Commonwealth of Virginia's Chesapeake Bay Watershed General Permit

Puget Sound Nutrient Source Reduction Project
March 6, 2019 Forum Meeting
Lacey, WA

Allan Brockenbrough, VA DEQ

Background on Chesapeake Bay Watershed

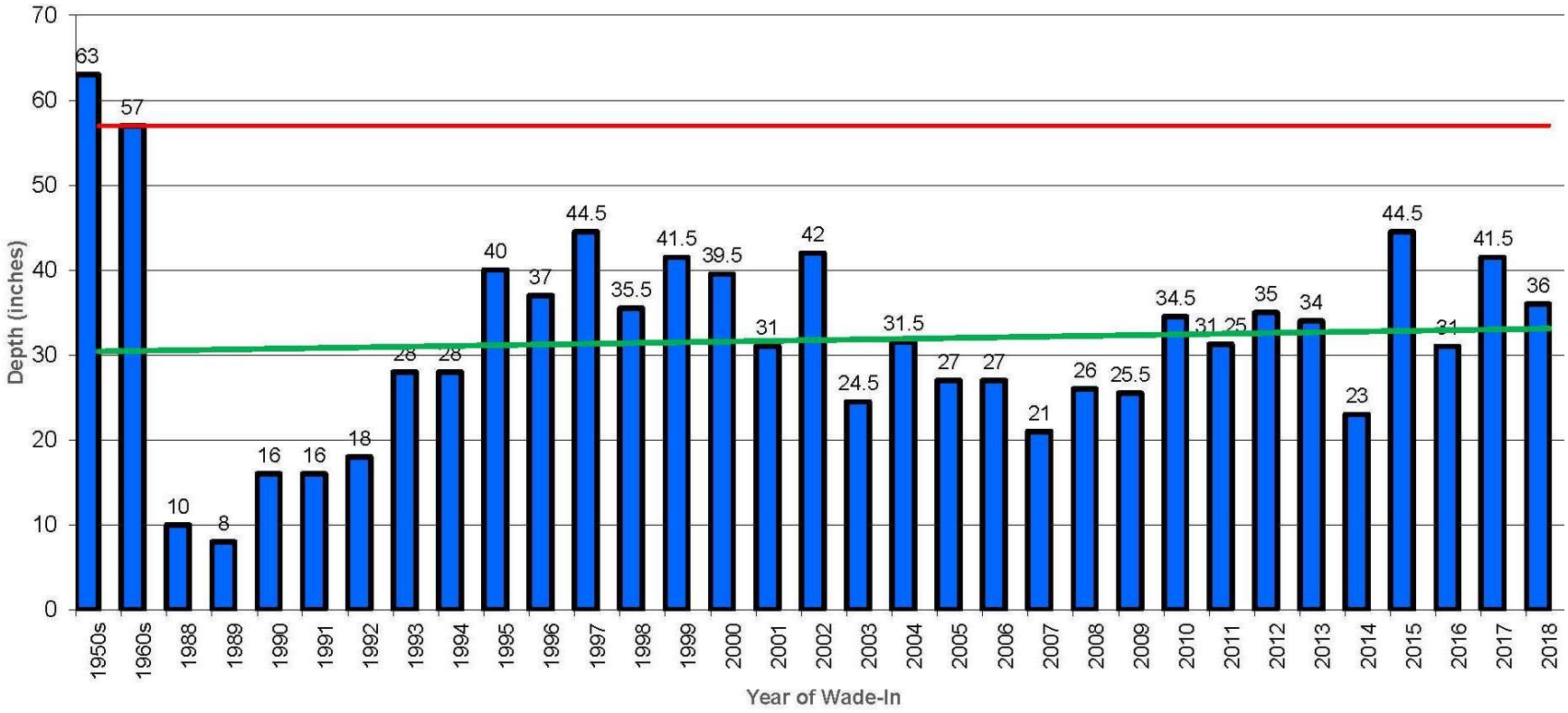
- Portions of 5 states and the District of Columbia in 2 EPA regions lie within the Basin:
  - 64,000 square miles watershed
  - 11,684 miles of shoreline
  - 200 miles long and 21 ft. deep on average
- Significant portions of Chesapeake Bay and its tidal tributaries are listed as impaired because of nitrogen, phosphorus, and sediment
- Home to over 18 million people
- Agricultural land use grew by >100,000 acres between 2004 and 2014
- Largest land area per unit volume of water of any estuary in the world

Water Quality Impairments

- Dissolved Oxygen
- Water Clarity
- Submerged Aquatic Vegetation

Bernie Fowler Sneaker Index

Bernie Fowler Sneaker Index



Chesapeake Bay Program History

1983

- Original Chesapeake Bay Agreement (1 page)
- MD, PA, VA, DC, EPA and chair of CB Commission
- Signatories became Chesapeake Bay Executive Council

1987

- First numeric goals to reduce N and P by 40% by 2000

1999

- EPA is sued for failing to require VA to develop a TMDL for Chesapeake Bay
- Consent decree mandated EPA develop TMDL by 2011 if VA did not do so by 2010

2000

- Comprehensive agreement set a clear vision and strategy for restoration efforts thru 2010
- 102 goals addressing pollution reduction, habitat restoration, living resources protection, land use policies, public engagement, ecosystem-based fisheries management, etc.
- NY and WV subsequently joined CB Partnership

Chesapeake Bay Program History cont.

2007

- **Recognizing that the 2010 deadline established in the Chesapeake 2000 Agreement would not be met, the Bay partnership begins work on a Bay-wide TMDL**

2009

- **EPA again sued with plaintiffs asserting that EPA was legally required to establish a TMDL**
- **President Obama issues Executive Order requiring development of a federal strategy to restore Chesapeake Bay.**
- **Chesapeake Executive Council requires 2-year milestones**

2010

- **2009 lawsuit settled requiring TDML and accountability framework**
- **TMDL issued**

Point Source Nutrient Controls in Virginia

1997	• Water Quality Improvement Fund Established to fund nutrient reduction strategies in the Chesapeake Bay watershed
2005	• Tributary Strategies establish loading goals • Legislation requiring watershed general permit
2007	• VPDES Watershed General Permit becomes effective on January 1, 2007
2010	• Bay TMDL issued by EPA on December 29, 2010
2011	• Effluent limits in 2007 VPDES Watershed General Permit become effective
2012 & 2017	• Virginia reissues the VPDES Watershed General Permit on January 1, 2012

Dual Approach to PS Nutrient Control

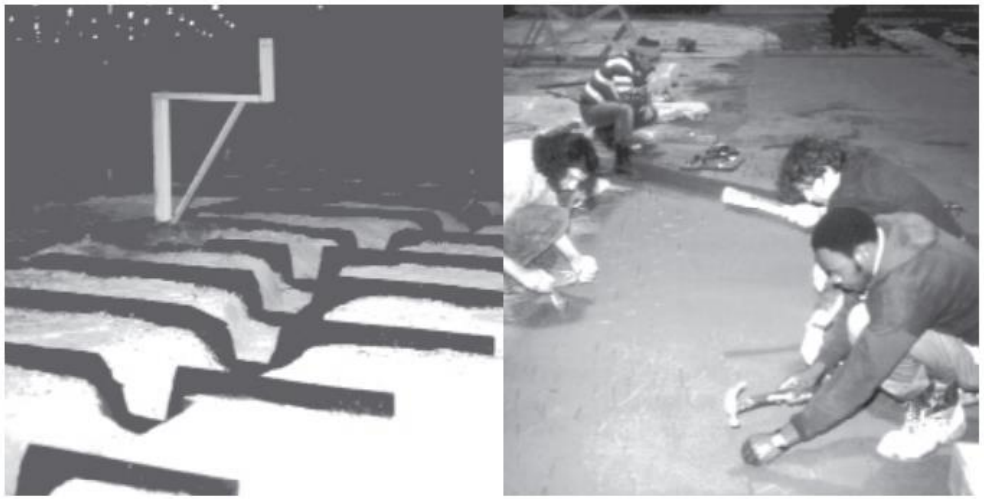
- Watershed General Permit for the control of annual TN and TP loads under the Chesapeake Bay TMDL (9VAC25-820)
  - Annual load limits
  - Trading allowed
- Technology based regulation for nutrient enriched waters and dischargers within the Chesapeake Bay watershed (9VAC25-40-70)
  - Minimum technology requirements for new or expanding facilities
  - Annual concentration limits based on nutrient removal technology installed at any plant in CB watershed
  - No trading

Chesapeake Bay Hydraulic Model

Chesapeake Bay Model, as it looked in August 1977. U.S. Army Corps of Engineers Waterways Experiment Station photo

Chesapeake Bay Model technician at a tide gauge located on the Elizabeth River, at Portsmouth, Virginia, August 1977. U.S. Army Corps of Engineers Waterways Experiment Station photo

The Chesapeake Bay Model is contained in this warehouse, on Kent Island, Maryland. The Chesapeake Bay Bridge is in the background. *U.S. Army Corps of Engineers Waterways Experiment Station photo*



(Left) Templates installed every two and a half feet for the construction of the model, between which the concrete was poured and contoured. (Right) Model aides installing some of the 700,000 resistance strips.
U.S. Army Corps of Engineers Baltimore District photos, c. 1976

Chesapeake Bay Modeling Today

- Watershed Model
- Estuary Model
- Airshed Model
- Land Change Model
- Chesapeake Assessment Scenario Tool (CAST)

GVPDESWPTNTPDNTCBWV

or

“Nutrient Trading Regulation”

General VPDES Watershed Permit for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia (9 VAC 25-820-10)

Drivers for Virginia's Approach

- General Assembly determines that adoption and utilization of a watershed general permit and market-based point source nutrient credit trading program will assist in:
  - meeting the nutrient cap load allocations cost-effectively and as soon as possible in keeping with the 2010 timeline and objectives of the Chesapeake 2000 agreement,
  - accommodating continued growth and economic development in the Chesapeake Bay watershed, and
  - providing a foundation for establishing market-based incentives to help achieve the Chesapeake Bay Program's nonpoint source reduction goals.

CB Watershed Nutrient General Permit Highlights

General permit overlays individual NPDES permits and addresses nutrient loads only

Calendar year annual TN and TP load limits

Cap & Trade Program

“Bubbling” or aggregate permits allowed

Common schedule of compliance

Point Source-to-Point Source trading for existing facilities to meet initial load cap

Point Source-to-Nonpoint Source trading reserved to accommodate new and expanding facilities

Permittees given ownership of the market

Watershed General Permit Requirements

- Coverage
  - Over 150 facilities
  - 119 Significant Dischargers plus smaller, new or expanding facilities
  - Covers facilities in each of the 5 watersheds
- Limits
  - Annual mass delivered loads for nitrogen and phosphorus for all dischargers
  - Based on TMDL implementation
  - More restrictive requirements as needed to meet local TMDLs or water quality standards in individual permits
  - Compliance
    - Addresses significant existing discharges and new and expanding discharges
    - Conditions for nutrient credit transactions
- Other permit components
  - compliance schedules and plans
  - monitoring and reporting

Virginia's Chesapeake Bay Watershed-based General Permit

- Compliance with wasteload allocation requirements **for existing facilities** through
  - Annual mass load meets permit requirements
  - Acquisition of sufficient point source credits independently or through the Nutrient Credit Exchange Association
  - Acquisition of credits through payments to Nutrient Offset Fund if no other option available

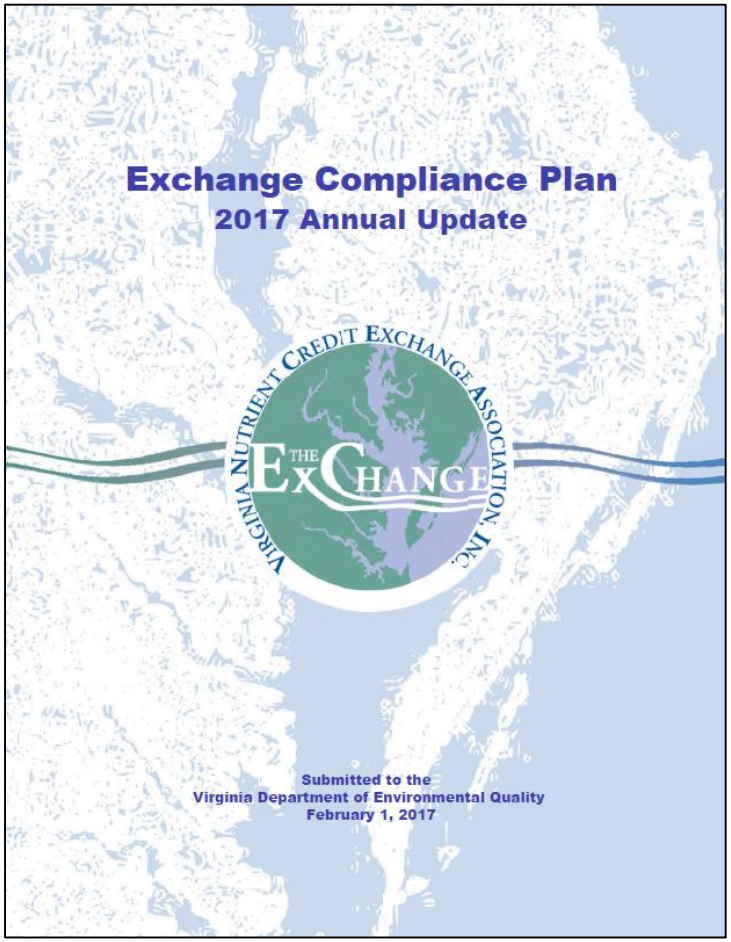
Virginia's Chesapeake Bay Watershed-based General Permit

- New or expanding facilities offset **new or expanded discharge** through acquisition of
  - Compliance credits from one or more permitted facilities
  - Purchase of WLAs from other sources (either short term or permanent)
  - Credits from nonpoint source best management practices
  - Credits through payments to Nutrient Offset Fund if no other option available
  - Allocations through other means approved by Virginia DEQ on a case-by-case basis
- Acquire 5 years of offsets prior to permitting

Virginia Watershed-based Permit Benefits

- Environmental Benefits
  - Quicker nutrient reductions from point sources
  - Manages additional loadings from growth through offsets of loads from new or expanding facilities
  - Creates incentives for NPSs to meet load allocations
  - BMP secondary benefits (e.g., habitat restoration, carbon sink)
- Benefits to Permittees
  - Provides several different tools for achieving compliance
  - More cost-effective approach than treatment upgrades only
  - Allows for future growth as it eases costs and resource demands
- Benefits to Virginia DEQ
  - More streamlined and efficient permitting process
  - Increased stakeholder support

Primary Factors in Success of the Point Source Trading Program



- Watershed general permit
  - Expedient – one negotiation
  - Common schedule of compliance
  - Consistent requirements
- Formation of the Virginia Nutrient Credit Exchange Association with voluntary membership
- Permittees given ownership of the market and have embraced the program

Nutrient Credit Exchange Association

- The Nutrient Credit Exchange Association is an association of owners of 108 permitted facilities discharging nutrients in the Bay watershed.
- Voluntary membership in non-stock corporation formed to facilitate the trading program
- Benefits of Membership
  - Easy access to buyers and sellers
  - Acts as clearinghouse – buys all generated credits and offers cost-sharing from sales
  - First right to buy generated credits

EXHIBIT 2-3

2018 Nitrogen Trading Ledger: Potomac-Shenandoah River Basin

POTOMAC Basin: Nitrogen Credit Ledger

Compliance Year:	2018	Credit Forecasts		Preliminary Use of Credits				Credit Exchange (Pounds)		
Facility Name	Delivered WLA	Expected Load	Expected Credits	In-Bubble Exchange	Private Exchange	WQIF-Held Credits	Expected Net Credits	Class A Sales	Class A* Purchases	Class B** (expected)
								PRICE: $ 0.07	$ 3.78	$ 0.02
The Exchange (group)	**2,612,604**	**1,906,103**	**706,501**	**-**	**(274)**	**(24,365)**	**681,862**	**535,306**	**(11,587)**	**158,143**
ACSA-Fishersville	4,873	1,845	3,028	(3,028)	-	-	-	-	-	-
ACSA-Greenville	1,424	497	927	(675)	-	-	252	118	-	134
ACSA-Harriston	1,025	203	822	(822)	-	-	-	-	-	-
ACSA-Middle River	8,284	3,764	4,520	-	-	-	4,520	2,123	-	2,397
ACSA-Mt. Sidney	854	1,307	(453)	453	-	-	-	-	-	-
ACSA-Stuarts Draft	2,436	588	1,848	-	-	-	1,848	869	-	979
ACSA-Vesper View	1,025	546	479	-	-	-	479	225	-	254
ACSA-Weyers Cave	1,462	5,534	(4,072)	4,072	-	-	-	-	-	-
Alexandria Renew Ent.	493,381	367,386	125,995	-	-	-	125,995	94,496	-	31,499
Arlington Co.	365,284	232,985	132,299	-	-	-	132,299	132,299	-	-
Berryville	5,373	3,070	2,303	-	-	-	2,303	2,000	-	303
Broadway Regional	5,601	4,924	677	-	-	-	677	-	-	677
Fairfax Co-Noman Cole	612,158	455,738	156,420	-	-	-	156,420	156,420	-	-
FCWSA-Vint Hill	579	219	360	-	-	-	360	-	-	360
Front Royal	29,725	25,303	4,422	-	-	-	4,422	1,056	-	3,366
FWSA-Opequon	31,681	18,402	13,279	-	-	-	13,279	-	-	13,279
FWSA-Parkins Mill	15,837	11,086	4,751	-	-	-	4,751	-	-	4,751
HRRSA-North River	55,746	36,664	19,082	-	-	-	19,082	19,082	-	-
KGCSA-Dahlgren S.D.	9,137	6,700	2,437	-	-	-	2,437	-	-	2,437
KGCSA-Fairview Beach	1,827	731	1,096	(427)	-	-	669	-	-	669
KGCSA-Purkins Corner	1,096	1,523	(427)	427	-	-	-	-	-	-
Leesburg	97,458	31,261	66,197	-	(274)	(24,365)	41,558	-	-	41,558
Loudoun Water- Broad Run	119,264	54,929	64,335	-	-	-	64,335	56,632	-	7,703
Luray	8,187	1,688	6,499	-	-	-	6,499	6,499	-	-
Massanutten PSC	6,030	2,975	3,055	-	-	-	3,055	-	-	3,055
Merck	4,824	14,473	(9,649)	-	-	-	(9,649)	-	(9,649)	-
MillerCoors LLC	18,091	18,091	-	-	-	-	-	-	-	-
Mt. Jackson	2,900	2,237	663	-	-	-	663	-	-	663
Purcellville	13,157	9,648	3,509	-	-	-	3,509	2,023	-	1,486
PWCSA-HL Mooney	219,280	175,881	43,399	-	-	-	43,399	30,379	-	13,020
Stafford Co-Aquia	73,093	64,596	8,497	-	-	-	8,497	7,647	-	850
Stoney Creek	2,891	2,814	77	-	-	-	77	-	-	77
Strasburg	5,134	7,072	(1,938)	-	-	-	(1,938)	-	(1,938)	-
UOSA	302,607	292,754	9,853	-	-	-	9,853	-	-	9,853
VA Am. Water PW Sec. 1	42,029	22,842	19,187	-	-	-	19,187	11,512	-	7,675
VA Am. Water PW Sec. 8	42,029	22,842	19,187	-	-	-	19,187	11,512	-	7,675
Waynesboro	6,822	2,985	3,837	-	-	-	3,837	414	-	3,423
Purchase by Eastern Shore	-	-	-	-	-	-	-	-	-	-

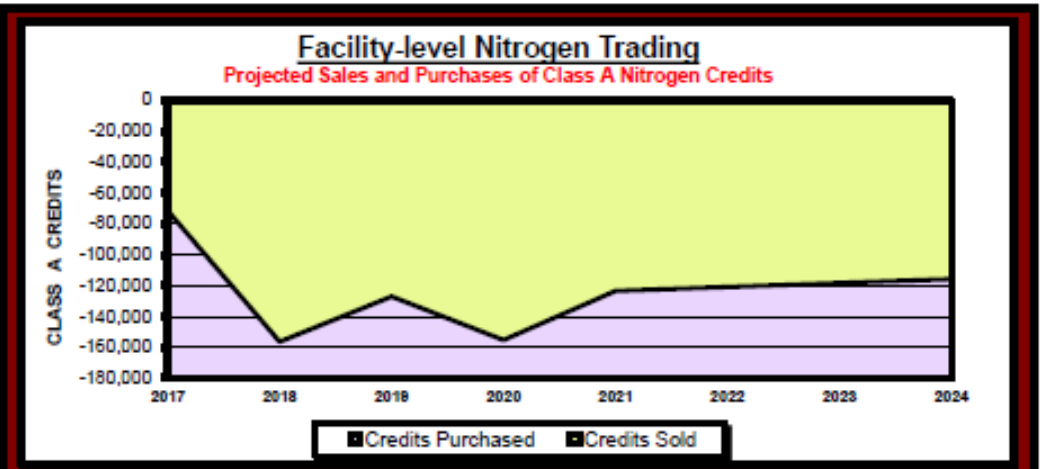
** For this Compliance Year, 0% of all Class A Credit Purchases are expected to be satisfied using Class B Credits.*

*** Expected Class B Credits are estimates only. Actual Class B Credits—and the resulting Class B sales price—will vary from estimates based on actual Delivered Loads in the Compliance Year.*

NITROGEN FACILITY SUMMARY

Fairfax Co-Noman Cole

POTOMAC Trading Basin



Loading & Credit Summary	2017	2018	2019	2020	2021	2022	2023	2024
	Planning Period					*Future Estimates (non-binding)*		
Design Flow (mgd)	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00
Projected Flow (mgd)	47.40	49.88	51.54	50.00	53.48	53.76	54.04	54.32
Projected Avg. Annual Concentration (mg/L)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Discharged Load (end of pipe)	433,079	455,738	470,904	456,834	488,630	491,188	493,746	496,304
Delivery Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Expected Load	433,079	455,738	470,904	456,834	488,630	491,188	493,746	496,304
Delivered WLA	612,158	612,158	612,158	612,158	612,158	612,158	612,158	612,158
Expected Credits (delivered)	179,079	156,420	141,254	155,324	123,528	120,970	118,412	115,854
Transfers In (Out) within Owner Bubble	0	0	0	0	0	0	0	0
Transfers In (Out) from Private Exchange	0	0	0	0	0	0	0	0
WQIF-Held Credits	0	0	0	0	0	0	0	0
Expected Net Credits	**179,079**	**156,420**	**141,254**	**155,324**	**123,528**	**120,970**	**118,412**	**115,854**
Class A Credit Sales (Purchases)	**71,632**	**156,420**	**127,128**	**155,324**	**123,528**	**120,970**	**118,412**	**115,854**
Expected Class B Credits	**107,447**	**0**	**14,126**	**0**	**0**	**0**	**0**	**0**

60+ inches of rain in 2018! – What was the actual performance?

Annual Avg Q = 40.1 MGD TN = 2.03 mg/l TN load = 253,273 lbs

Actual Credits Generated: 612,158 – 253,273 = 358,885

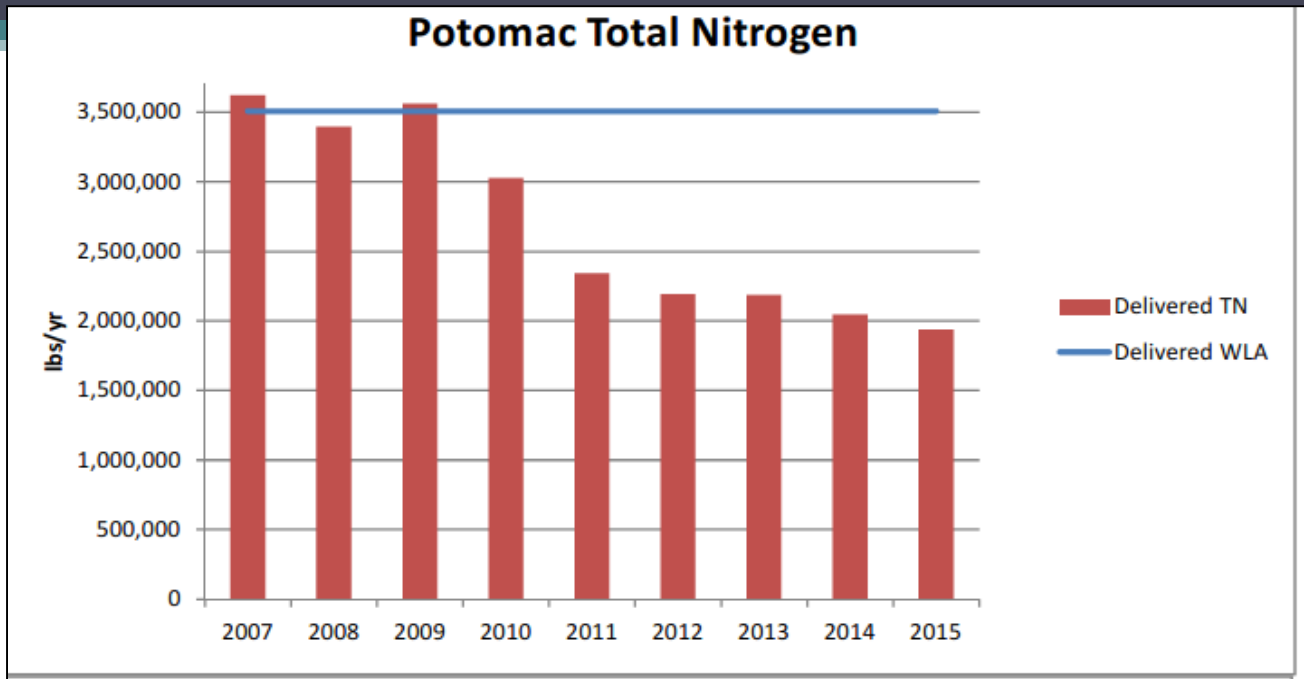
Point Source Compliance Trades

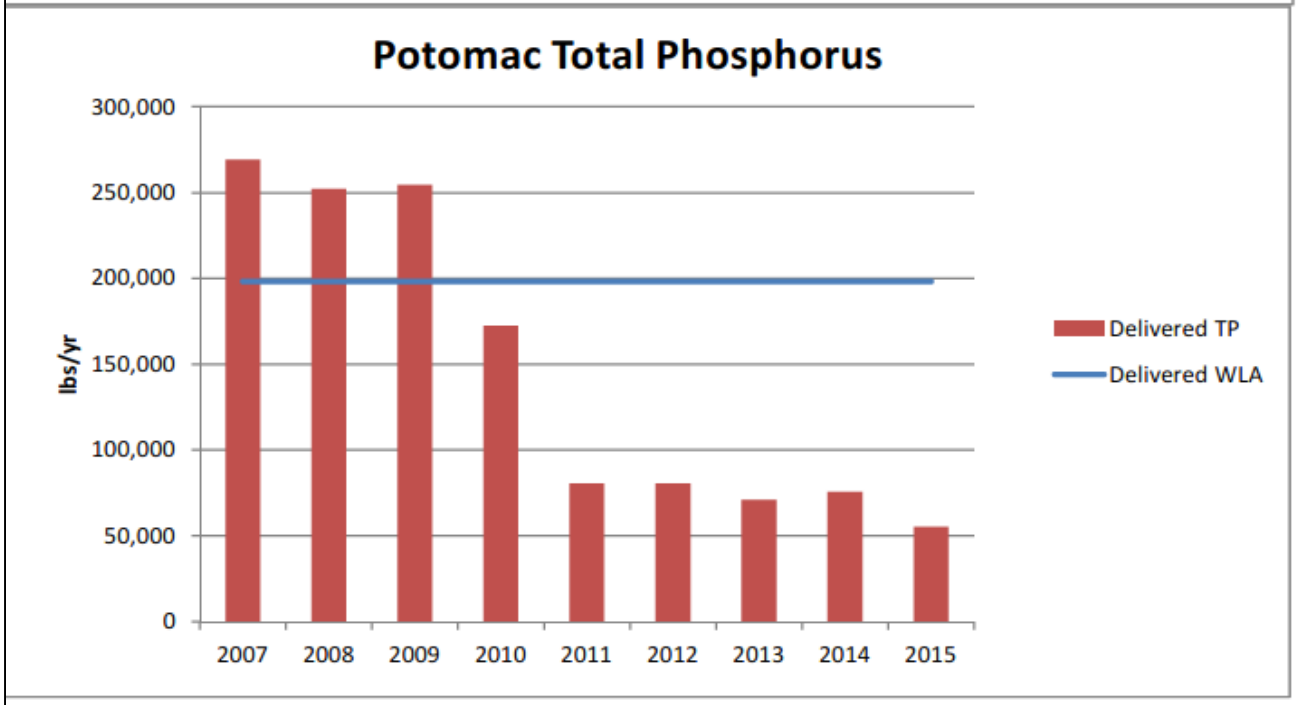
	2011	
35 facilities	246,309 lbs of TN	1.5 % of WLA
	79,128 lbs of TP	4.5 % of WLA

	2017	
21 facilities	306,174 lbs of TN	1.9 % of WLA
	28,073 lbs of TP	2.4 % of WLA

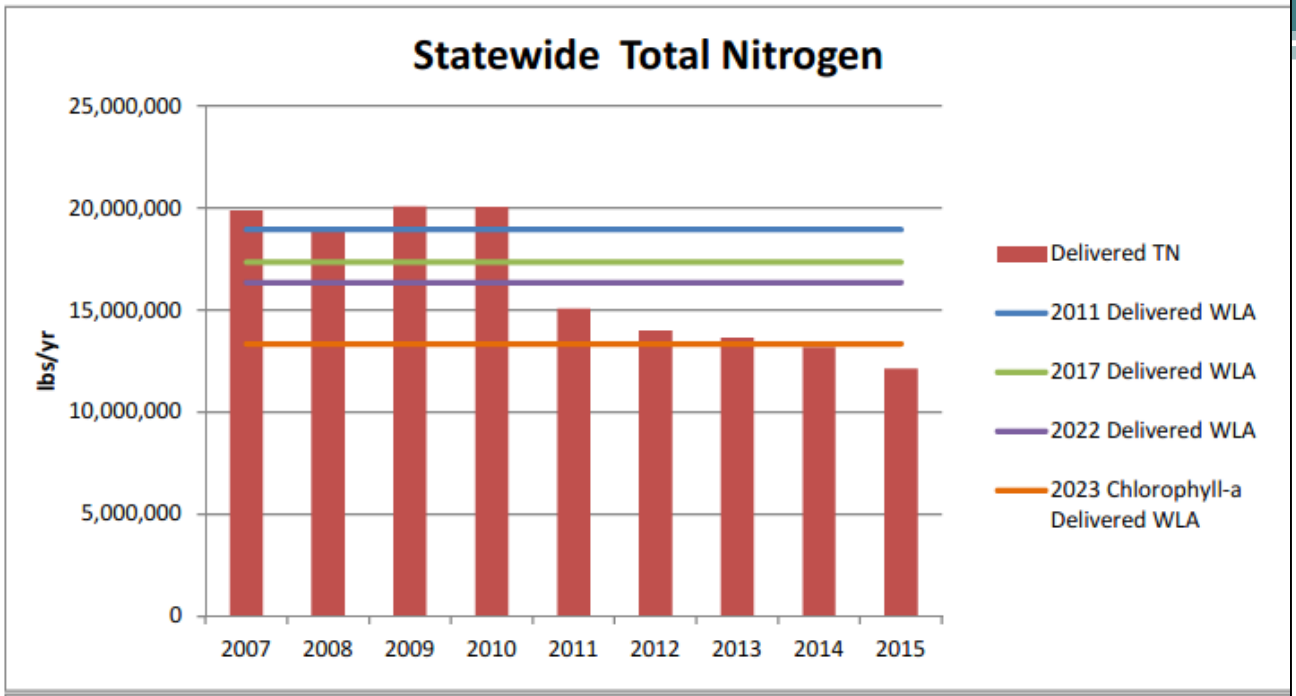
100 of 119 significant facilities trade as members of the Virginia Nutrient Credit Exchange Association.

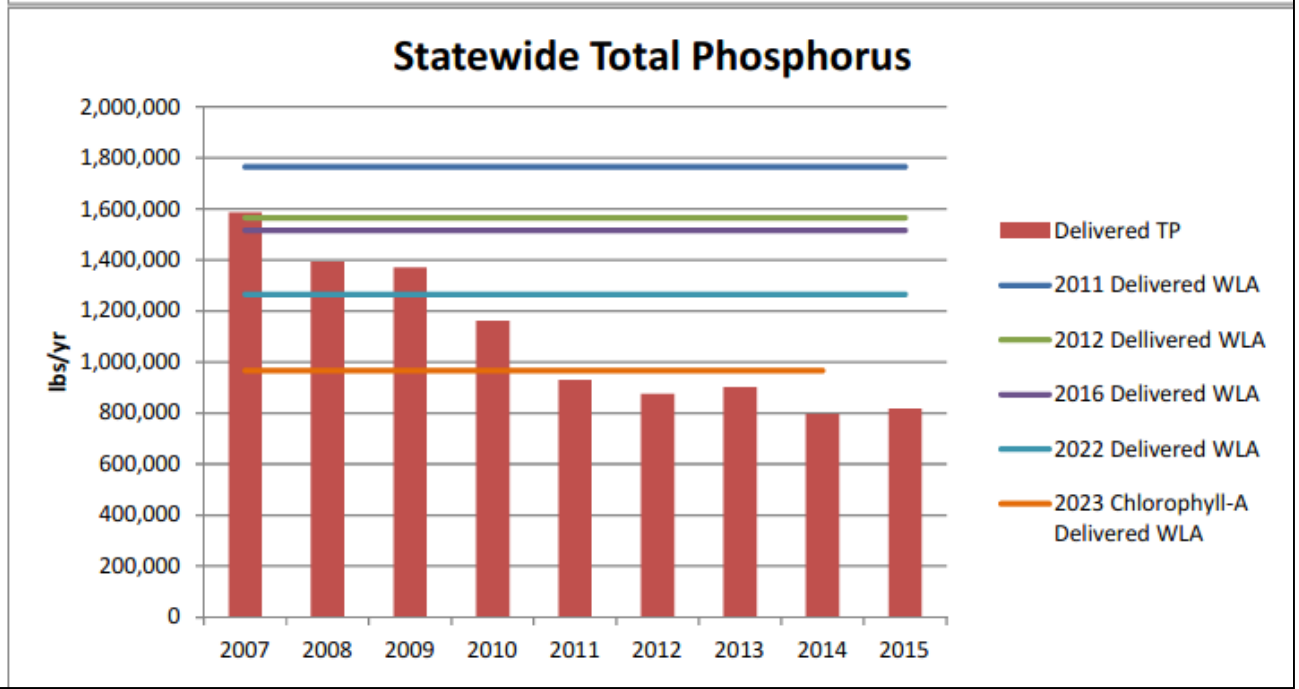
Point Source Nutrient Reductions



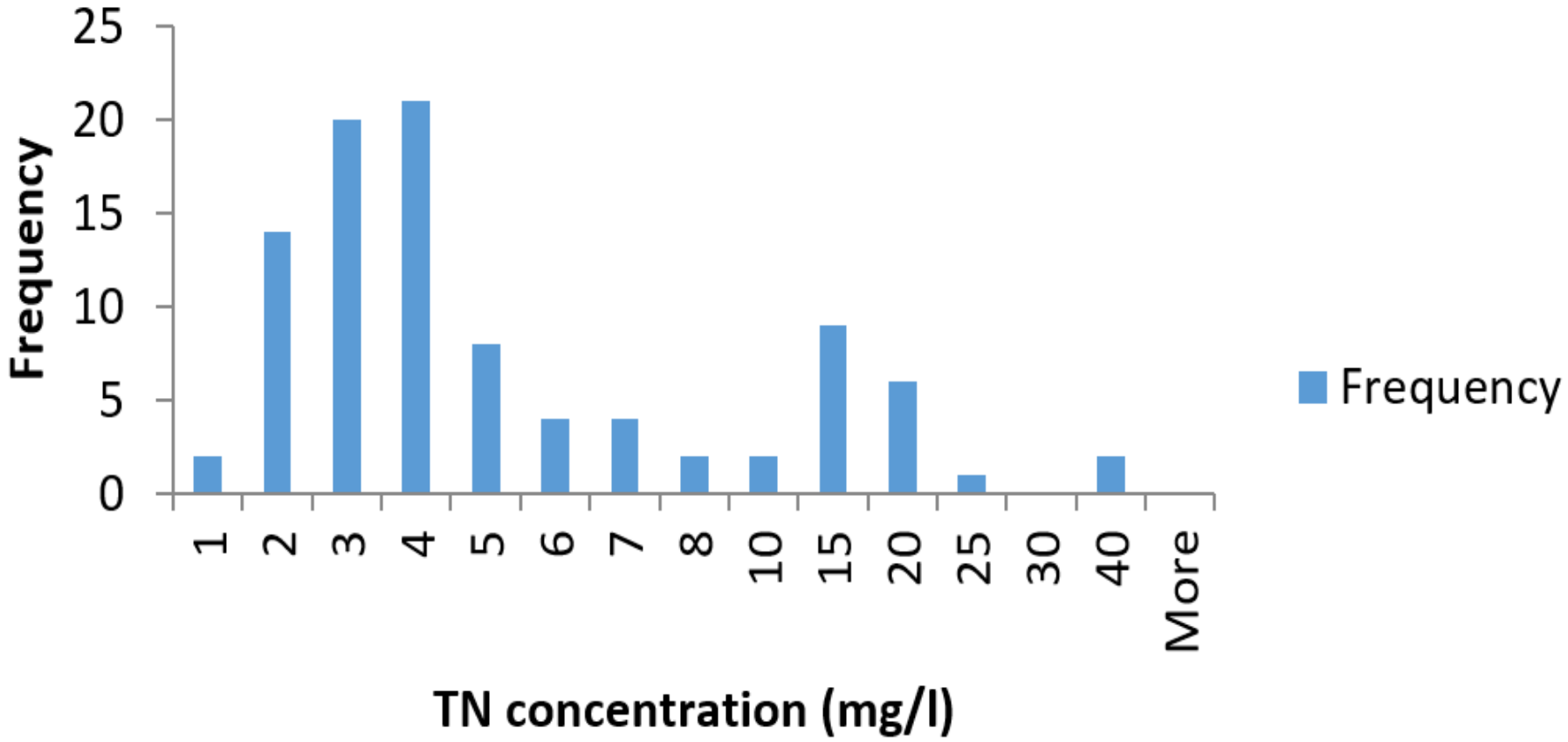


Point Source Nutrient Reductions

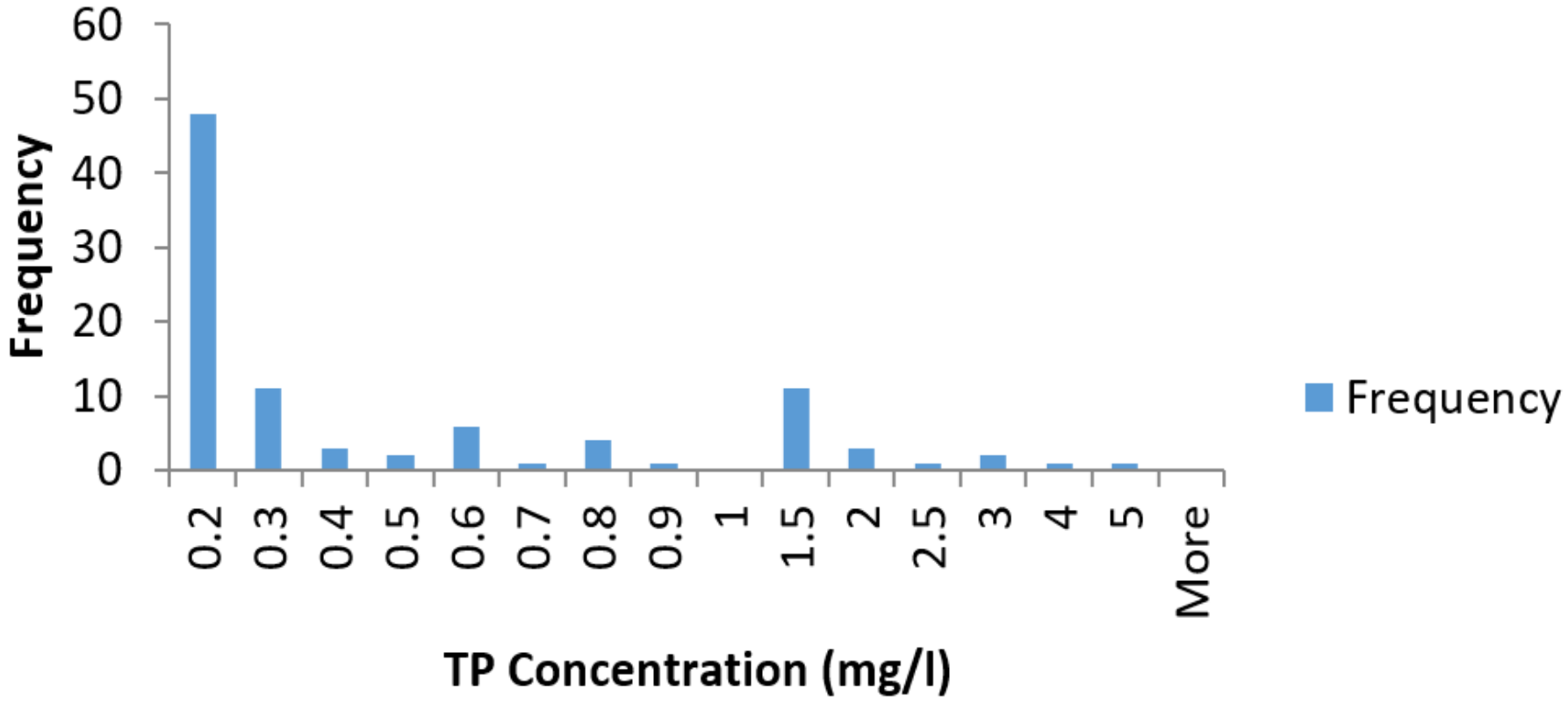




2018 Municipal TN



2018 Municipal TP

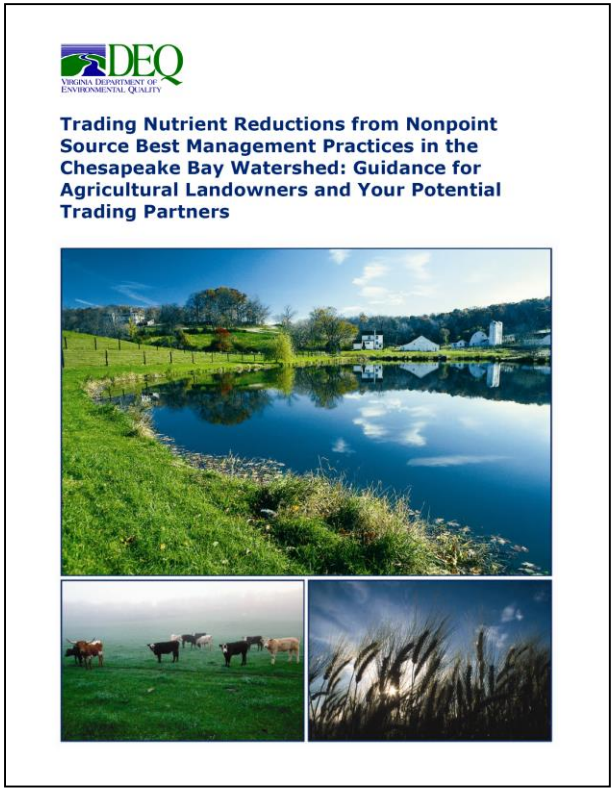


Nonpoint Source Trading in VA

Reserved for accommodating new and expanding point sources only

Guidance adopted in January 2008

First bank approved in July 2008



Practice-based Ag Baseline Requirements

Implementation of.....

- Soil Conservation Plan
- Nutrient Management Plans
- Cover Crops
- Livestock Stream Exclusion w/ 35’ buffer
- 35’ Riparian buffer

Ag BMP Enhancements to Generate Credits

- Soil Conservation Plan – Continuous No-Till
- Nutrient Management Plans – 15% N reduction on corn
- Cover Crops – Early planting date
- Livestock Stream Exclusion w/ 35’ buffer – Increase size
- 35’ Riparian buffer – Increase size
- Land Conversion

2:1 trading ratio

It takes a lot of land!

So Why Are There No NPS-to-PS Trades in VA?

- Economic downturn brought new WWTPs to a halt
- Expanding WWTPs able to upgrade and stay under load cap
- Adequate capacity in existing POTWs (WLAs based on 2011 design flow)
- Adequate credits available from other point sources
- It takes a lot of land – a problem of scale

Current Status of NPS Trading in VA

- Current program consists of providing **permanent** stormwater offsets to meet Virginia's post construction P loading requirements under the Virginia Stormwater Management Program (VSMP)

- 122 NPS banks with 7,100 lbs of permanent TP offsets and 47,800 lbs of permanent TN offsets on state registry

- Many small P trades – approximately 4,000 lbs of P sold with retirement of an associated 27,600 lbs of N reductions retired (P serves as a proxy for N reductions under VSMP

- In the process of adopting regulations on the certification of NPS credits

- Required N and P reductions in Municipal Separate Stormwater Sewer System (MS4) permitting program may create demand for NPS credit market

2017 Nutrient Trades

Point Source to Point Source under Watershed General Permit

- 25 facilities acquired approximately 28,000 lbs of TP and 306,000 lbs of TN credits
- Several minor WLA trades
- Approximately $1,800,000 market value

Non-Point Source Credits Sold (Permanent Offsets)

- Approximately 900 lbs of TP with 5,400 lbs of TN retired
- Approximately $18,000,000 market value

Underwater Grass Comeback Helps Chesapeake Bay

Stories of Progress in Achieving Healthy Waters

U.S. EPA Region 3 Water Protection Division

Susquehanna Flats• January 21, 2016

The fortified Susquehanna Flats, the largest bed of underwater grasses in the Chesapeake Bay and a popular fishing spot, seems able to withstand a major weather punch. Its resilience is contributing to an overall increase in the Bay's submerged aquatic vegetation (SAV), a key indicator of ecosystem health.

Susquehanna Flats in the Chesapeake Bay with underwater grasses returning.

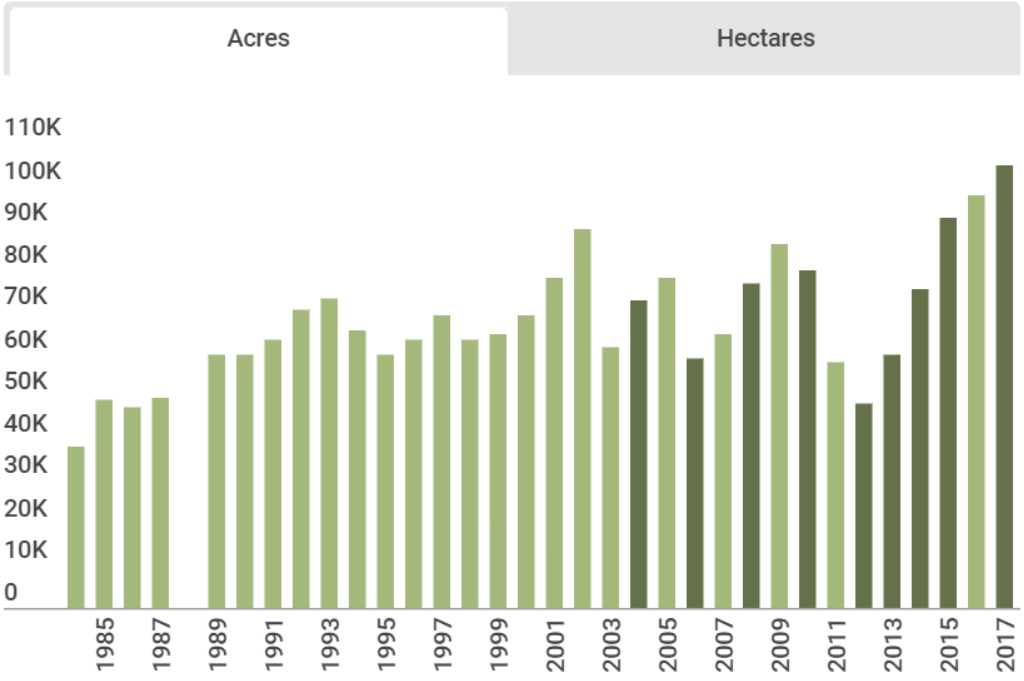
Chesapeake Bay water quality at near-record high

Bay Barometer shows Chesapeake resilient, improving

Steep Cuts in Wastewater Pollution Leading Way in Chesapeake Bay Restoration; Sector Meeting 2025 Pollution Limits 10 Years Early (June 14, 2016) - Upgrades and operational efficiencies at wastewater treatment plants throughout the Chesapeake Bay watershed have achieved steep reductions in nitrogen and phosphorus pollution, putting this sector at the forefront of Bay restoration. The wastewater sector has reduced nitrogen going to the Bay by 57 percent and phosphorus by 75 percent since 1985 and, for the first time, is effectively meeting its 2025 nutrient pollution limits in the landmark Chesapeake Bay TMDL, according to Chesapeake Bay Program analysis.

Chesapeake regaining "resilience," EPA reports

Submerged Aquatic Vegetation (SAV)



Light green bars denote years with partial data. Dark green = years with complete data. No bar

Source:Virginia Institute of Marine Science

Live Radio · RADIO IQ
BBC Newshour

Home | Schedules & Frequencies | News | Programs | Music | About Us | Support | Search

Virginia's Efforts To Restore Seaside Grasses May Be A Worldwide Model

By PAMELA D'ANGELO • JUL 13, 2018

Tweet
Share
Google+
Email

Harvested eel grass with seed pods

CREDIT PAMELA D'ANGELO

Grateful Dead-Zone: Thank You for Not Growing

Follow

30 NOV 2017

Blog Post CBF in Maryland, CBF in Virginia

What does this mean?

The overall message is best stated by Beth McGee: "**There is scientific consensus that the dead zone is getting smaller over time, and ending earlier in the summer.** This is an indication that the Clean Water Blueprint is working. But we also know that much more needs to be done to achieve a Bay that is healthy for all living creatures."

We will always have year to year variations in the dead zone due to the weather, but the long-term trend is very encouraging. **The Chesapeake Clean Water Blueprint's ongoing programs to reduce nutrient pollution are working and we hope to keep on truckin' for smaller dead zones in years ahead.**

Lessons Learned in Virginia

- Nutrient and sediment reductions necessary in all sectors
  - Wastewater, Agriculture, Regulated and Unregulated Urban, Septic, Forest
- State and local funding is critical
  - VA's Water Quality Improvement Fund (WQIF)
  - Local stormwater fee programs
- Wastewater reductions have been the most dependable reductions and have "carried the load" under the Chesapeake Bay TMDL
- Watershed General Permit/Technology Regulation combined with WQIF funding was instrumental in achieving timely and lasting nutrient reductions
- Point Source – to – Nonpoint Source trading is very difficult
- Large scale environmental restoration is possible!

Questions?