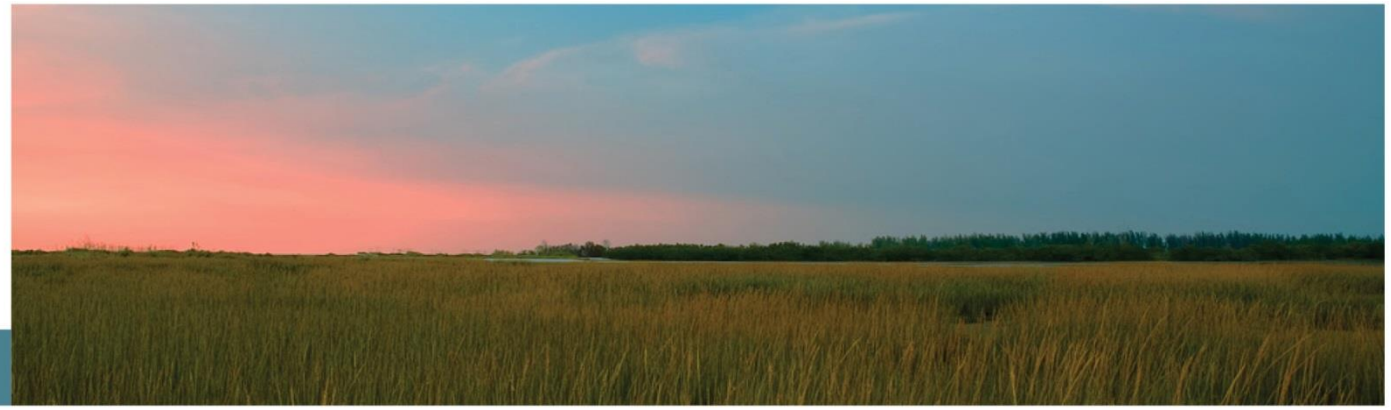
CoastWise PARTNERS

Holly Greening & Rich Batiuk

We'll work for (good) food!



Who We Are

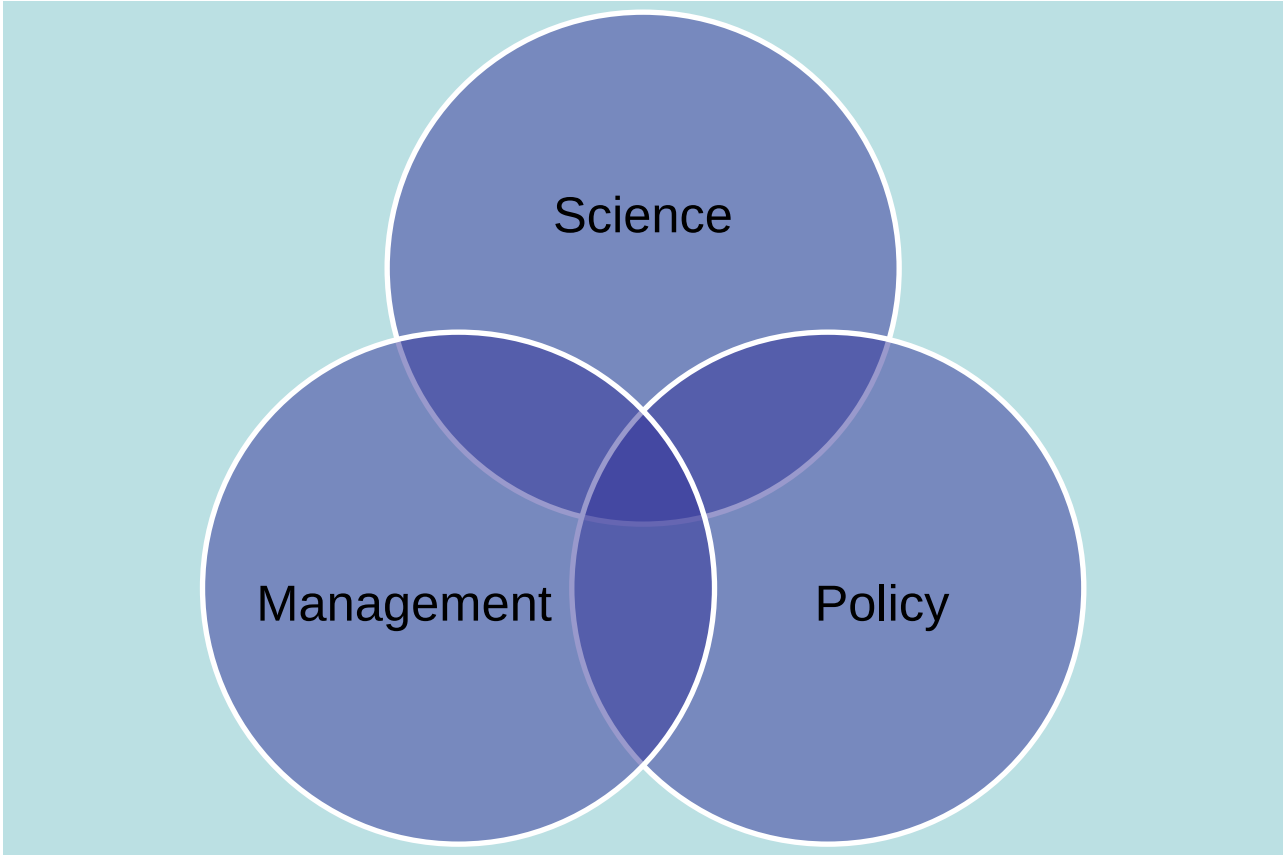
Rich Batiuk, retired from U.S. EPA Chesapeake Bay Program Office. Instrumental in designing Chesapeake Bay's extensive cooperative approach to meeting Bay targets.

Holly Greening, retired from Tampa Bay Estuary Program. Facilitated Tampa Bay's successful nutrient management and seagrass recovery strategy.

OFFERING VOLUNTEER ASSISTANCE WITH...

GOAL-SETTING | ESTABLISHING CRITERIA | TECHNICAL ADVICE | MONITORING DESIGN | WORKSHOP PARTICIPATION | PEER REVIEWS

SAV and Water Quality: The Nexus of Science, Management and Policy



Using Collaboration for Connecting SAV Science to Clean Water Management — Chesapeake Bay Lessons Learned

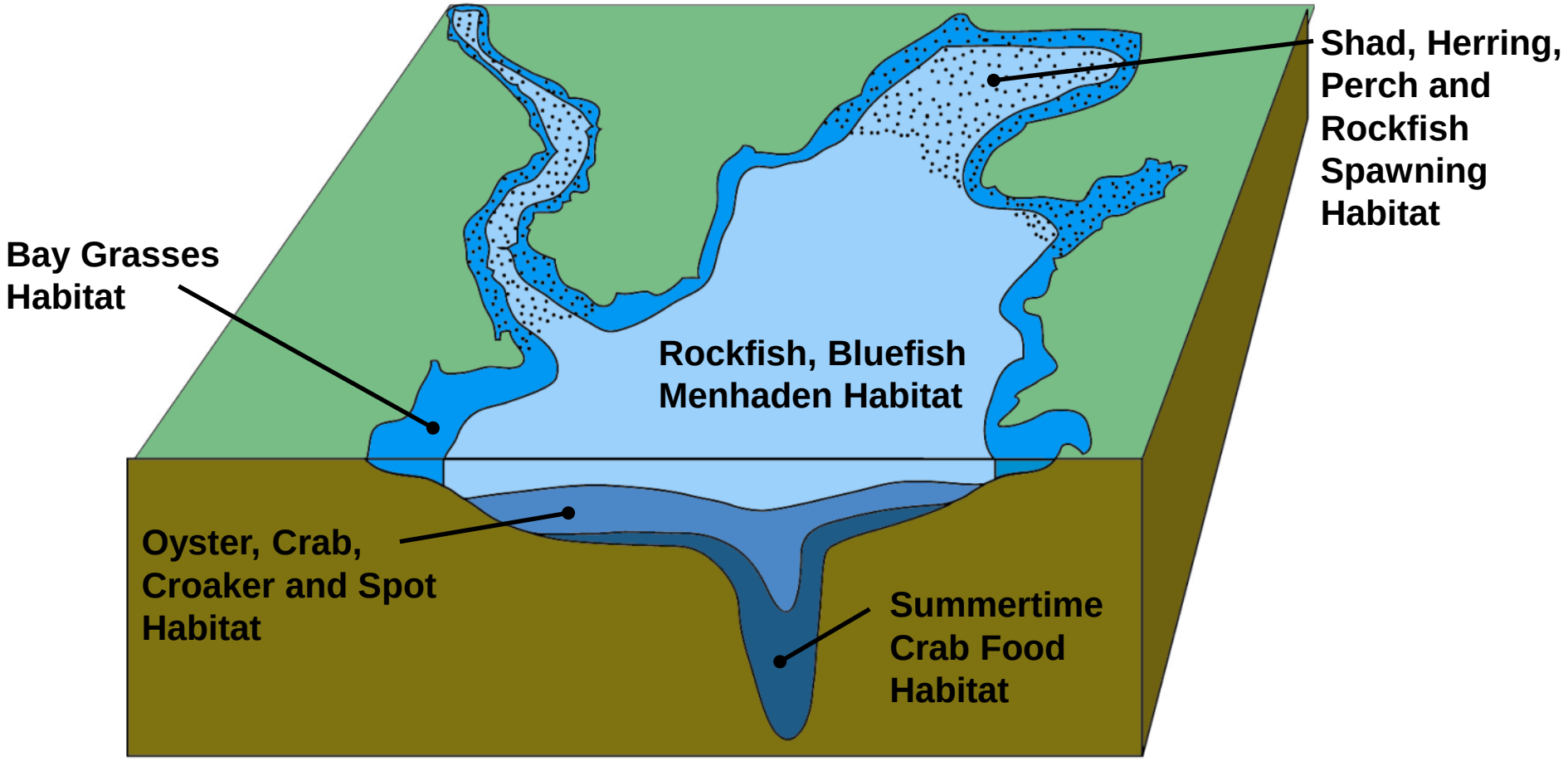
Define Clean Water Simply

Fish need oxygen

Underwater grasses need light

Oysters need good food

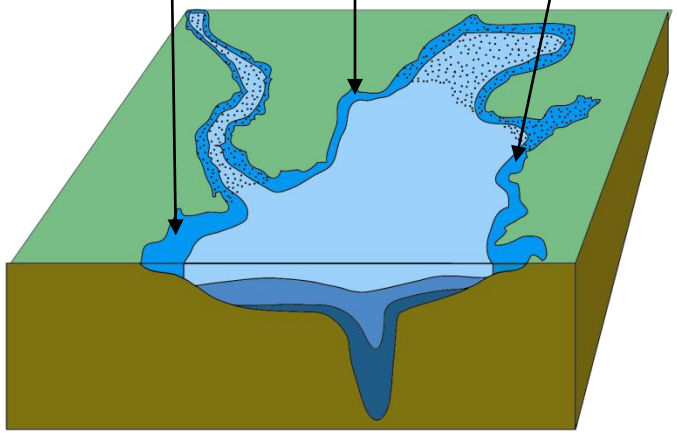
Local “Zoning” for Bay and Tidal River Fish, Crab and Grasses Habitats

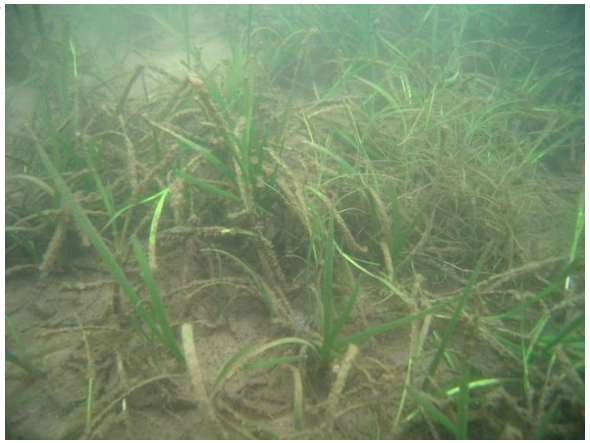


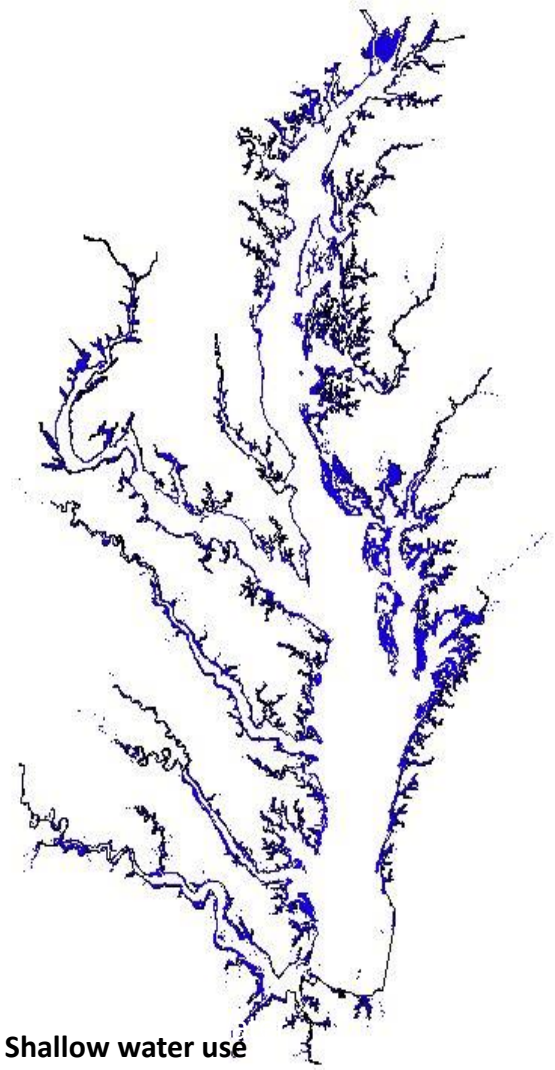
Source: U.S. EPA 2003b

Shallow-Water Underwater Bay Grass Use

Supports underwater Bay grasses in shallow waters (0.5-2 m) during the respective growing season

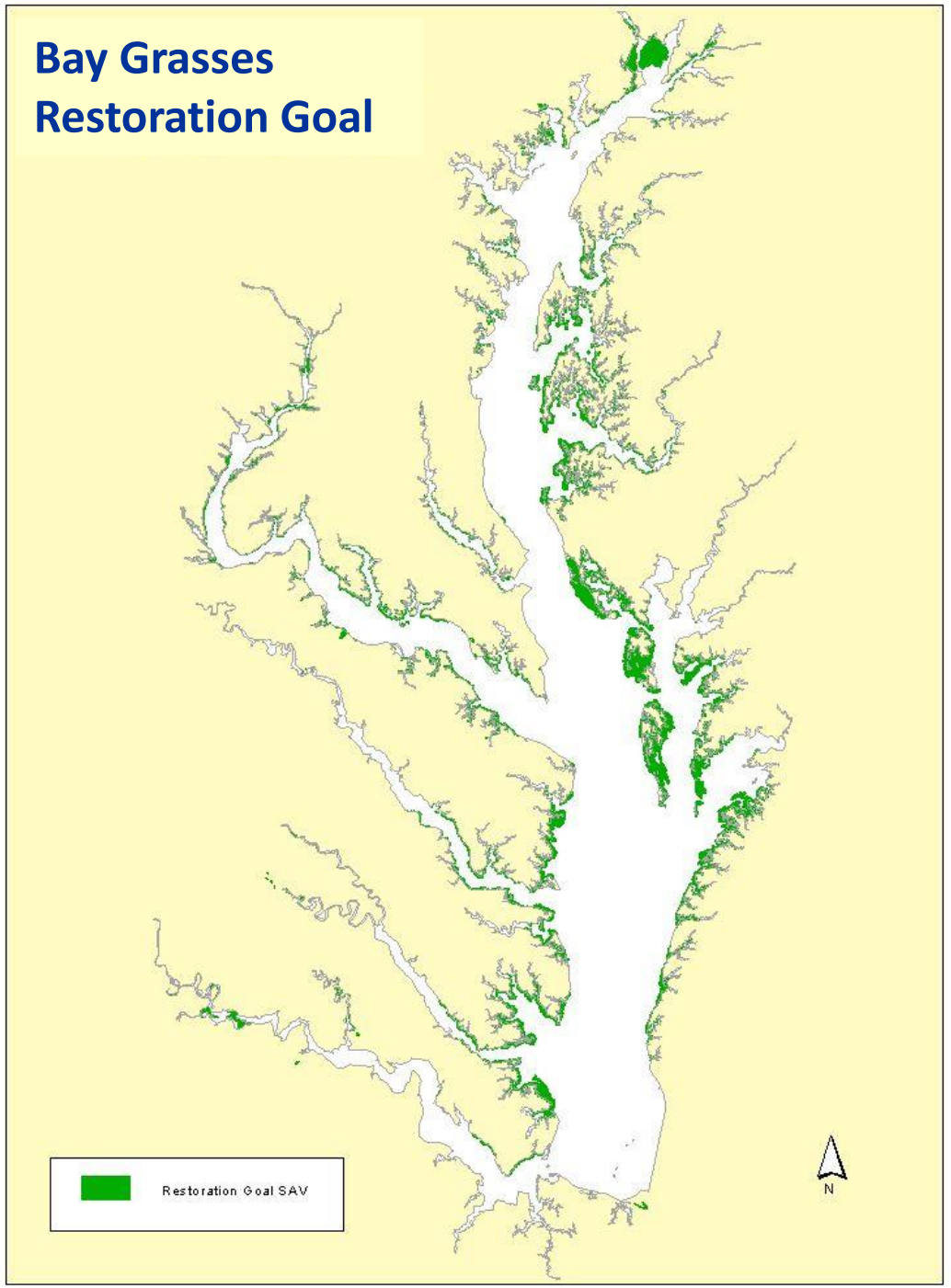






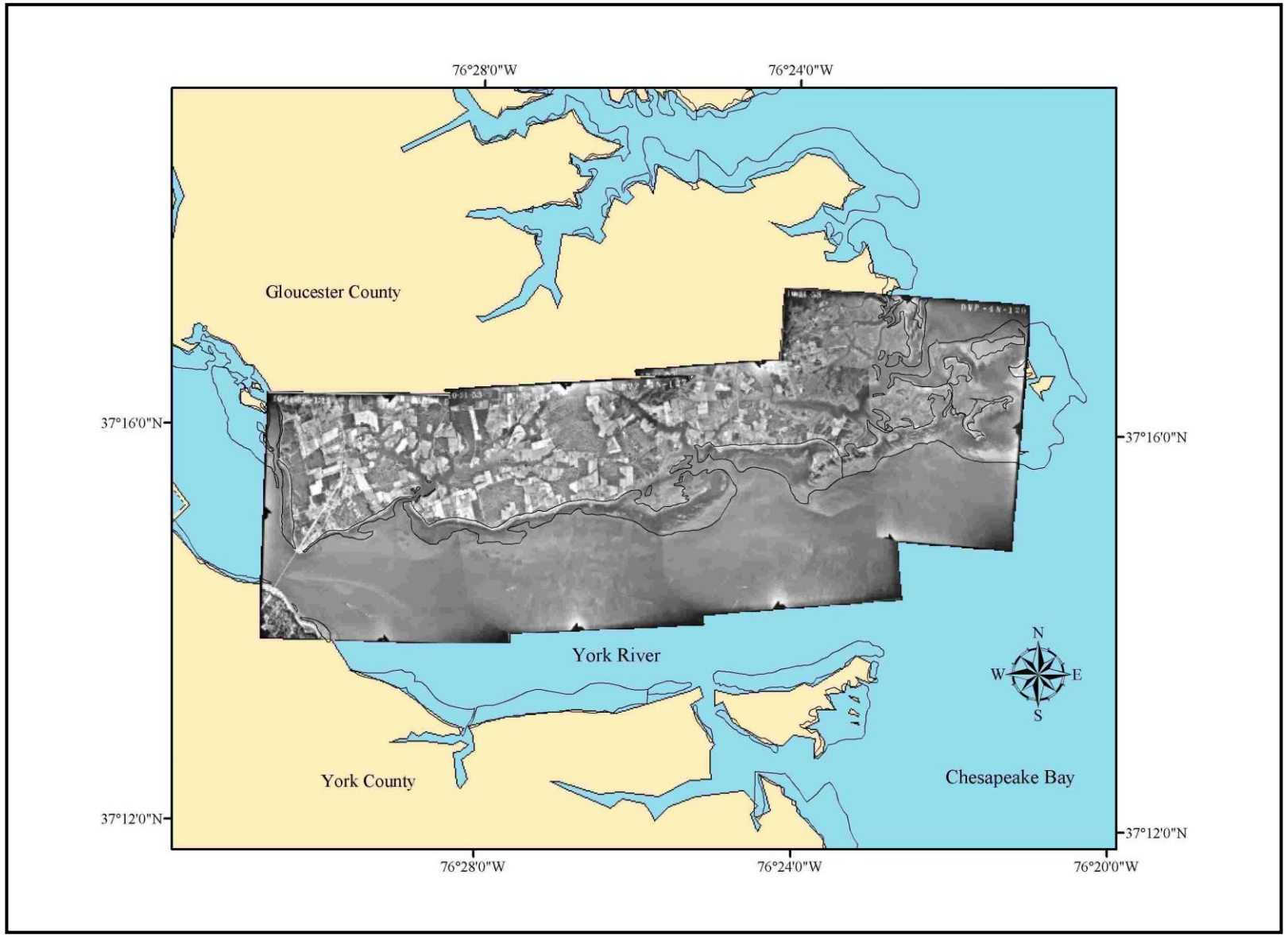
Sources: Batiuk et al. 1992, 2000; U.S. EPA 2003b

MD, VA, DE and DC have adopted the 185,000 acre Bay grasses restoration goal into their state water quality standard regulations at the Bay segment scale

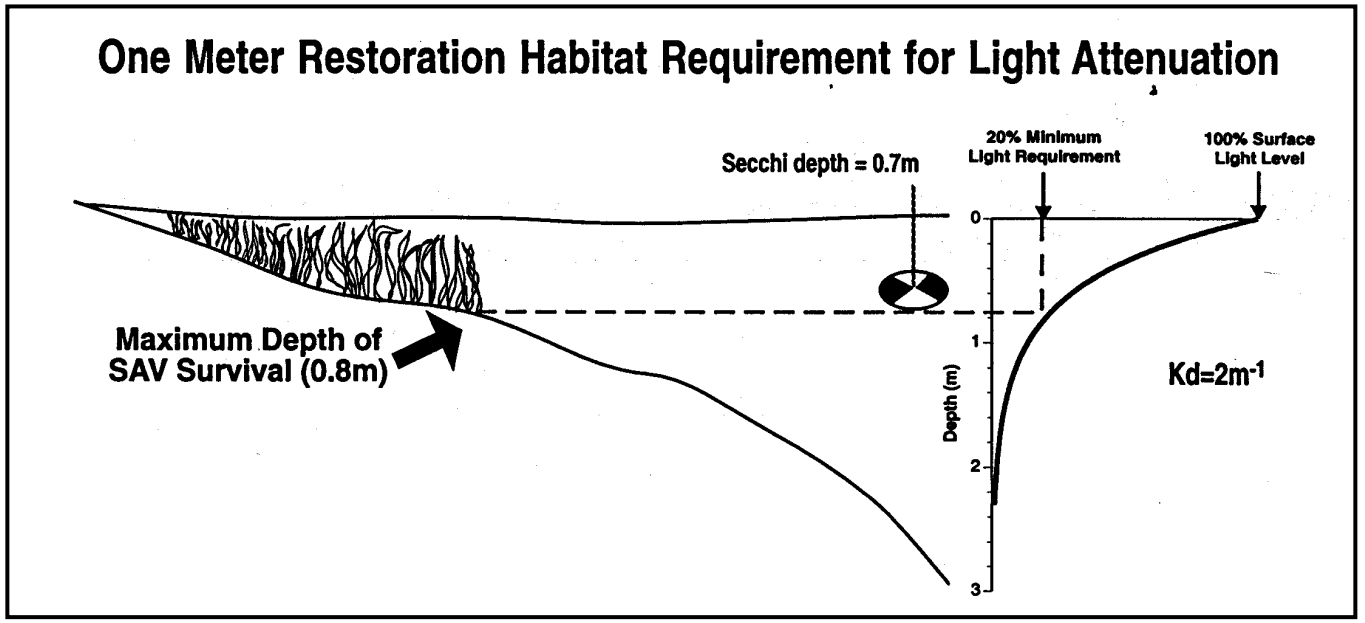


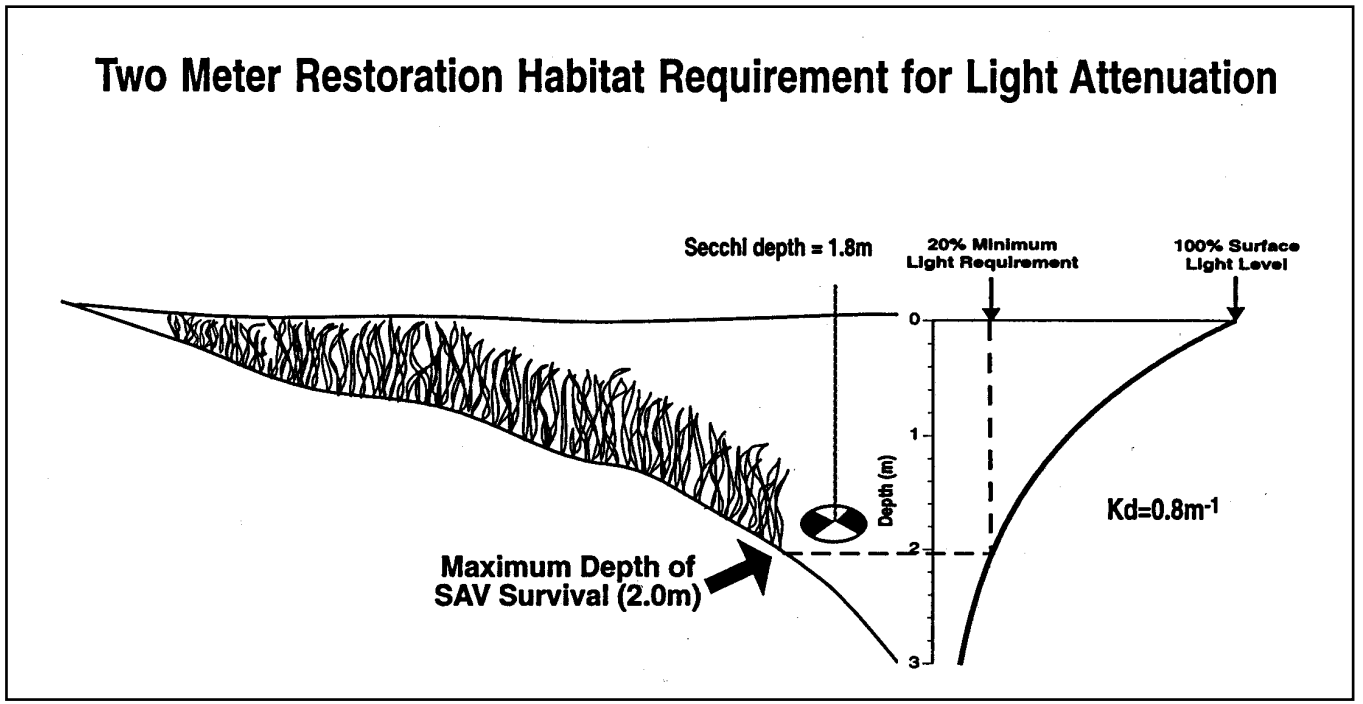
Sources: Batiuk et al. 2000; U.S. EPA 2003b

Historical Photography Used with Partnership Decision Rules to Derive Restoration Goals



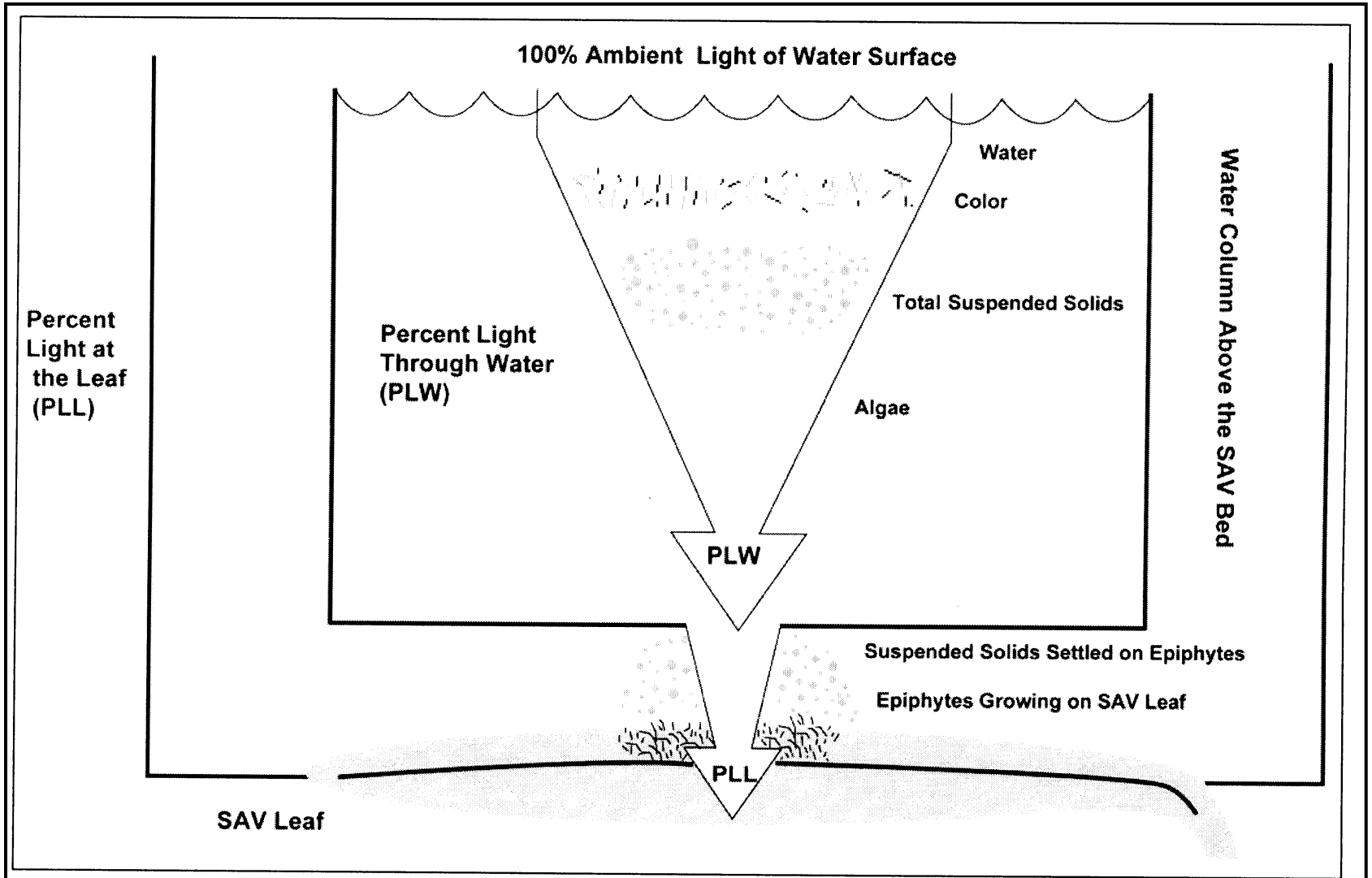
Growing seasonal light requirements determined at maximum depths of grass beds





Source: Batiuk et al. 2000

“Percent Light” Selected as Water Clarity Criteria



Two Percent Light Parameters for Evaluating Ambient Conditions. Illustration of the relationship of the two percent light parameters and the water quality conditions influencing both of them.

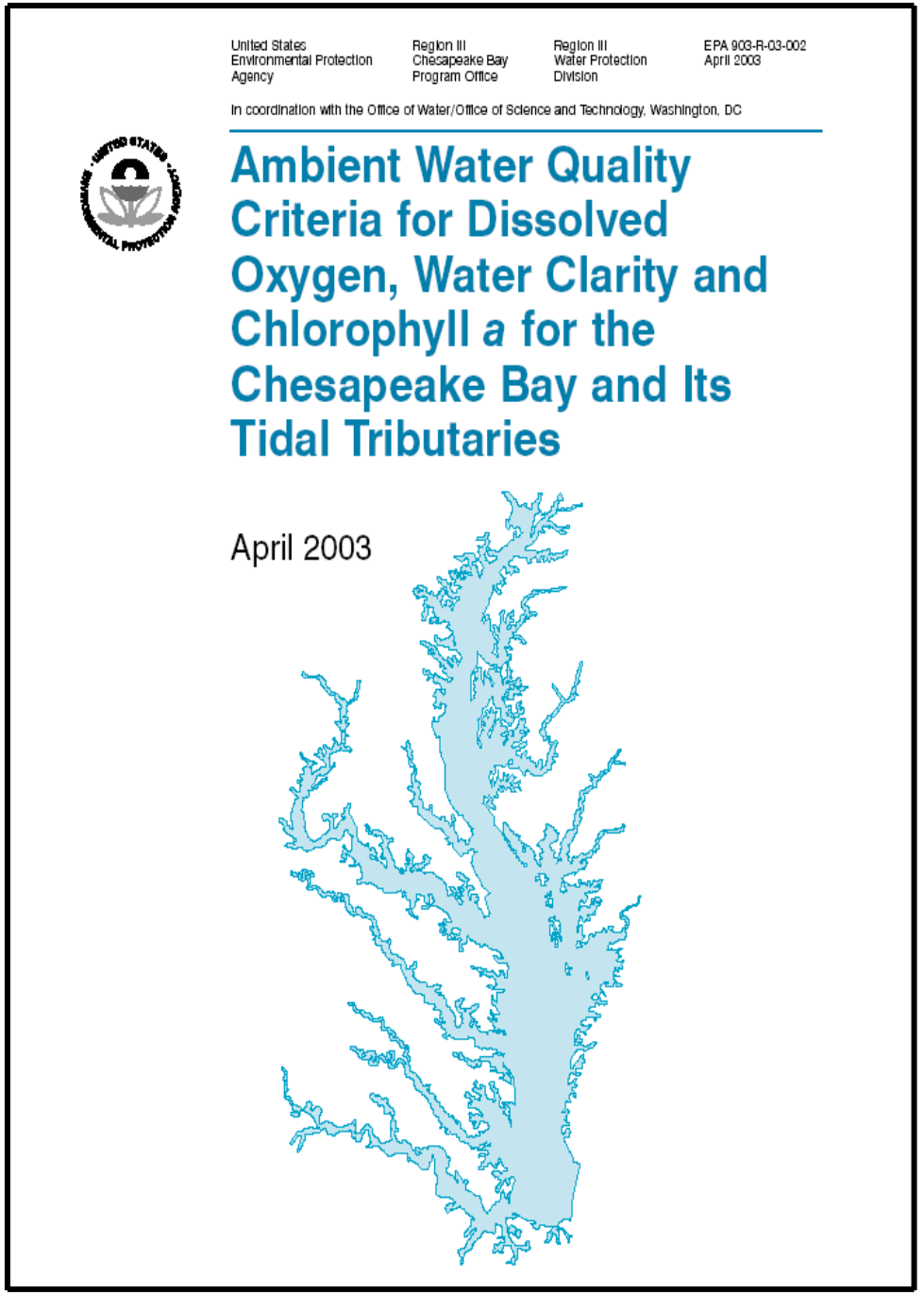
Source: Batiuk et al. 2000

SAV Habitat Requirements ➡ Water Clarity Criteria

	2000 SAV Habitat Requirements					2003 Water Clarity Criteria	
Salinity	Kd	TSS mg/l	Chl µg/l	DIN mg/l	DIP mg/l	PLW	PLL
Tidal Fresh (<0.5 ppt)	< 2	< 15	< 15	---	< 0.02	> 13%	> 9%
Oligohaline (0.5-5 ppt)	< 2	< 15	< 15	---	< 0.02	> 13 %	> 9%
Mesohaline (5-18 ppt)	< 1.5	< 15	< 15	< 0.15	< 0.01	> 22%	> 15%
Polyhaline (>18 ppt)	< 1.5	< 15	< 15	< 0.15	< 0.02	> 22%	> 15%

Sources: Batiuk et al. 2000; U.S. EPA 2003a

Published the resultant minimum light requirements as percent light through water water clarity criteria



United States Environmental Protection Agency | Region III Chesapeake Bay Program Office | Region III Water Protection Division | EPA 903-R-03-002 April 2003

In coordination with the Office of Water/Office of Science and Technology, Washington, DC

Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll *a* for the Chesapeake Bay and Its Tidal Tributaries

April 2003

Source: U.S. EPA 2003a

Water Clarity Criteria/Restoration Goals ➡ State WQ Standards

Shallow-water designated use considered protected when there is:

- **Restoration of the defined number of Bay grasses acres per Chesapeake Bay segment**

OR

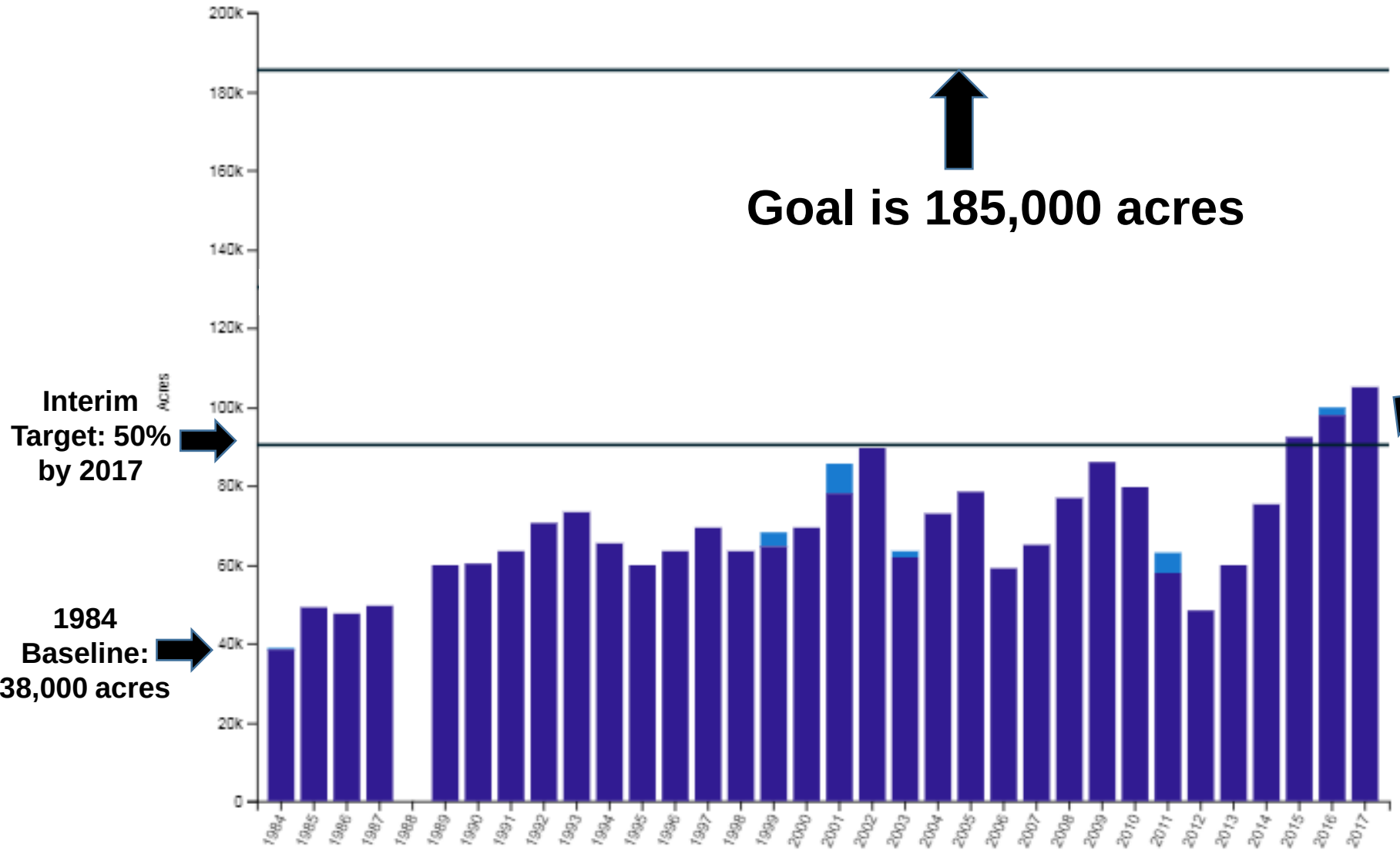
- **Attainment of sufficient shallow water clarity acres required to support restoration of Bay grasses to desired acreage**

OR

- **Combination of both acres of Bay grasses plus shallow water clarity acres**

Sources: U.S. EPA 2003a, 2007a, 2010

Chesapeake Bay Underwater Grasses are More then Halfway to their Restoration Goal (promulgated into MD, VA, DE and DC WQ Standards)



A Collaborative Approach to Recovery: Tampa Bay, Florida

Holly Greening

March 2020

Estuary Program

Tampa Bay in the 1970s

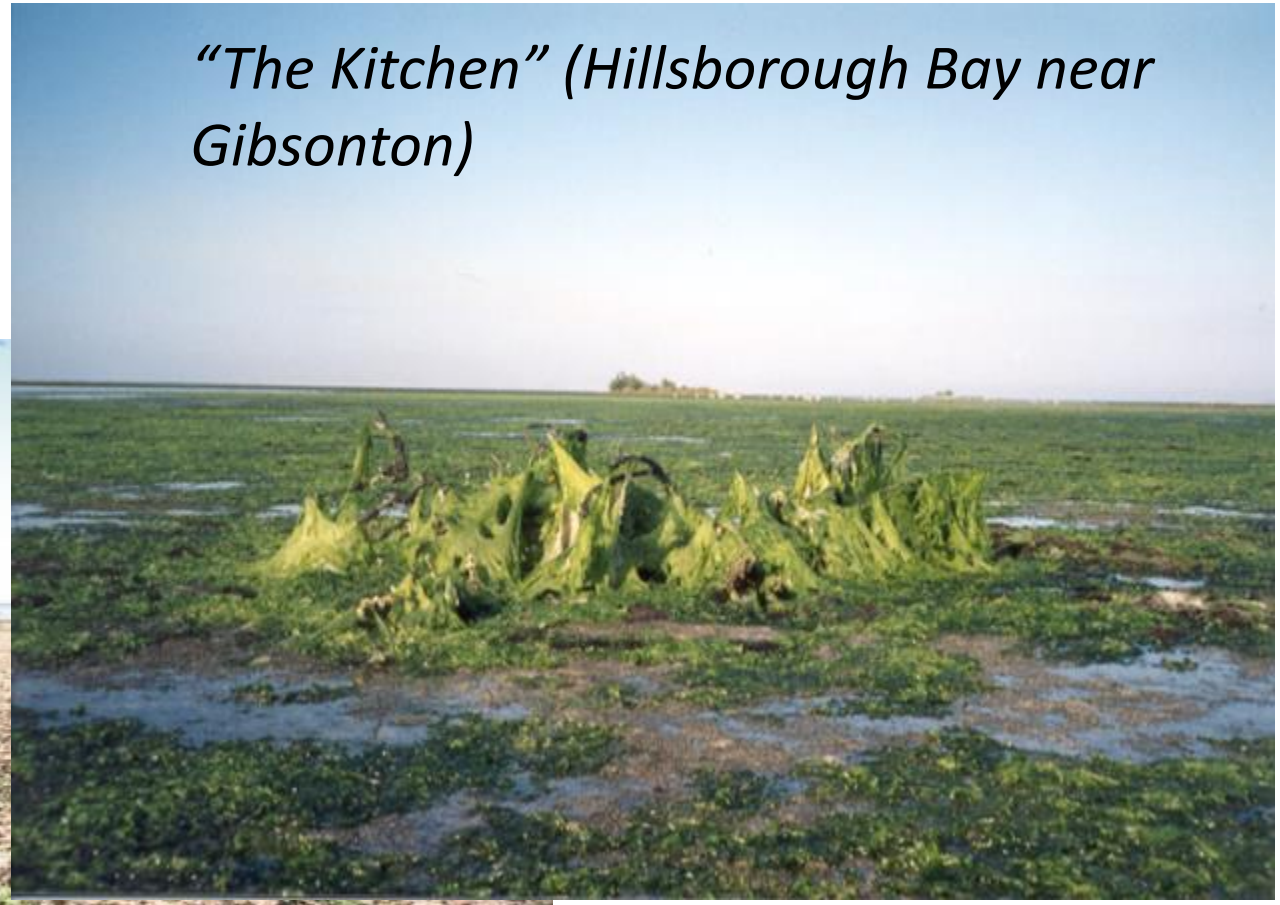
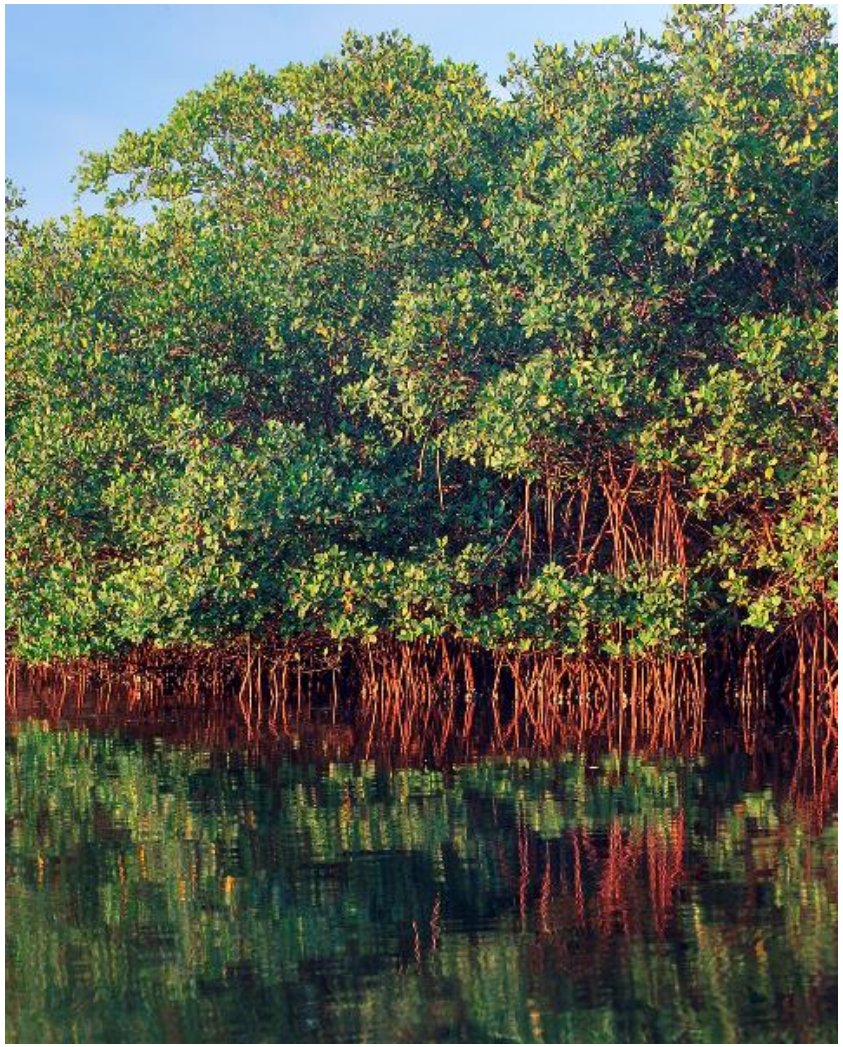


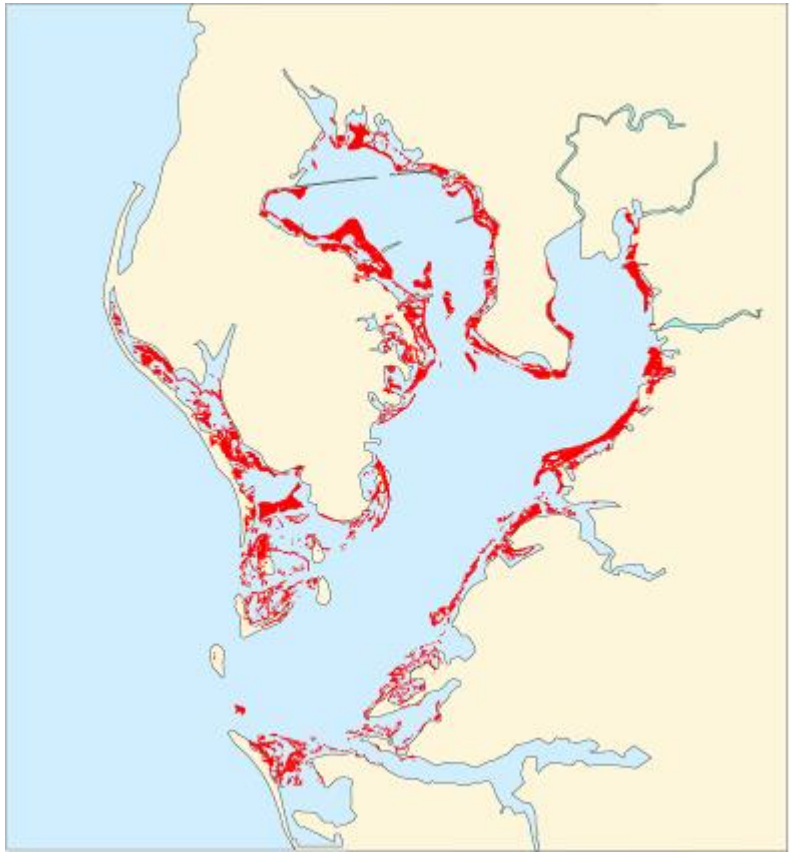
Photo by JOR Johansson

Restoring Tampa Bay

- Citizen action
- Regulations
  - Wastewater plants
  - Stormwater
- Regional collaboration
  - SWFWMD SWIM
  - Agency on Bay Management
  - TBEP



Tampa Bay Seagrass Restoration Goal

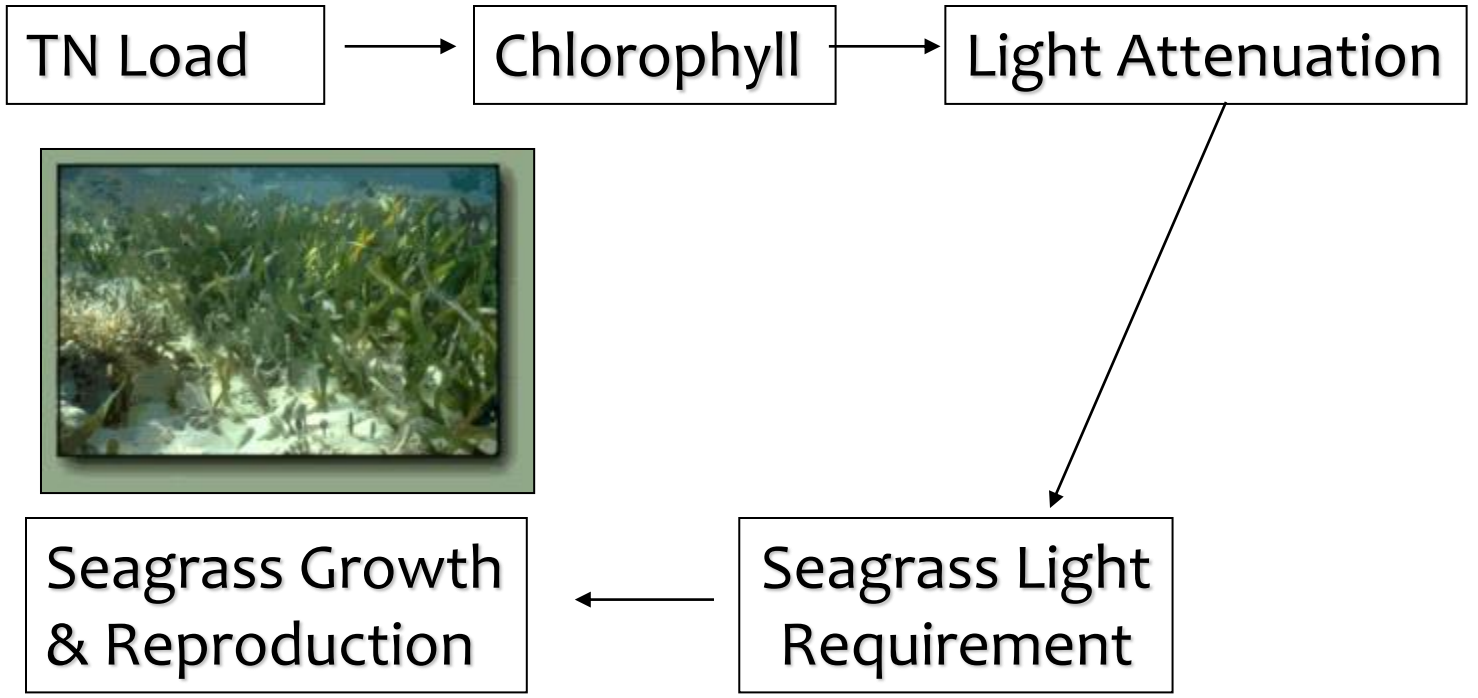


Difference between 1950 and 1990 seagrass cover

Seagrass Restoration Goal:

Restore seagrass acreage to that observed in ~1950.

Tampa Bay Nitrogen Management Strategy Paradigm



The beginning of Tampa Bay's Collaborative Approach

- Public sector realized that nitrogen management goals were unattainable without private sector help.
- Private sector invited to participate with the public sector in the voluntary Nitrogen Management Consortium.
- Each partner contributed to nitrogen management goal as they were able- no requirements or allocations

Tampa Bay Public/Private Partnership

Tampa Bay Nitrogen Management Consortium

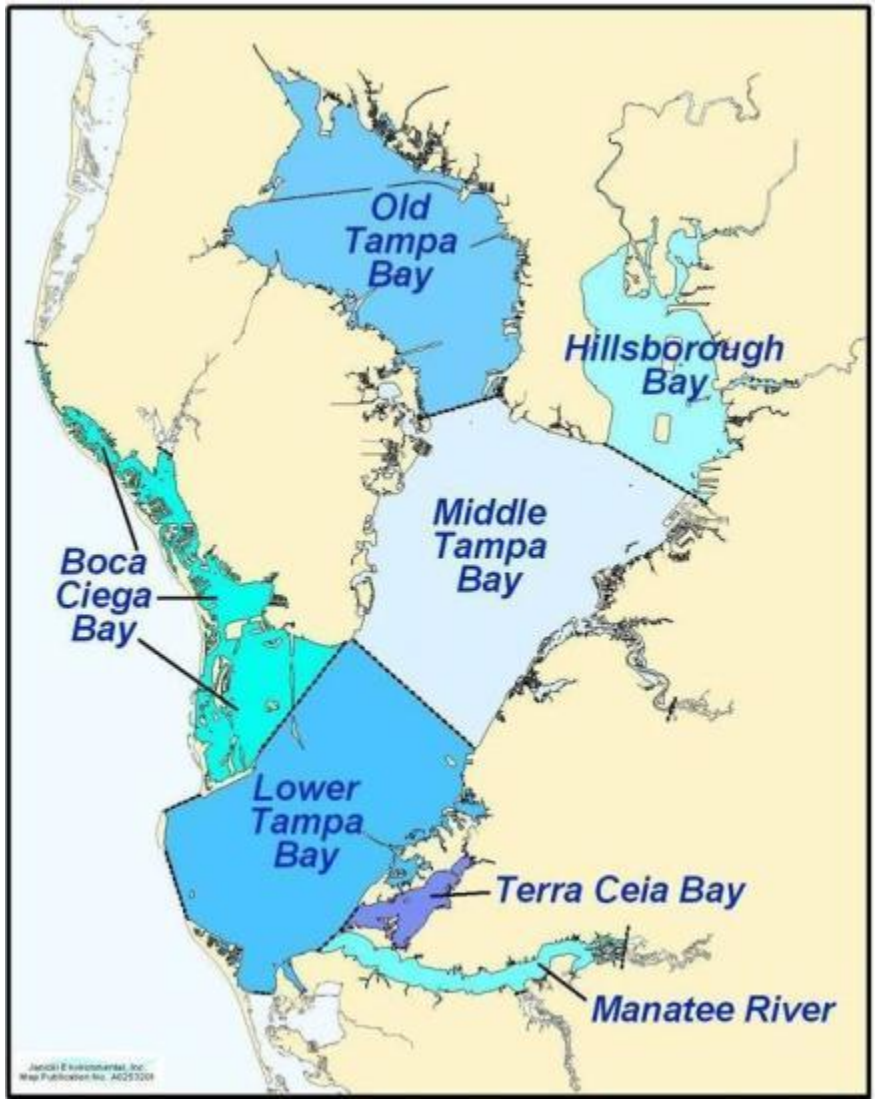
Formed in 1996

Partnership of:

- local governments,
- regulatory agency participants,
- local phosphate companies,
- agricultural interests and
- electric utilities

50+ NMC participants responsible for meeting nitrogen load reduction goals

Tampa Bay TMDL and Nutrient Criteria



1998- EPA Region 4 approves TN loads for 1992-1994 (voluntary goal) as TMDL for nitrogen for Tampa Bay.

Consortium requested– and FDEP and EPA encouraged-- Consortium to collaboratively develop recommended nutrient criteria consistent with the voluntary TN load goals.

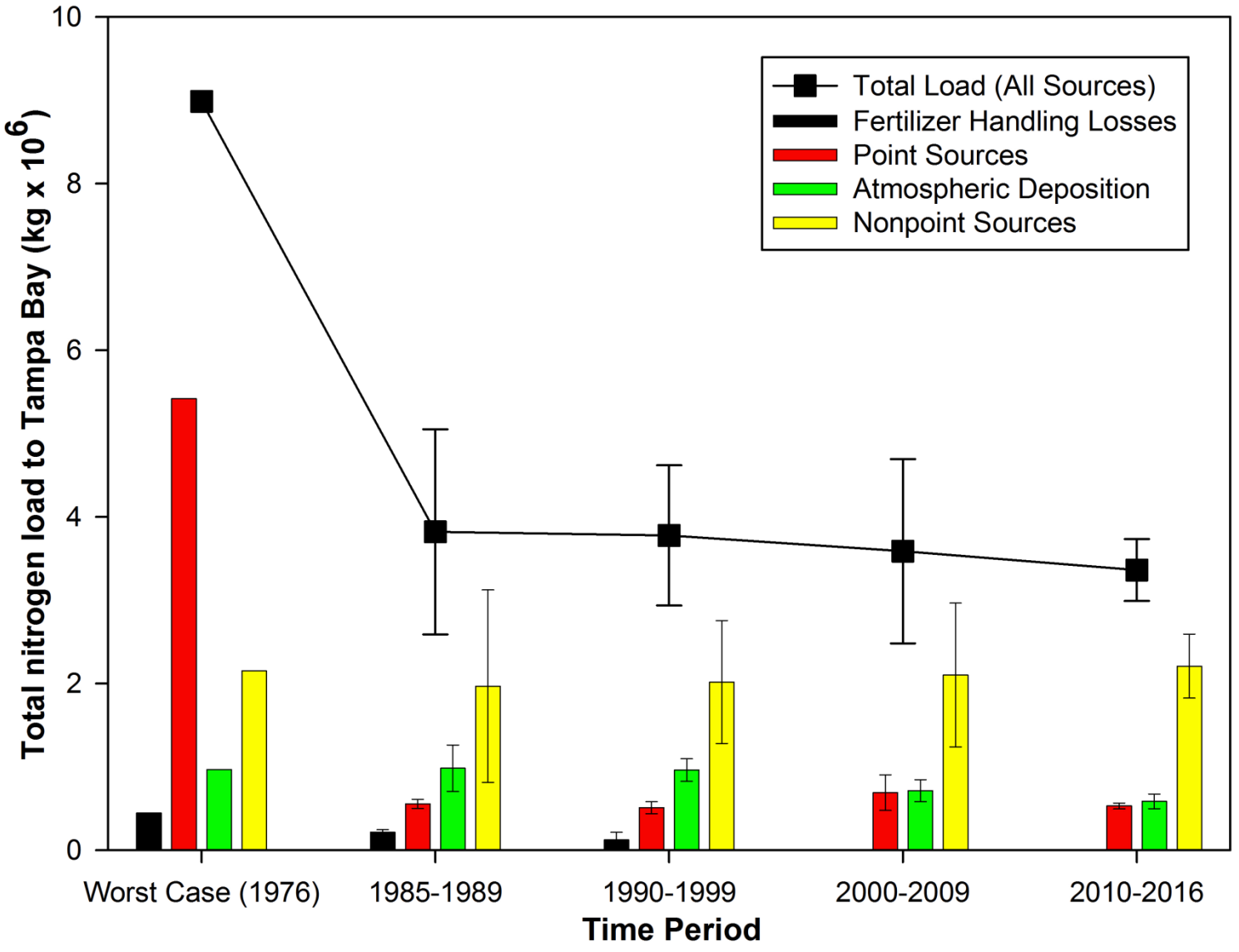
Tampa Bay Nitrogen Management Consortium

- 50+ public and private partners throughout watershed-collaborative approach to meeting regulatory water quality goals (EPA-recognized TMDL and nutrient criteria).

- 500 projects and actions

- Consortium developed and agreed to voluntary ‘caps’ on nitrogen loads at 2003-2007 levels for all sources. Caps now incorporated into permits. TMDL is being met.

Nitrogen load has decreased



Water quality has improved

Annual average chl-a concentration thresholds

Advanced wastewater treatment begins

Stormwater regulations enacted

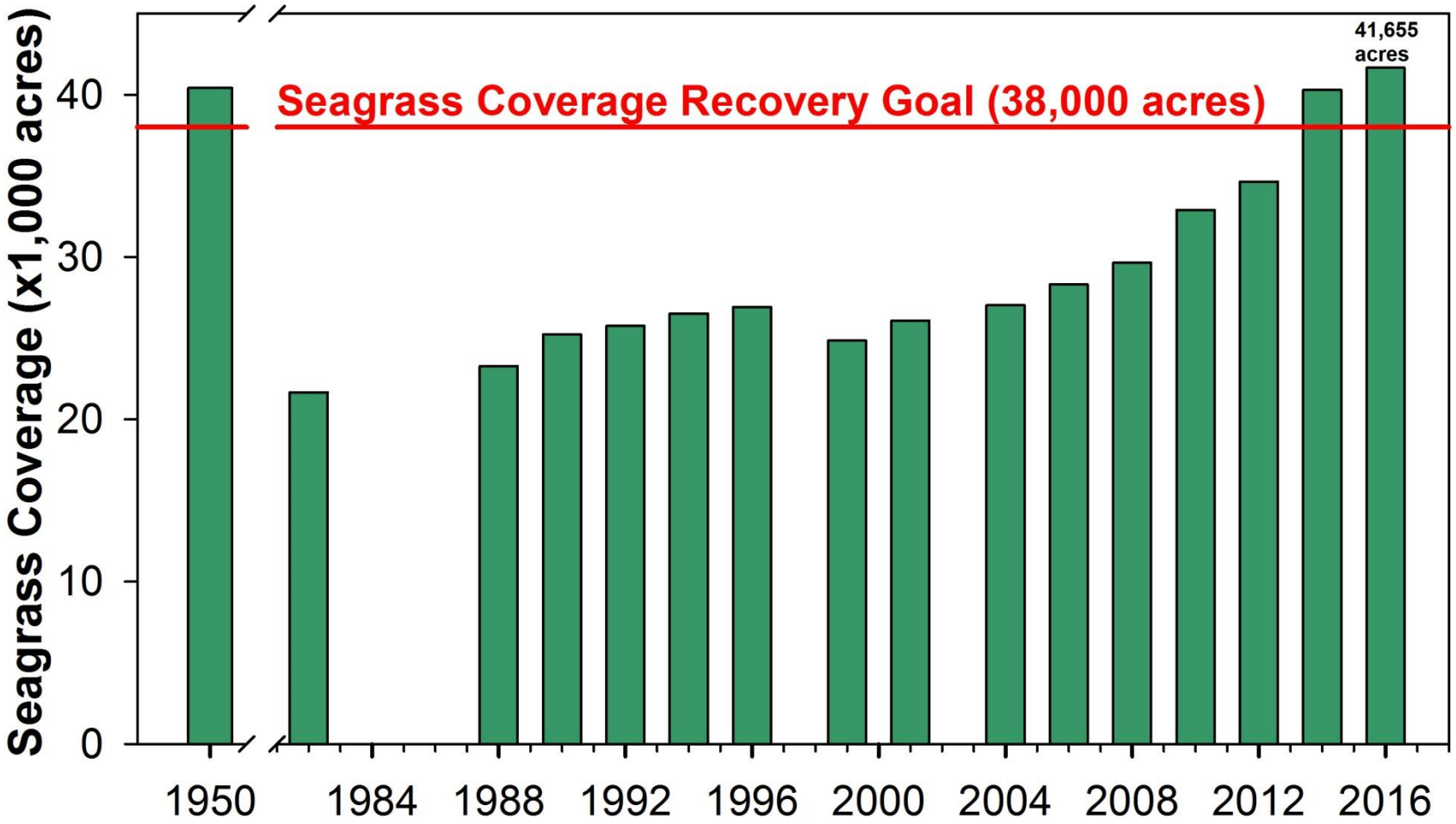
TBEP formed

NMC formed

Year	Old Tampa Bay	Hillsbor-ough Bay	Middle Tampa Bay	Lower Tampa Bay
1974	No	No	No	Yes
1975	No	No	No	Yes
1976	No	No	No	Yes
1977	No	No	No	No
1978	No	No	No	Yes
1979	No	No	No	No
1980	No	No	No	No
1981	No	No	No	No
1982	No	No	No	No
1983	No	No	No	No
1984	Yes	Yes	No	Yes
1985	No	No	No	Yes
1986	No	No	Yes	Yes
1987	No	Yes	No	Yes
1988	Yes	Yes	Yes	Yes
1989	No	Yes	Yes	Yes
1990	No	Yes	Yes	Yes
1991	Yes	Yes	Yes	Yes
1992	Yes	Yes	Yes	Yes
1993	Yes	Yes	Yes	Yes
1994	No	No	No	No
1995	No	No	No	Yes
1996	Yes	Yes	Yes	Yes
1997	Yes	Yes	Yes	Yes
1998	No	No	No	No
1999	Yes	Yes	Yes	Yes
2000	Yes	Yes	Yes	Yes
2001	Yes	Yes	Yes	Yes
2002	Yes	Yes	Yes	Yes
2003	No	Yes	Yes	Yes
2004	No	Yes	Yes	Yes
2005	Yes	Yes	Yes	No
2006	Yes	Yes	Yes	Yes
2007	Yes	Yes	Yes	Yes
2008	Yes	Yes	Yes	Yes
2009	No	Yes	Yes	Yes
2010	Yes	Yes	Yes	Yes
2011	No	Yes	Yes	Yes
2012	Yes	Yes	Yes	Yes
2013	Yes	Yes	Yes	Yes
2014	Yes	Yes	Yes	Yes
2015	No	Yes	Yes	Yes
2016	Yes	Yes	Yes	Yes
2017	No	Yes	Yes	Yes

Data source: EPCHC

2016- Goal Met



Data: SWFWMD

CLEAN WATER MEANS MORE THAN YOU THINK

Despite massive growth, water quality in Tampa Bay has improved dramatically in 20 years

Dorian Photography Inc.

HEALTHY BAY

1 out of every 5 jobs in the TBEP Watershed depend on a healthy bay.

$22B
within all six counties

13%
of economy for all six counties

Key Elements in Tampa Bay's Management Strategy : Process and Metrics

- Target resources identified by both public and scientists as "worthy" indicators
- Community willing to work together towards common goals
- Science-based numeric goals and targets
- Multiple tools: Regulation; public/private collaborative actions; citizen actions
- Long-term collaborative monitoring
- Assessment and adjustment
- Link to economic value

Recent SAV Workgroup initiatives applicable to NC SAV management and protection

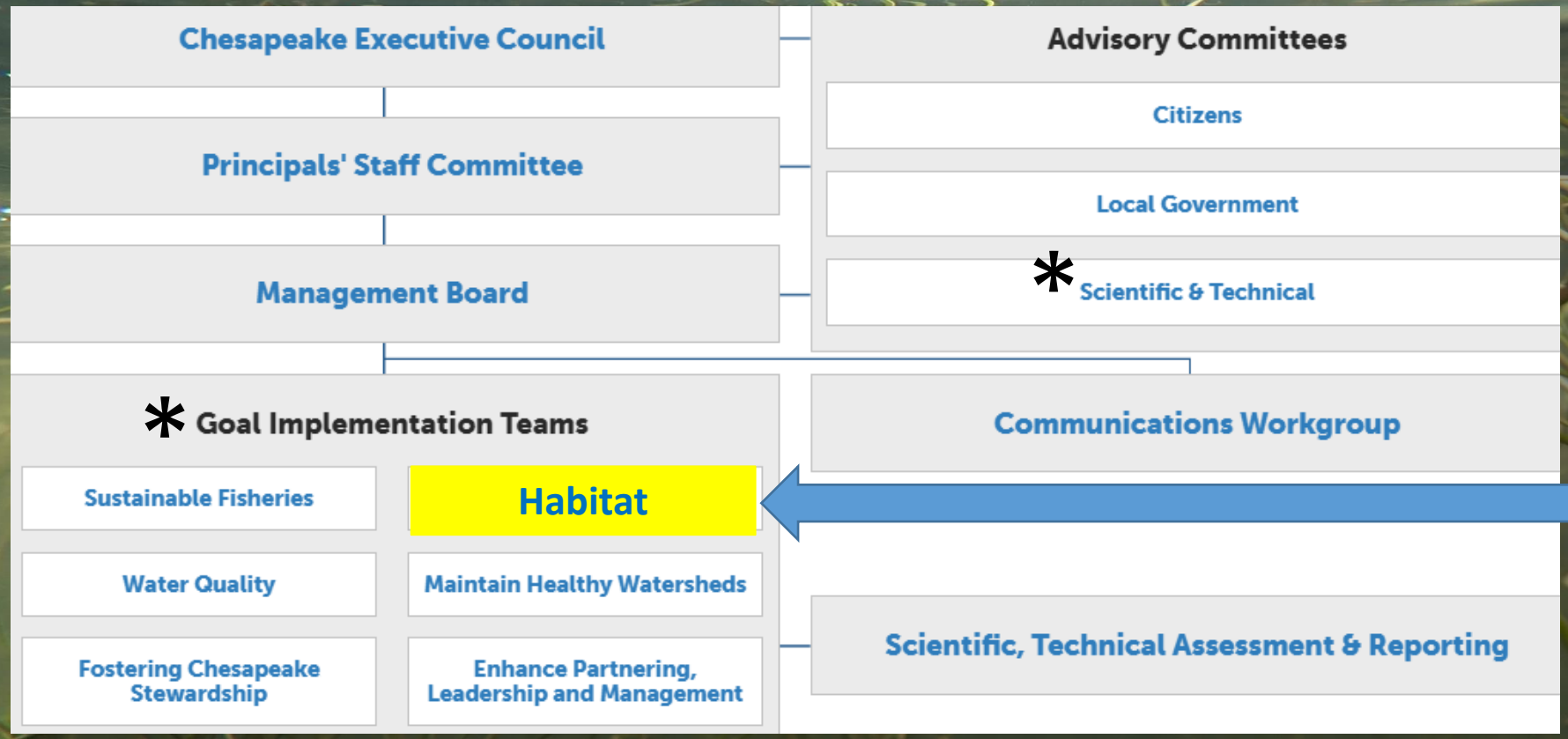
J. Brooke Landry

Chair, Chesapeake Bay Program's SAV Workgroup

brooke.landry@maryland.gov

(410) 260-8629

Chesapeake Bay Program's SAV Workgroup



SAV Workgroup

- Management Strategy
- 2-Year Workplan

***Provide annual funding for workplan actions and needs**

SAV Management Strategy

SAV Management Strategy

- Support efforts to improve water quality
- Protect existing SAV
- Restore SAV
- Enhance SAV Research and Monitoring
- Enhance Citizen Involvement, Education, and Outreach

SAV MStrat: https://www.chesapeakebay.net/documents/22042/2018-2019_sav_management_strategy.pdf

Chesapeake Bay Program
Science. Restoration. Partnership.

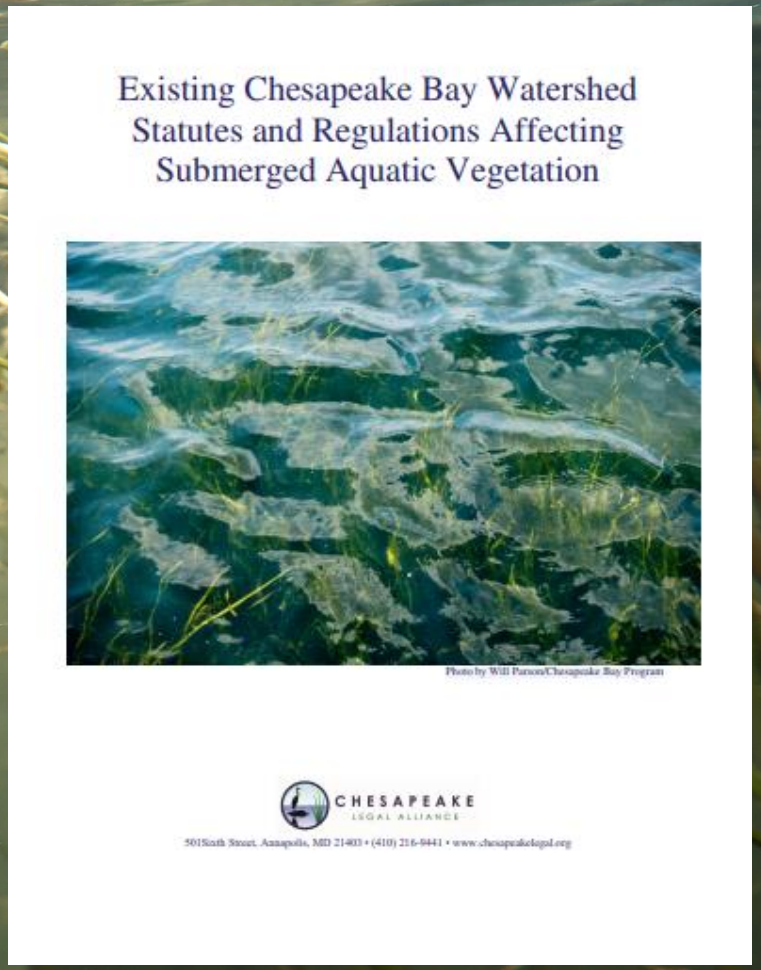
Submerged Aquatic Vegetation Outcome
Management Strategy
2015–2025, v.2

SAV WG: Protect Existing SAV

Conducted SAV Regulatory Review to determine if SAV is being adequately protected by current statutes, regulations, and policies, and if not, recommend improvements:

Existing Chesapeake Bay Watershed Statutes and Regulations Affecting SAV,

- Contracted to the Chesapeake Legal Alliance
- Goal Implementation Team funding

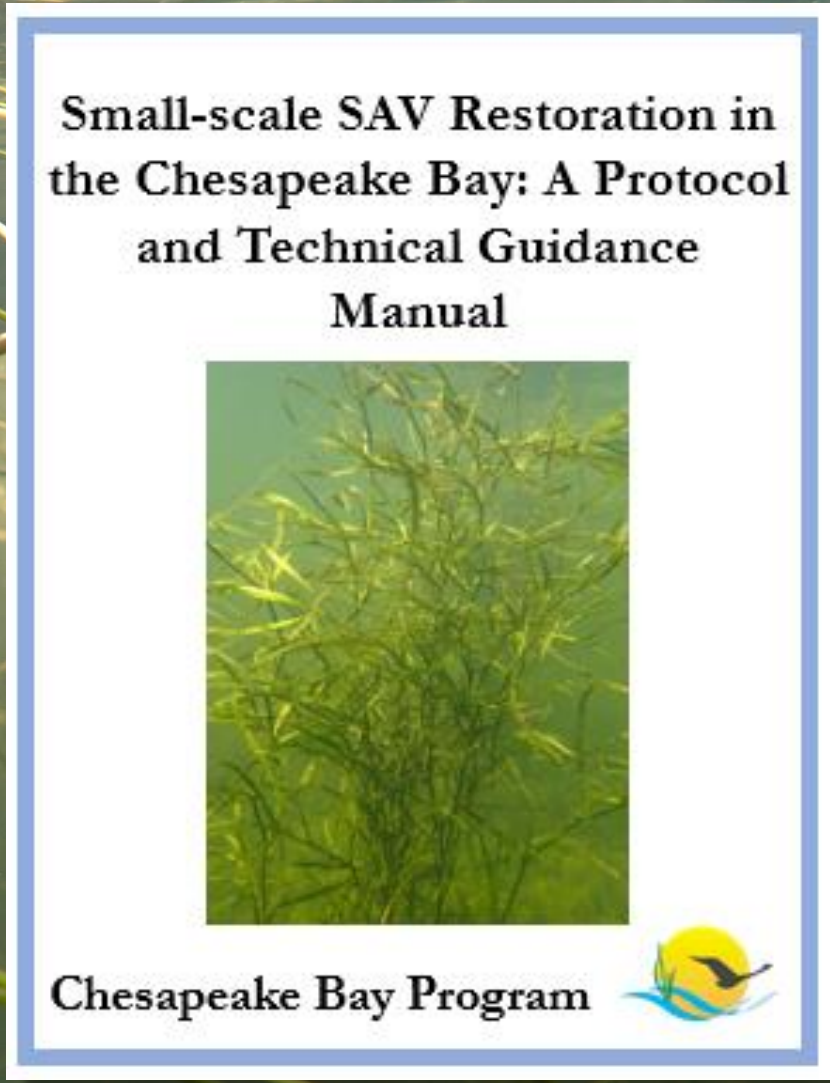


Can be found at www.chesapeakelegal.org under Guides and Reports

SAV WG: Restore SAV

Small-scale SAV Restoration in the Chesapeake Bay: A Protocol and Technical Guidance Manual

- Target audience: Riverkeeper and watershed organizations, local, state, and federal agencies responsible for SAV mitigation
- Projected completion: Dec. 2021
- Goal Implementation Team funding



SAV WG: Enhance Research and Monitoring

A Series of Technical Syntheses

[Chesapeake Bay SAV Habitat Requirements and Restoration Targets: A Technical Synthesis]

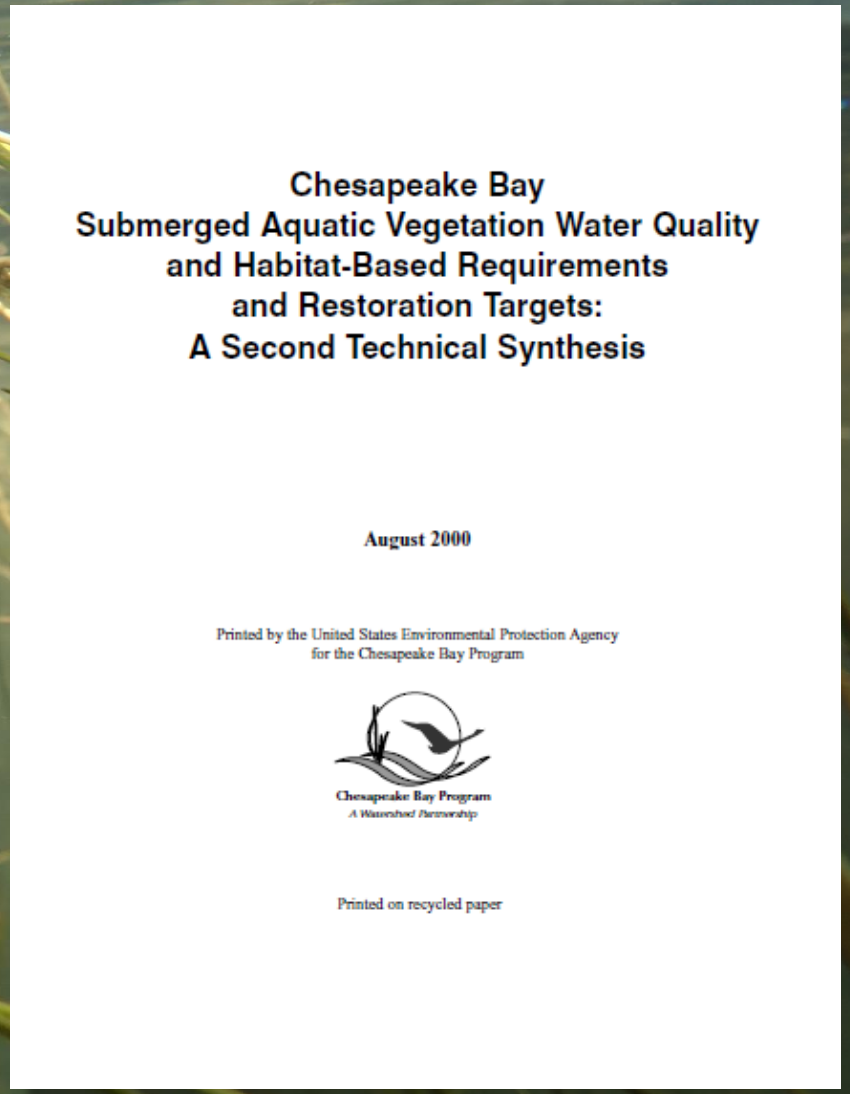
- 1992

[Chesapeake Bay SAV Water Quality and Habitat-Based Requirements and Restoration Targets: A Second Technical Synthesis]

- 2000

[Chesapeake Bay SAV: A Third Technical Synthesis]

- 2016



Chesapeake Bay
Submerged Aquatic Vegetation Water Quality
and Habitat-Based Requirements
and Restoration Targets:
A Second Technical Synthesis

August 2000

Printed by the United States Environmental Protection Agency
for the Chesapeake Bay Program

Chesapeake Bay Program
A Watershed Partnership

Printed on recycled paper

SAV WG: Enhance Research and Monitoring

SAV Synthesis Project: Long-term Trends Analysis: 2016-2019

Publications:

Orth et al. 2019. Estuaries and Coasts. Long-term Annual Aerial Surveys of Submersed Aquatic Vegetation (SAV) Support Science, Management, and Restoration

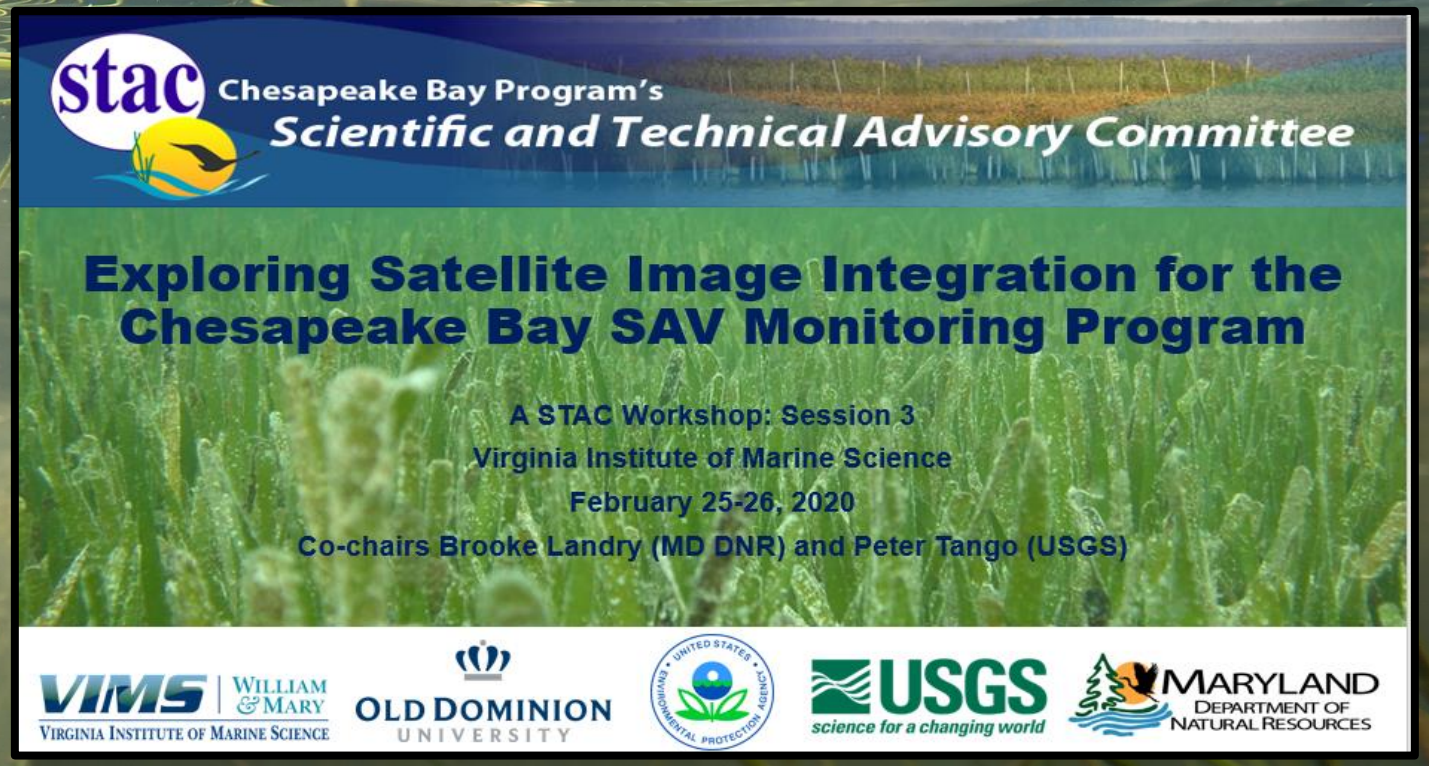
Lefcheck et al. 2018. PNAS. Long-term nutrient reductions lead to the unprecedented recovery of a temperate coastal region.

Orth et al. 2017. BioScience. Submersed Aquatic Vegetation in Chesapeake Bay: Sentinel Species in a Changing World

SAV WG: Enhance Research and Monitoring

STAC Workshop to explore satellite data integration into CB SAV Monitoring Program

- Science and Technical Advisory Committee annual workshop funding

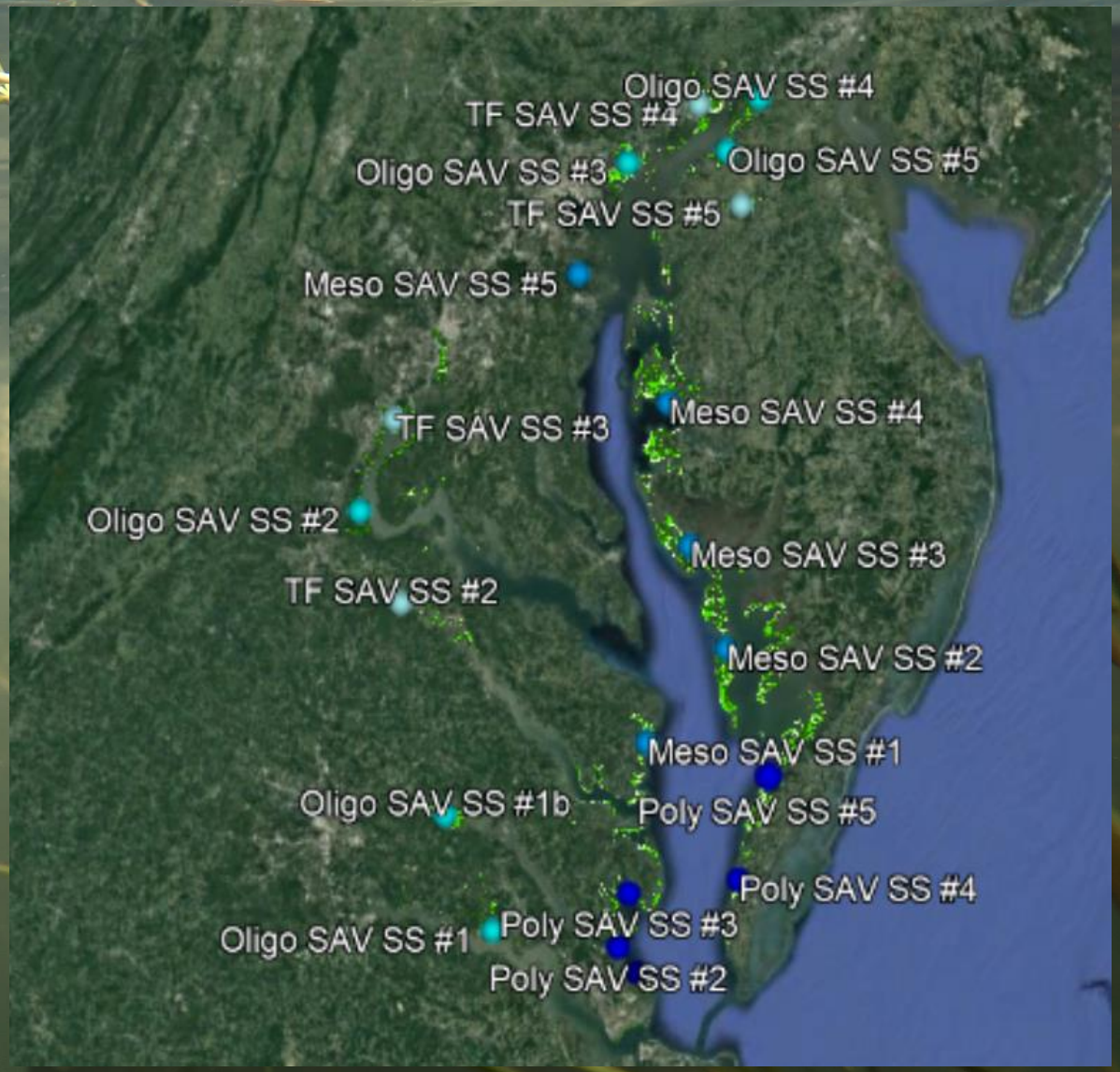


Federal agencies have access to commercial grade (~1m resolution) satellite data for free, and can task WorldView satellites for specific purposes, per NGA contract with Digital Globle/Maxar. Report available ~ August, 2020

SAV WG: Enhance Research and Monitoring

Chesapeake Bay Sentinel Site Program for SAV

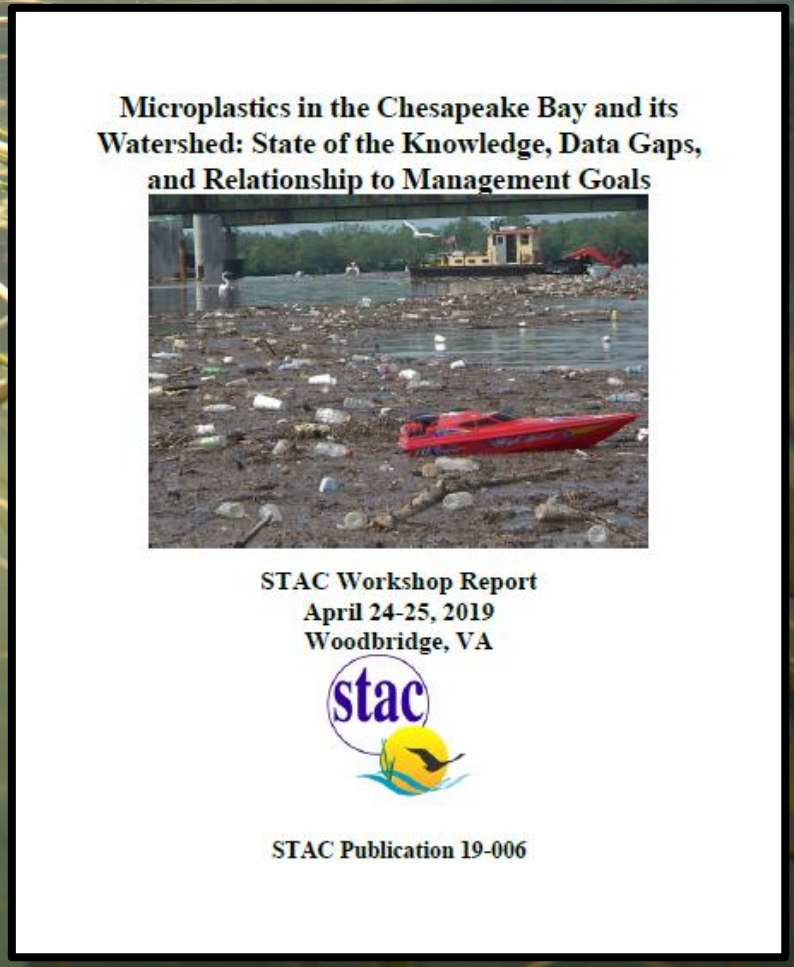
- 20 sites throughout the Bay
- Monitored by state agencies, academic institutions, and Riverkeeper and watershed organizations
- Volunteer basis as of now
- Basic to advanced protocol (tiered approach)
- May incorporate into MarineGEO
- Need funding



SAV WG: Enhance Research and Monitoring

Microplastics in the Chesapeake Bay and its Watershed: State of the Knowledge, Data Gaps, and Relationship to Management Goals

- SAV beds = sinks for MPs
- SAV beds = source of MPs to food chain
- Formed Plastic Pollution Action Team under CB Management Board as result of workshop recommendations
- Science and Technical Advisory Committee annual workshop funding



https://www.chesapeake.org/stac/document-library/microplastics-in-the-chesapeake-bay-and-its-watershed-state-of-the-knowledge-data-gaps-and-relationship-to-management-goals/

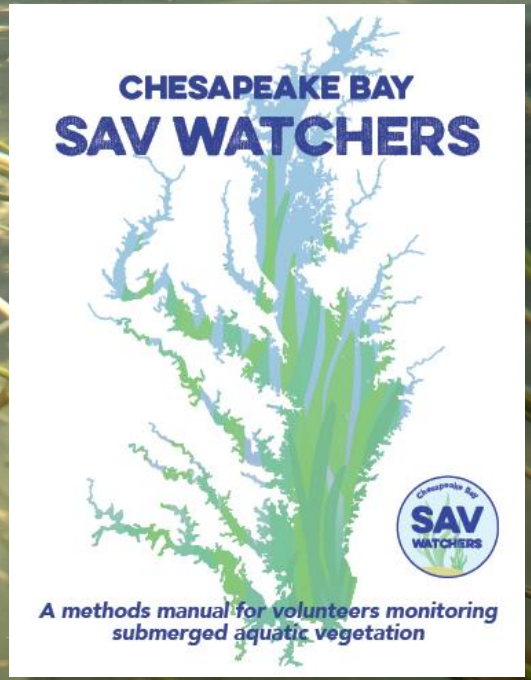
SAV WG: Enhance Citizen Involvement, Outreach, and Education

Chesapeake Bay SAV Watchers: Volunteer SAV Monitoring Program

- Target audience: Riverkeeper and watershed organizations and their volunteers, colleges and high schools
- Goal Implementation Team funding
- www.chesapeakebaysavwatchers.com

Community Based Social Marketing Campaigns

- Target audience: recreational boaters and waterfront homeowners
- Goal Implementation Team funding

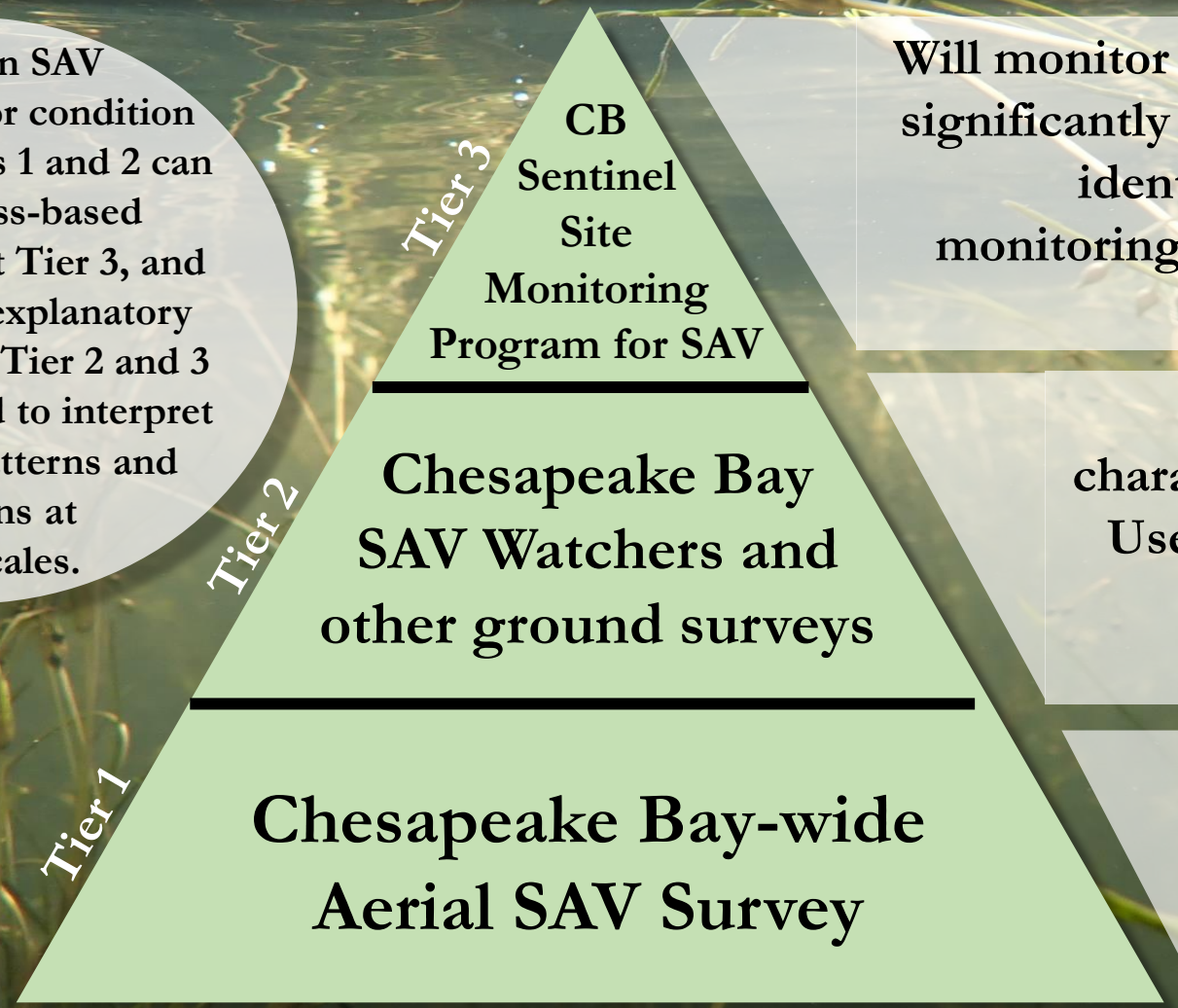


Chesapeake Bay SAV WATCHERS

SAV WG: Protect existing SAV/ Enhance Research and Monitoring

Three-tiered hierarchical monitoring approach for CB SAV

Changes in SAV habitat extent or condition detected at Tiers 1 and 2 can direct process-based investigations at Tier 3, and statistical and explanatory models built on Tier 2 and 3 data can be used to interpret and predict patterns and conditions at larger scales.



Will monitor multiple parameters in greater detail at a significantly smaller number of locations. Focuses on identifying causal relationships by intensively monitoring drivers of change, ecosystem responses, and ecological processes.

Monitors a limited number of habitat characteristics at a large number of locations. Useful for broad-scale condition assessment and for identifying and quantifying driver/response relationships.

Characterizes SAV acreage and density. Useful for quantifying SAV habitat distribution and density throughout the Bay and its tributaries.

14th International Seagrass Biology Workshop and World Seagrass Conference 2020

The Graduate Hotel
Annapolis, Maryland

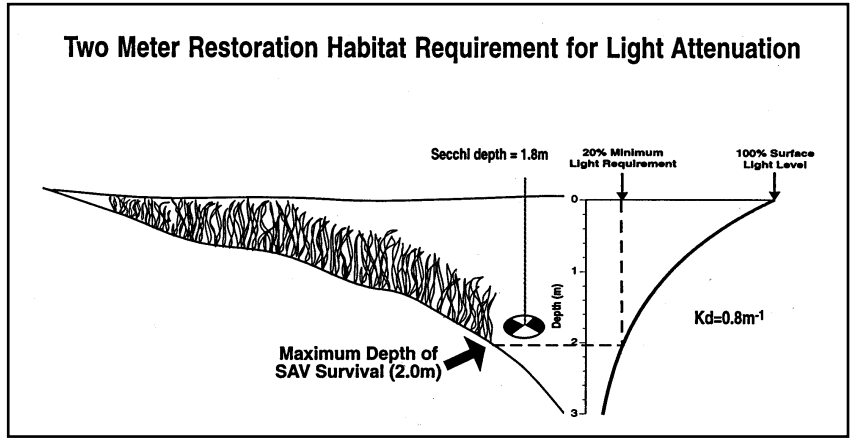
August 9th - 14th, 2020
Abstracts due by April 1st, 2020
www.isbw14.org

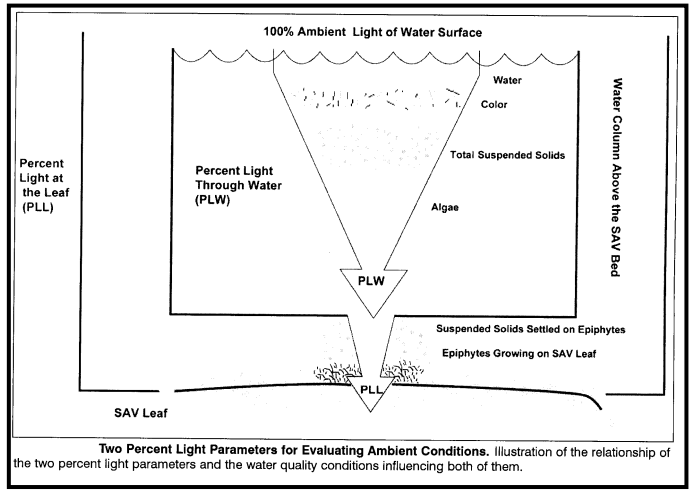
ISBW14
Chesapeake Bay 2020

The critical roles that collaboration has played in Chesapeake Bay and Tampa Bay

Collaboratively Developing and Agreeing to the Scientific Basis of the Approach

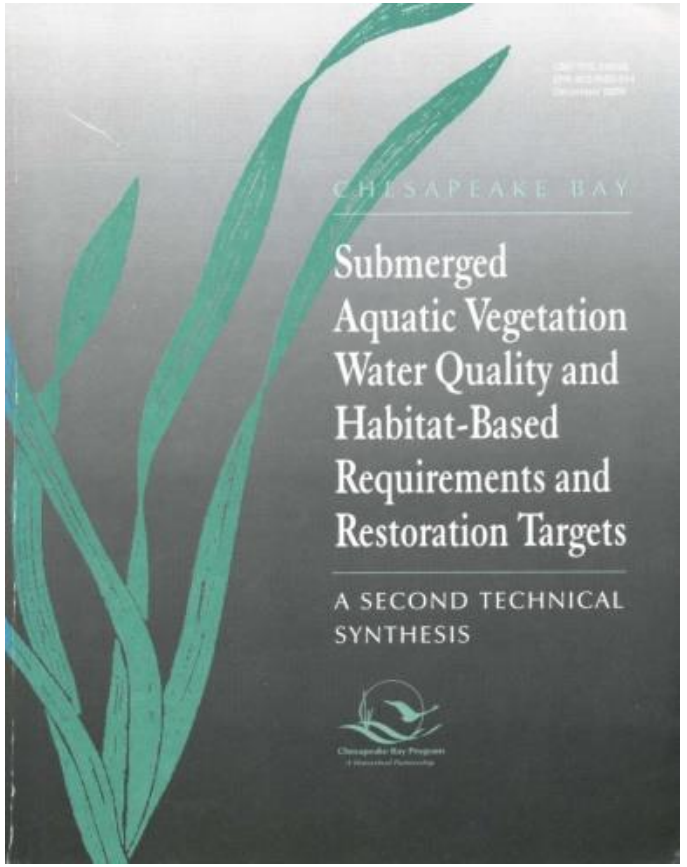
Reach Agreement on Conceptual Models of the Interrelationships between SAV and WQ



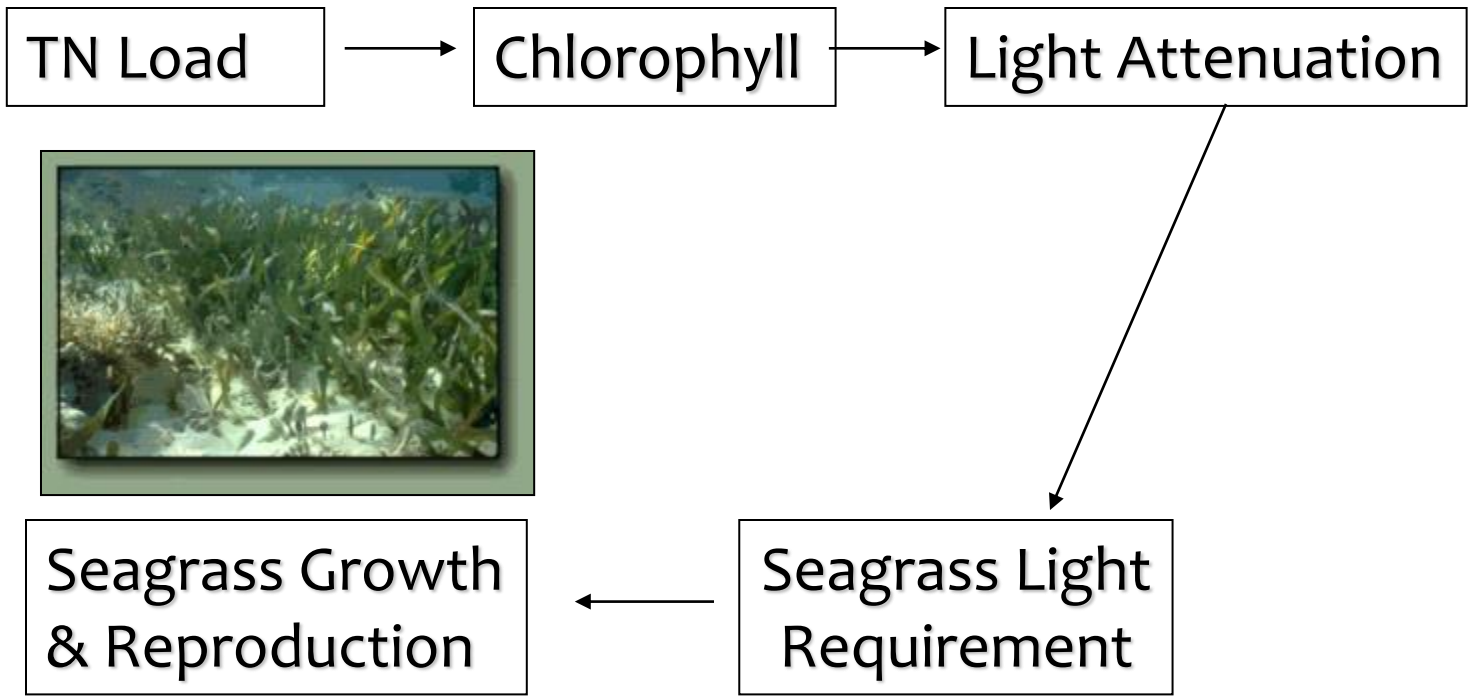


Two Percent Light Parameters for Evaluating Ambient Conditions. Illustration of the relationship of the two percent light parameters and the water quality conditions influencing both of them.

Synthesize the Science for Management Applications AND Spell Out What We Still Don't Understand

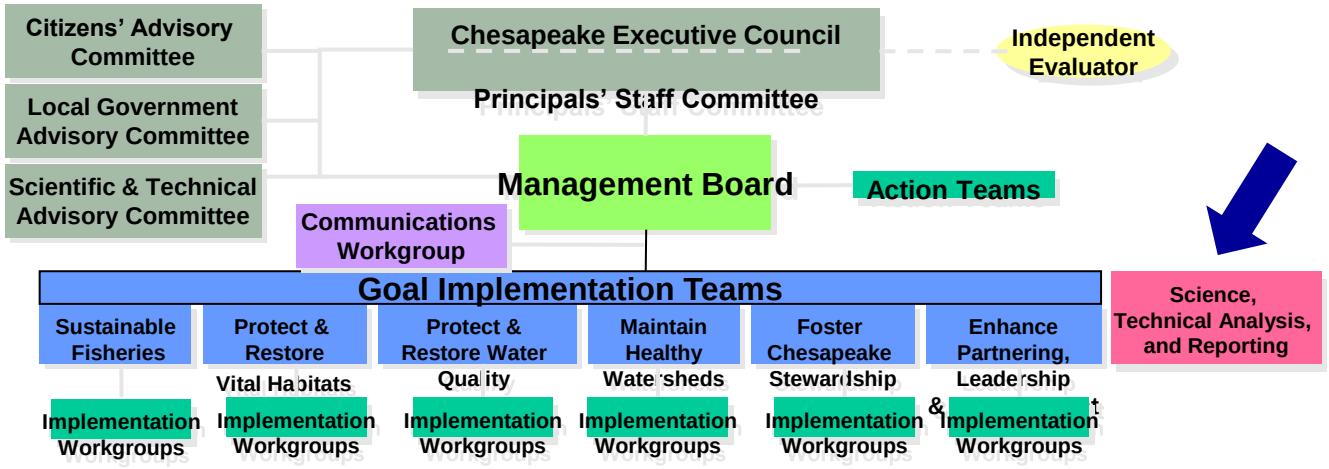


Collaboratively Developing and Agreeing to the Scientific Basis of the Approach

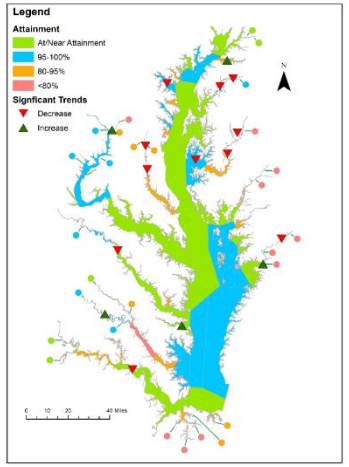


Collaborative Approaches to Monitoring—Building a Dependency on Data

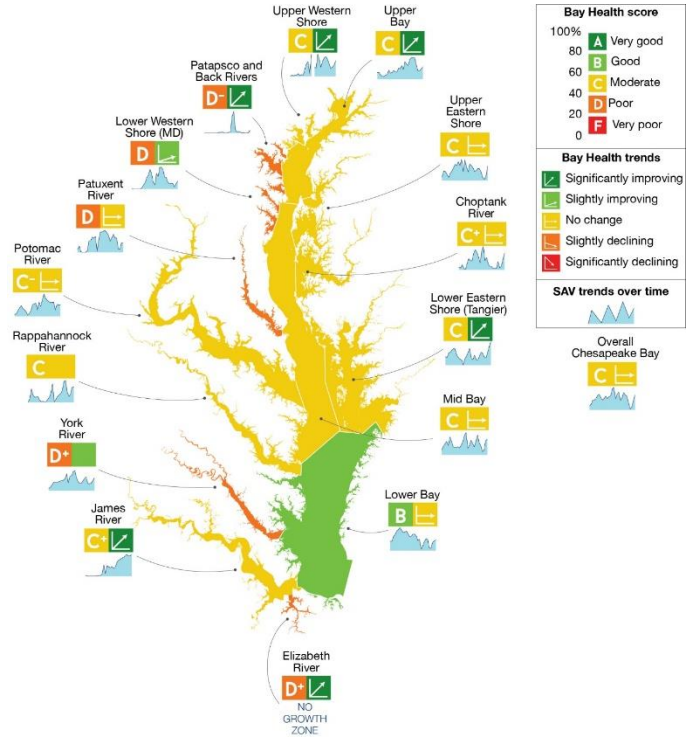
Empower a Multi-Agency/Institution Group to Coordinate Monitoring Watershed-Wide



Make Management Decision-making Dependent on Collection/Analysis of Monitoring Data



Report Annually to the Public in Ways Easily Understood/Connect to What They Value



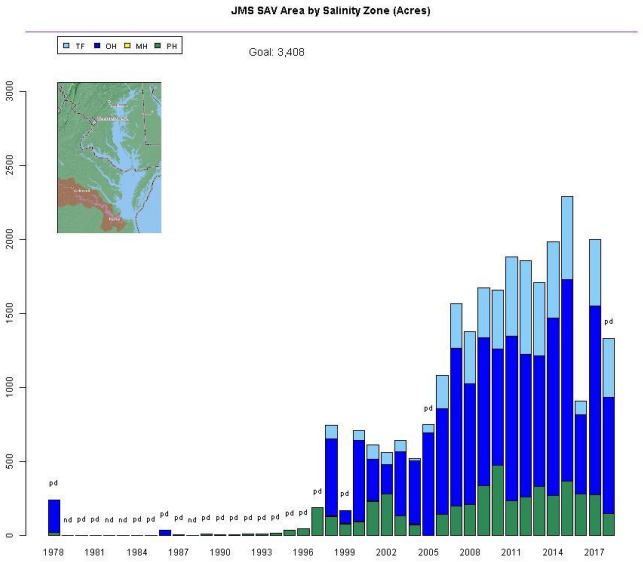
Collaborative Approaches to Monitoring—Southwest Florida Regional Ambient Monitoring Program

RAMP is a voluntary, region-wide collaboration of over 30 water quality sampling organizations and laboratories working together on data comparability, field sampling techniques, and lab analysis for improved surface water monitoring methods and data.

Allows collating data from separate labs to provide a regional picture of water quality.

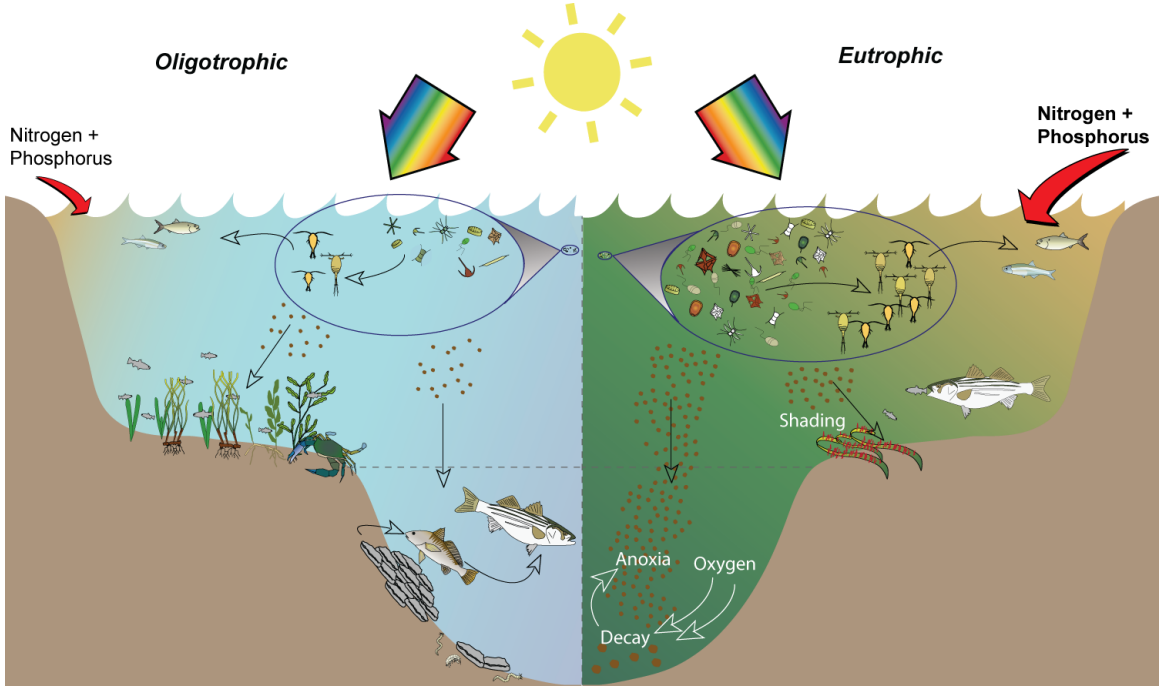
Importance of Citizen Engagement and Outreach

Establish Numerical Goals and Report Progress Towards Them Annually



Recognize Citizens Can Collect Data of Equal Value and for Management Applications

Tell Stories that the Public Can Both Understand and Connect with Issues Important to Them



Importance of Citizen Engagement and Outreach

Be Floridian social marketing campaign to encourage homeowners to skip the lawn fertilization during summer rainy months.

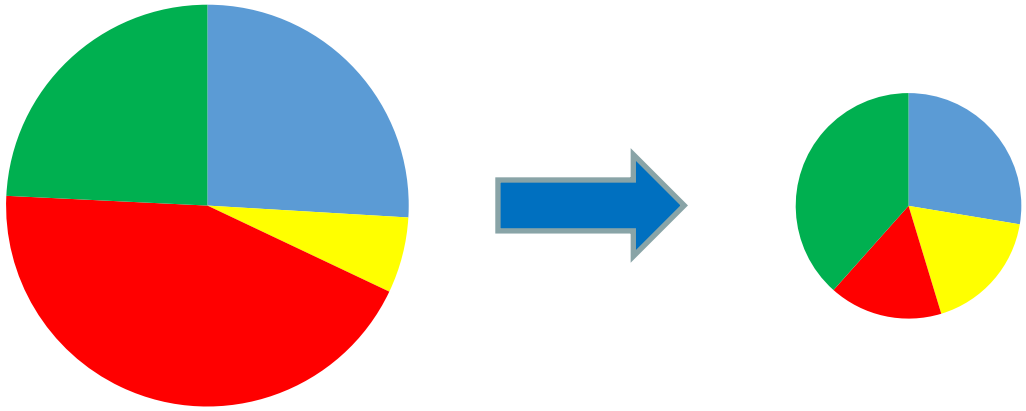
Has been effective in reducing TN loading from residential areas, improving water quality in lakes and streams.

Agency and Government Collaboration Including Regulatory Drivers

Reach Widespread Agreement on a Simple Definition of Clean Water

Oxygen
Clear Water
Good Food

A Bay Pollution Diet is Something the Public Can Understand and Relate to



Adopt State Water Quality Standards Which Reflect that Simple Clean Water Definition

Dissolved Oxygen
Water Clarity/SAV Acreage
Chlorophyll *a*

Building in a System of Public Accounting is Absolutely Critical to Achieving Clean Water!

2018 Oversight Status

Ongoing | Enhanced | Backstop

	Agriculture	Urban/Suburban	Wastewater	Trading/Offsets
Delaware	Enhanced Oversight	Ongoing Oversight	Ongoing Oversight	Ongoing Oversight
District of Columbia	Not Applicable	Ongoing Oversight	Ongoing Oversight	Ongoing Oversight
Maryland	Ongoing Oversight	Enhanced Oversight	Ongoing Oversight	Ongoing Oversight
New York	Ongoing Oversight	Ongoing Oversight	Enhanced Oversight	Ongoing Oversight
Pennsylvania	Backstop Action Levels	Backstop Action Levels	Ongoing Oversight	Enhanced Oversight
Virginia	Ongoing Oversight	Ongoing Oversight	Ongoing Oversight	Ongoing Oversight
West Virginia	Ongoing Oversight	Ongoing Oversight	Ongoing Oversight	Ongoing Oversight

Agency and Government Collaboration including Regulatory Drivers

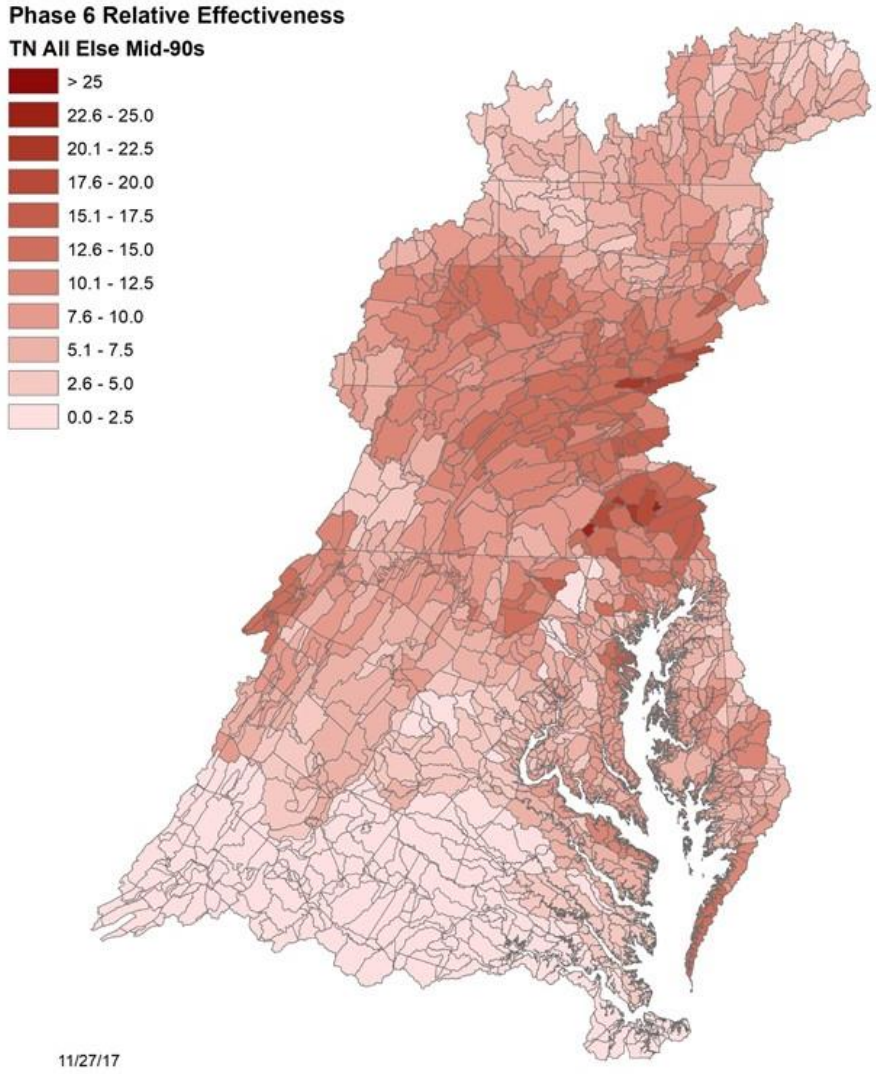
Consortium participants willing to work together to develop voluntary allocations (caps) for nitrogen loads and nutrient criteria, for agencies' consideration.

Decided they wanted to 'drive the bus' rather than having regulatory agencies make those determinations alone.

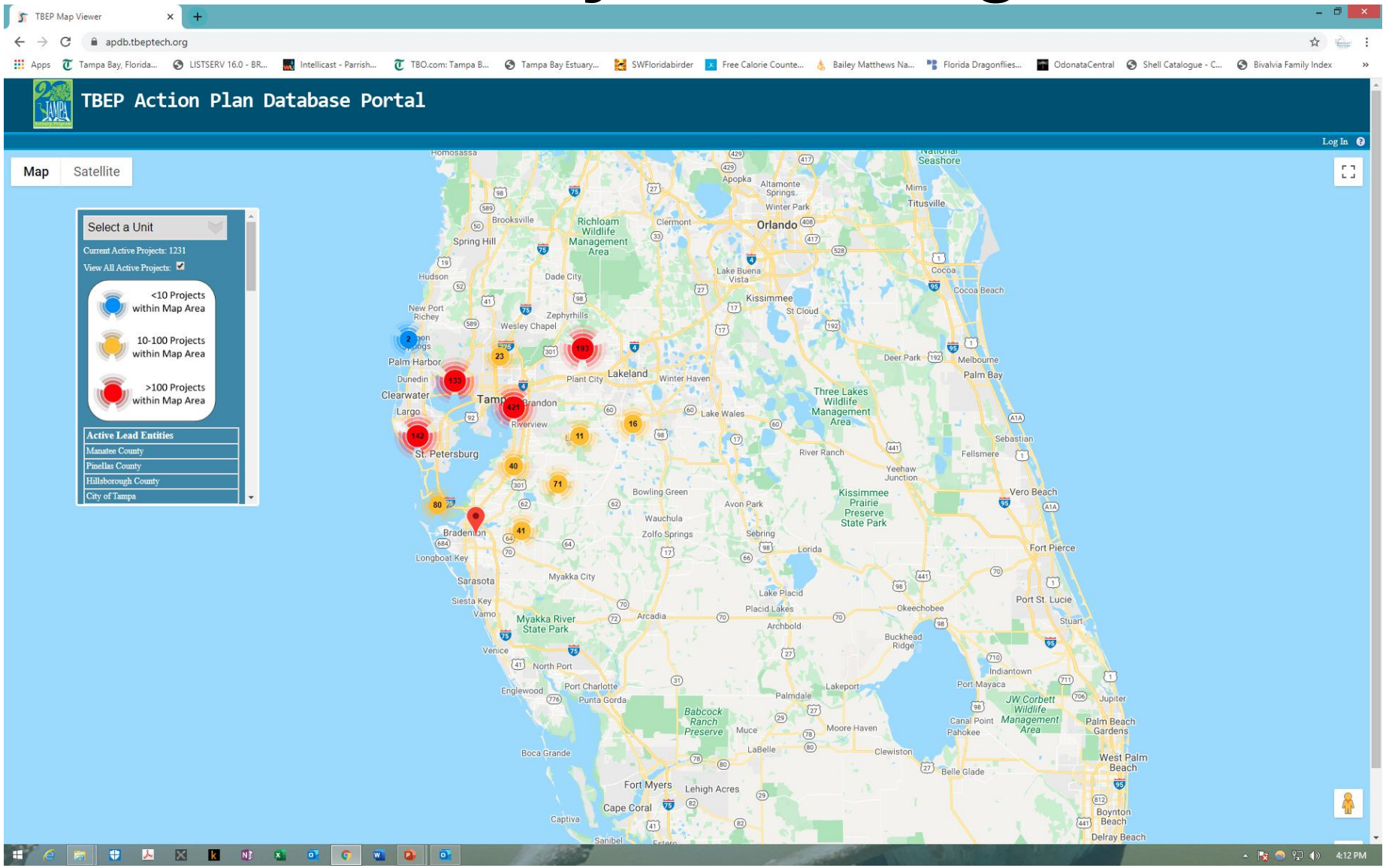
Implementing on the Ground Actions While You are Synthesizing the Science

With You Current Story, You Have Enough to Support Many On-the-Ground Actions

As Your Story Evolves and Becomes Clearer, Set the Stage for More Specific Actions



Implementing on the Ground Actions While You are Synthesizing the Science



Document estimated load reductions from the many projects already on the ground. Highlight new projects which will result in pollutant reduction, including 'no regrets' actions that will improve watershed and Sound conditions.

- Stormwater
- Wastewater
- Habitat restoration
- Education
- Water use reductions
- Air emission reductions
- Agricultural BMPs

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"We work for good food!"

Questions