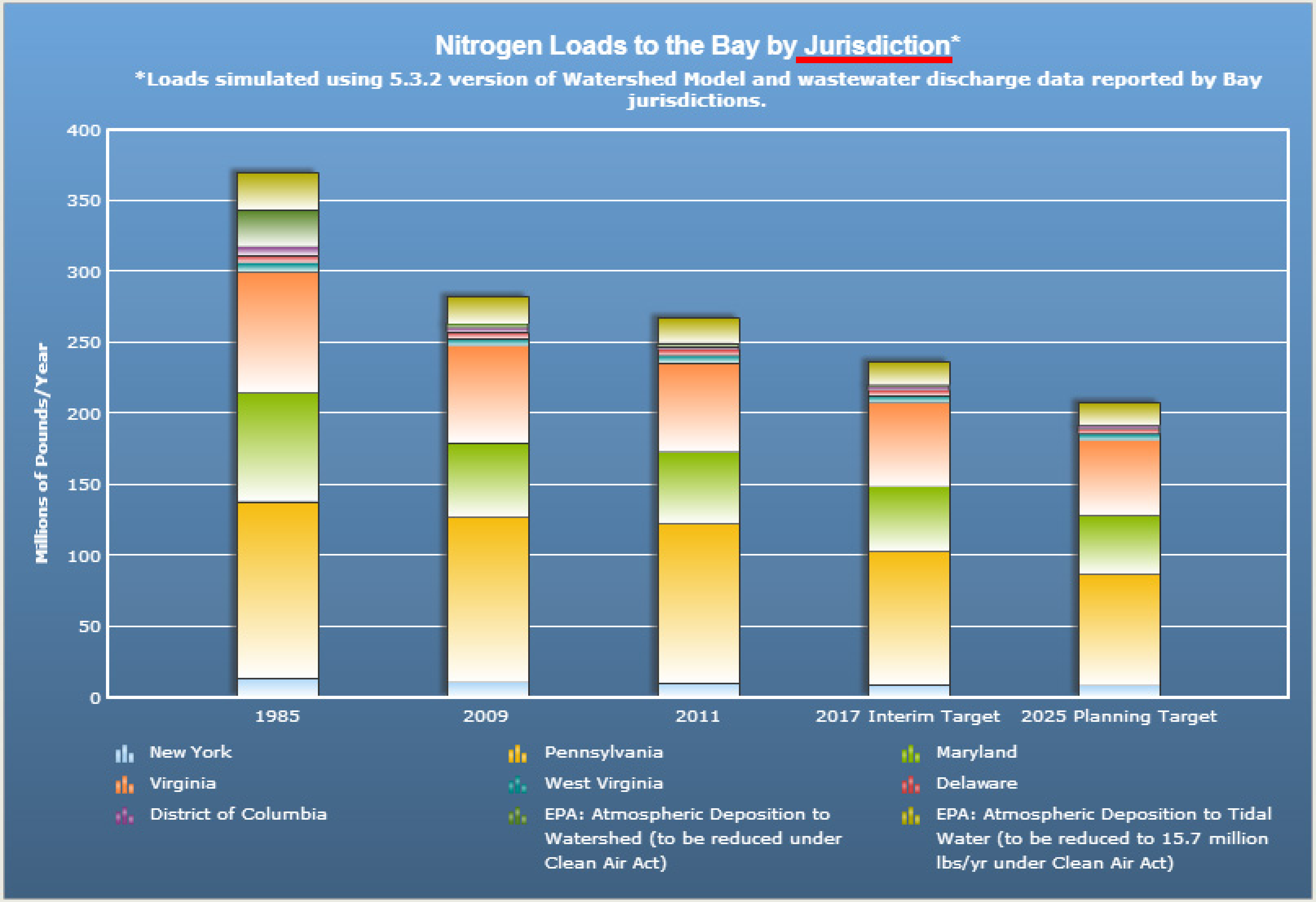
Public Access

Reducing Nitrogen Pollution

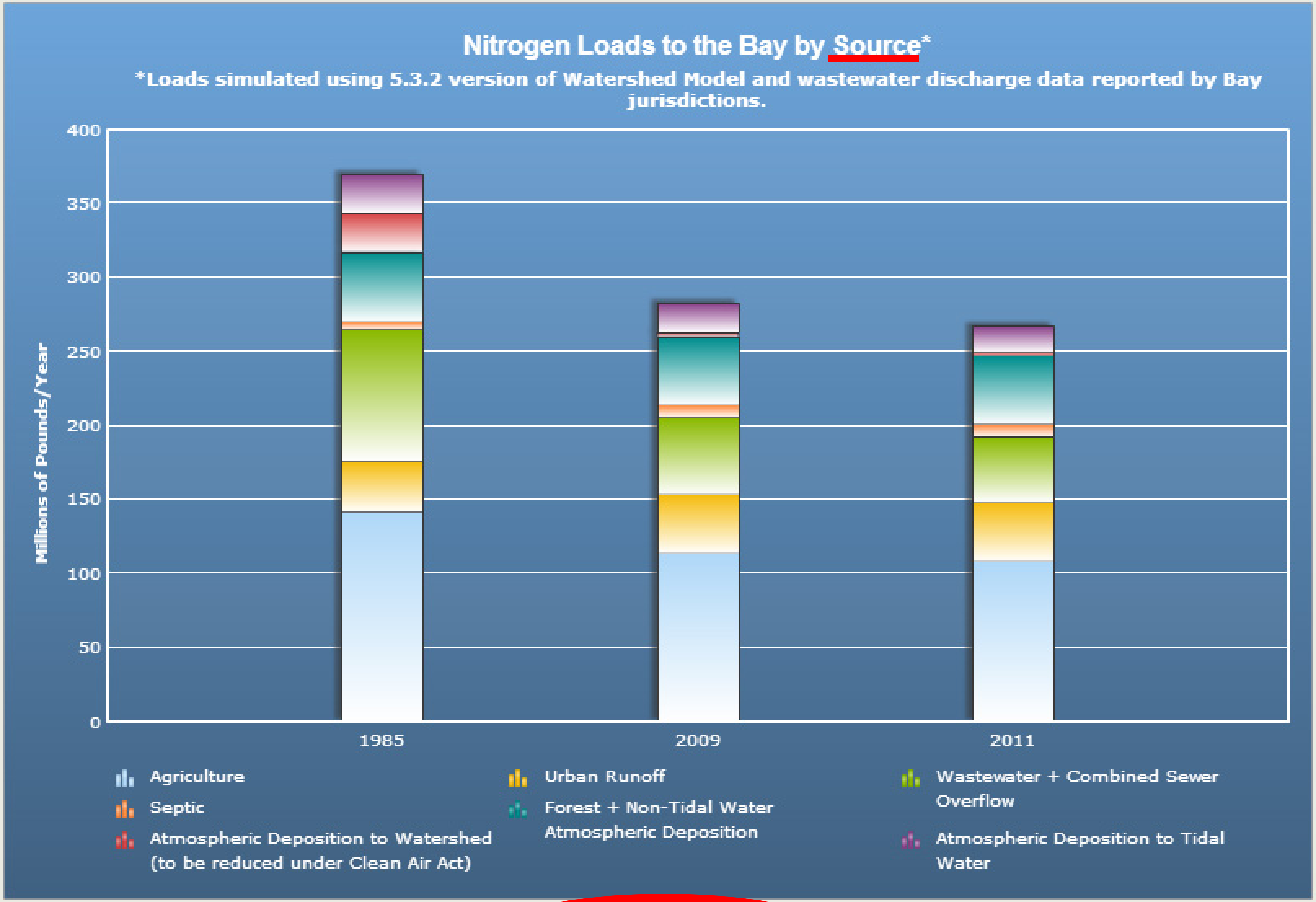
Computer simulations of pollution controls implemented between July 2009 and June 2011, calibrated using monitoring data, indicate that nitrogen loads to the Bay would have decreased 15.67 million pounds to 267 million*.

Annual | Videos





Nitrogen Loads to the Bay by Jurisdiction*
*Loads simulated using 5.3.2 version of Watershed Model and wastewater discharge data reported by Bay jurisdictions.
Millions of Pounds/Year
400
350
300
250
200
150
100
50
0
1985
2009
2011
2017 Interim Target
2025 Planning Target
New York
Pennsylvania
Maryland
Virginia
West Virginia
Delaware
District of Columbia
EPA: Atmospheric Deposition to Watershed (to be reduced under Clean Air Act)
EPA: Atmospheric Deposition to Tidal Water (to be reduced to 15.7 million lbs/yr under Clean Air Act)



Download Data (114.55 KB)

Analysis & Methods (127.5 KB)

Importance

The Bay cannot be restored without water that is clean, clear and rich in oxygen. Currently, the Bay and its rivers receive too much nitrogen, phosphorus and sediment for the ecosystem to remain healthy. The primary sources of these pollutants are agricultural runoff and discharges, wastewater treatment plant discharges, urban and suburban runoff and septic tank discharges, and air deposition.

Goal

Reduce computer-simulated nitrogen loads to the Bay by 75.39 million pounds, from 282.66 million in 2009, to 207.27 million by 2025*.

*Loads simulated using 5.3.2 version of Watershed Model and wastewater discharge data reported by the Bay jurisdictions. The Chesapeake Bay Program Watershed Model uses actual wastewater discharge data, which is influenced by annual weather conditions, to estimate wastewater pollution. The Model estimates pollution from other sources such as agriculture or urban runoff using average weather conditions. Loads include atmospheric deposition of nitrogen to tidal waters and the portion of atmospheric deposition to the watershed that is EPA's responsibility to reduce under the Clean Air Act. Planning targets, established in August 2011 represent the actions, assumptions, and "level of effort" necessary to meet the TMDL.

Additional Information

Measuring Progress and Pollution Loads

Progress is measured by using the most up-to-date wastewater discharge data and tracking data reported to EPA by Chesapeake Bay Program (CBP) partners. Computer model simulations are used to estimate the amount of nitrogen, phosphorus and sediment delivered to the Bay resulting from annual efforts to reduce pollutants from agricultural runoff and discharges, wastewater treatment plant discharges, urban and suburban runoff and septic tank discharges, and air deposition.

Pollutant loads to the Bay in any given year are influenced by changes in land-use activities and management practices, as well as the amount of water flowing to the Bay (hydrology). Annual rain and snowfall influence the amount of water in rivers flowing to the Bay.

These indicators report computer-simulated nitrogen, phosphorus and sediment loads to the Bay, using the Chesapeake Bay

Additional Information

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These indicators report computer-simulated nitrogen, phosphorus and sediment loads to the Bay, using the Chesapeake Bay Program phase 5.3.2 Watershed Model. The CBP Watershed Model uses actual wastewater discharge data, which is influenced by annual weather conditions, to estimate wastewater pollution. The influence of weather, rain and snowfall can be quite large and can influence wastewater loads more than the restoration efforts in any single year. However, the indicator does demonstrate long-term progress to reduce wastewater pollution. The Model estimates pollution from other sources such as agriculture or urban runoff using average weather conditions. This allows managers to understand trends in efforts to implement pollution reduction actions. The simulations are also important for developing "what-if" scenarios managers can use to project future impacts of management actions on Bay water quality.

Other indicators featured in the Factors Impacting Health section of the Health and Restoration Assessment, track annual changes in river flow and pollutant loads to the Bay. It is important to calculate the amount of river flow and pollution load to the Bay in any particular year in order to understand and explain trends in Bay water quality conditions.

Because of these differences, the two types of indicators can report different pollutant load amounts in a particular year. For example, in the Nitrogen Loads and River Flow indicator, the annual load to the Bay in 2009 was 235 million pounds of nitrogen. This represents the best estimate of how much nitrogen reached the Bay in 2009 since it is based on actual river flow during that year. In the Reducing Nitrogen Pollution indicator, the simulation of nitrogen loads in 2009 was 283 million pounds. This simulation does not represent how much nitrogen actually reached the Bay in 2009 since the loads from agriculture, urban runoff, septic, forest and atmospheric sources are based on long-term average hydrology rather than the actual amount of water flowing to the Bay in 2009. Conversely, the wastewater portion of the Reducing Nitrogen Pollution indicator shows actual loads reaching the Bay, but high- or low-flow years may confound progress associated with wastewater treatment upgrades.

Bay "Pollution Diet" and Watershed Implementation Plans

In December 2010, the Environmental Protection Agency established a pollution diet for the Chesapeake Bay, formally known as a Total Maximum Daily Load or TMDL. The TMDL is designed to ensure that all nitrogen, phosphorus and sediment pollution control efforts needed to fully restore the Bay and its tidal rivers are in place by 2025, with controls, practices and actions in place by 2017 that would achieve at least 60% of the reductions from 2009 necessary to meet the TMDL. The TMDL sets pollution limits (allocations) necessary to meet applicable water quality standards in the Bay and its tidal rivers. Specifically, the TMDL allocations are 201.63 million pounds of nitrogen, 12.54 million pounds of phosphorus, and 6,453.61 million pounds of sediment per year (note, the nitrogen allocation includes a 15.7 million pound allocation for atmospheric deposition of nitrogen to tidal waters).

As a result of this new Bay-wide "pollution diet," Bay Program partners are implementing and refining Watershed Implementation Plans (WIPs) and improving the accounting of their efforts to reduce nitrogen, phosphorus and sediment pollution. The WIPs developed by Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia and West Virginia identify how the Bay jurisdictions are putting measures in place by 2025 that are needed to restore the Bay, and by 2017 to achieve at least 60 percent of the necessary nitrogen, phosphorus and sediment reductions compared to 2009. Much of this work already is being implemented by the jurisdictions consistent with their Phase I WIP commitments, building on 30 years of Bay restoration efforts.

Planning targets were established August 1, 2011 to assists jurisdictions in developing their Phase II WIPs. Specifically, the planning targets are 207.27 million pounds of nitrogen, 14.55 million pounds of phosphorus and 7,341 million pounds of sediment per year (note, the planning target for nitrogen includes a 15.7 million pound allocation for atmospheric deposition of nitrogen to tidal waters). These planning targets, while slightly higher than the allocations published in the December 2010 TMDL, represent the actions, assumptions, and "level of effort" necessary to meet the TMDL allocations.

The CBP partnership is committed to flexible, transparent, and adaptive approaches towards Bay restoration and will revisit these planning targets in 2017. The partnership will also conduct a comprehensive evaluation of the TMDL and the CBP's computer modeling tools in 2017.

Phase III WIPs will be established in 2017 and are expected to address any needed modifications to ensure, by 2025, that controls, practices and actions are in place which would achieve full restoration of the Chesapeake Bay and its tidal tributaries to meet applicable water quality standards.

Additional Notes About Data Portrayed in Charts

Loads to Bay were simulated using CBP phase 5.3.2 Watershed Model.

Atmospheric deposition simulated using the Chesapeake Bay Airshed Model (a combination of a regression model of wet deposition and a continental-scale air quality model of North America called the CMAQ for estimates of dry deposition).

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Atmospheric deposition to the watershed that is EPA's responsibility to reduce under the federal Clean Air Act is calculated by subtracting watershed loads in 1985, 2009 and 2011 assuming that existing requirements under the Clean Air Act are fully implemented (known as "allocation air") from watershed loads and the actual atmospheric deposition that occurred in 1985, 2009 and 2011.

Urban Runoff and Septic loads typically increase with development unless offset by BMPs due to growth in impervious surfaces, turf, the number of septic systems, and their associated loads.

Forest loads will increase due to buffer and tree plantings, but this change lowers total loads since less pollution comes from an acre of forest than from agricultural or urban lands.

Who to Contact

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U.S. Environmental Protection Agency
(410) 295-1358

Related Indicators

- Wastewater

Portraying Load Changes

Issue

- Issue from last MSWG meeting is portraying progress using current hydrology – with the model.
  - Indicator "Loads and Annual Average River Flow" shows current loads affected by hydrology from both monitoring and modeling.
  - Model output that's typically shown is average annual hydrology (1991 – 2000 period as decided by WQGIT).
  - Currently extending precipitation and meteorological data to 2011 for the Phase 5.3.2 model.

Portraying Load Changes

Issue

- Issue from last MSWG meeting is portraying progress using current hydrology – with the model.
    - Could model “current” loads in next version of the model if Modeling Workgroup chooses NLDAS (North American Land Data Assimilation Systems) – pros and cons of data set.
    - Would not be used for assessing “progress” as heavily influenced by hydrology for current year; would not necessarily capture critical conditions; etc.