A Framework for Understanding the Role of Stream and Wetland Restoration in Cleaning Up the Chesapeake

Presentation to Chesapeake Bay Commission Members

October 27, 2023

ANNE ARUNDEL COUNTY MARYLAND

DPW & YOU

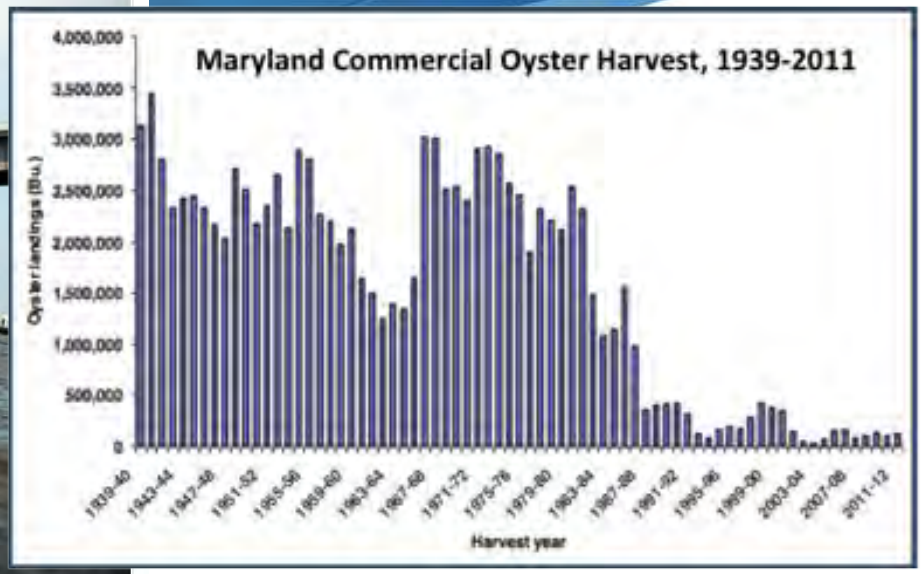
www.aarivers.org

Anne Arundel County Bureau of Watershed Protection & Restoration


WORKS FOR YOU
HISTORIC RAINFALL IN ANNE ARUNDEL COUNTY
PARTS OF MARLEY NECK ROAD WIPED OUT BY RAIN

The Washington Post

Alarming 'dead zone' grows in the Chesapeake



(Ricky Carioti/THE WASHINGTON POST) - Mike Kirschner and his son Zachary, 10, of Bel Air, Md., fish below the Chesapeake Bay Bridge in Annapolis, Md.

Chesapeake Bay dead zone could be the largest ever

by Sarah Laskow 26 Jul 2011 11:07 AM

grist
A BEACON IN THE SMOG

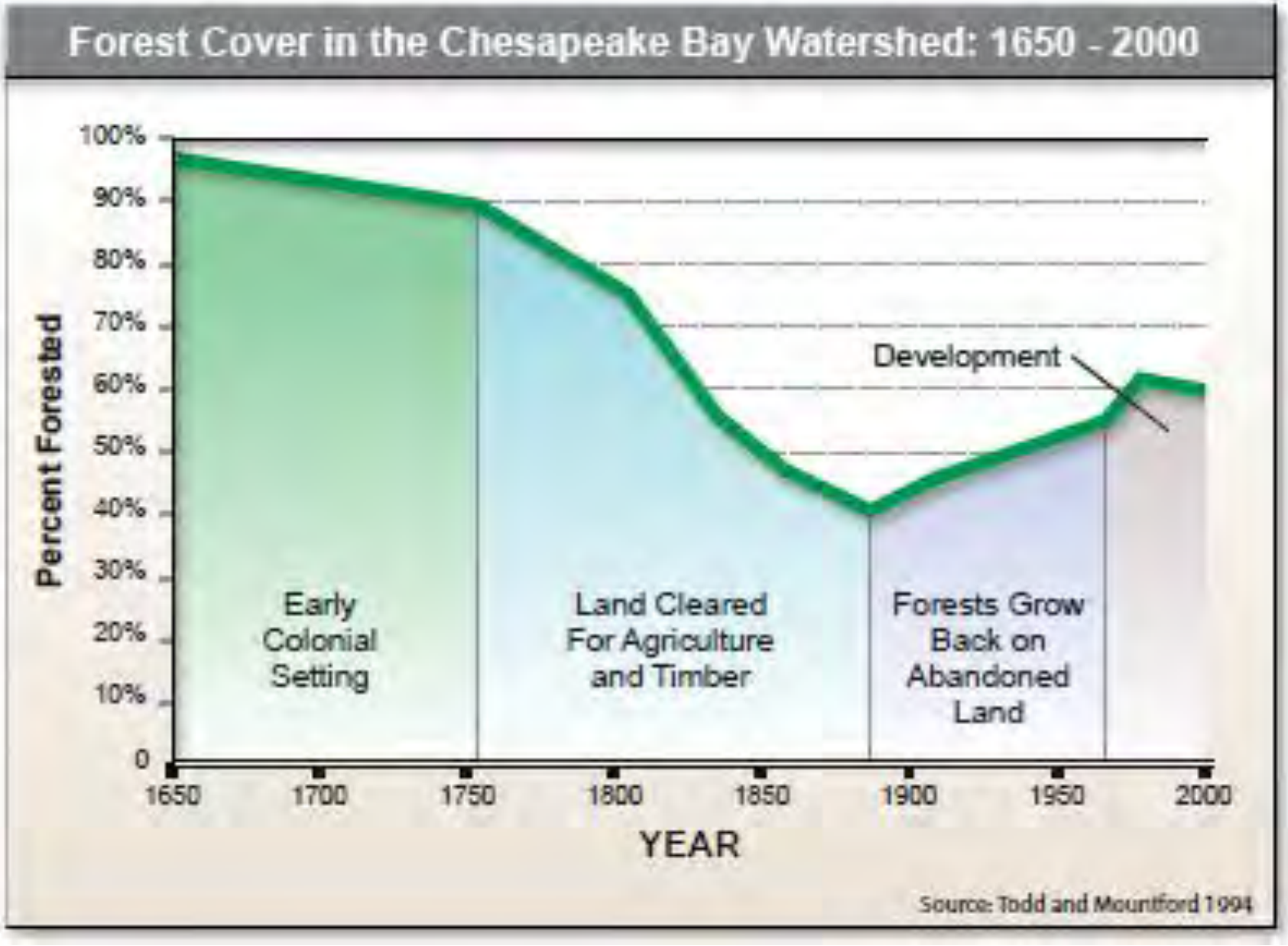
How Did We Get Here?

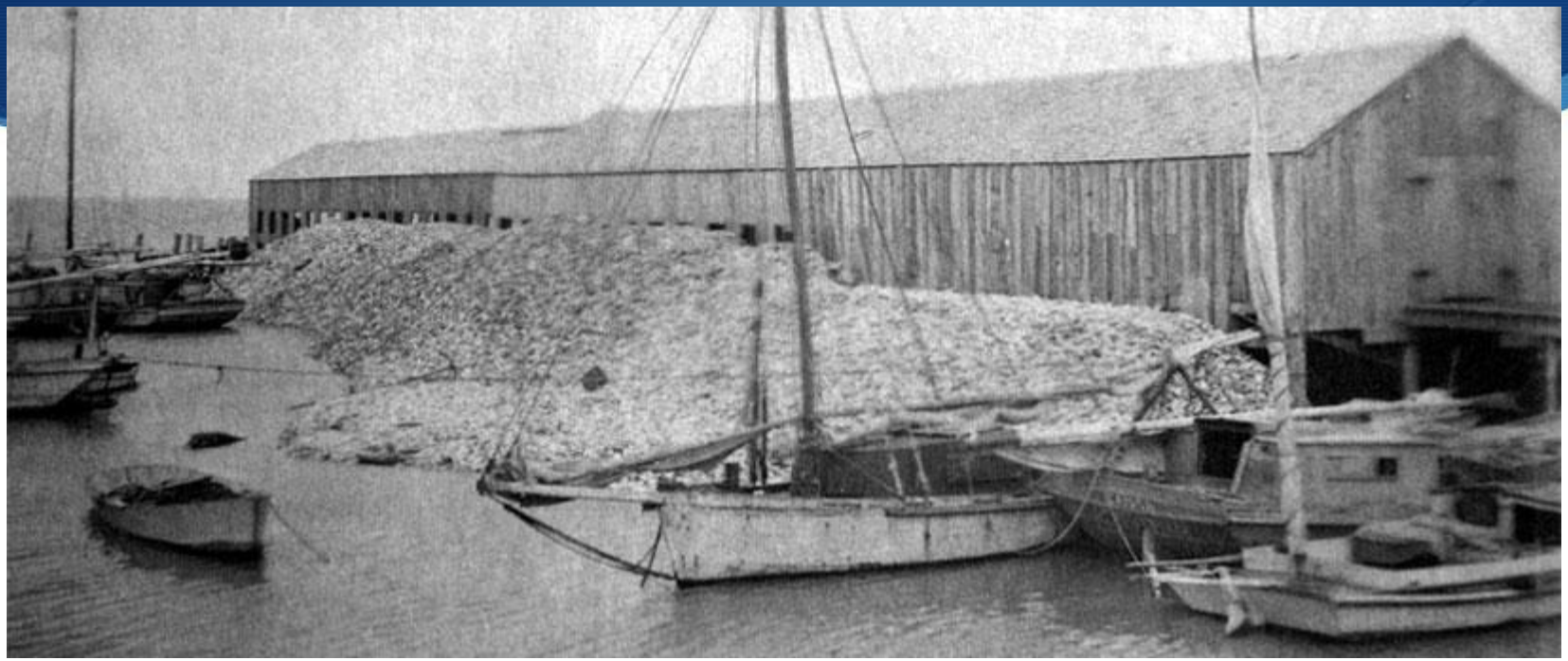

The beaver population in North America in precolonial time is estimated to have been between 60 and 400 million individuals.

Beavers were functionally extinct from much of New England and the east coast by the early 1700s

"This is not a land of prospects. There is too much wood." – Early settler

White Oak, West Virginia, 1913


Forest Cover in the Chesapeake Bay Watershed: 1650 - 2000
Percent Forested
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0
1650
1700
1750
1800
1850
1900
1950
2000
YEAR
Development
Early Colonial Setting
Land Cleared For Agriculture and Timber
Forests Grow Back on Abandoned Land
Source: Todd and Mountford 1994




J.S.DARLING & SON.
OYSTER PLANTERS & PACKE

REPORT

OF

ANTI-MOSQUITO WORK

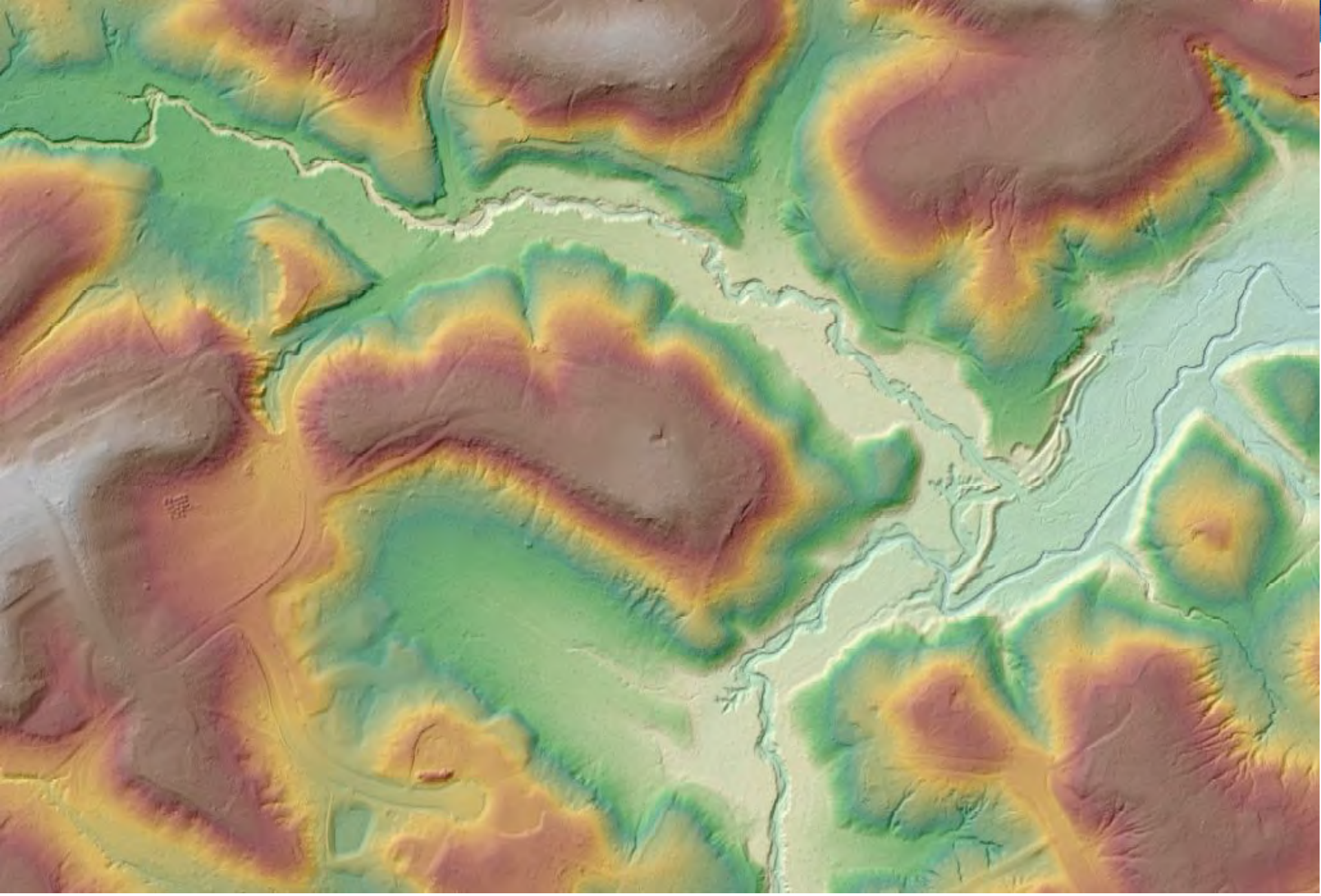
IN

MARYLAND

July, 1934

LOWERING OF CULVERT ON SPA ROAD BY STATE ROADS COMMISSION IN ORDER TO DRAIN THE UPPER REACHES OF SPA CREEK.

Projects Located In	Acres Drained	Miles of New Ditch
Anne Arundel County....	499.9	27.9



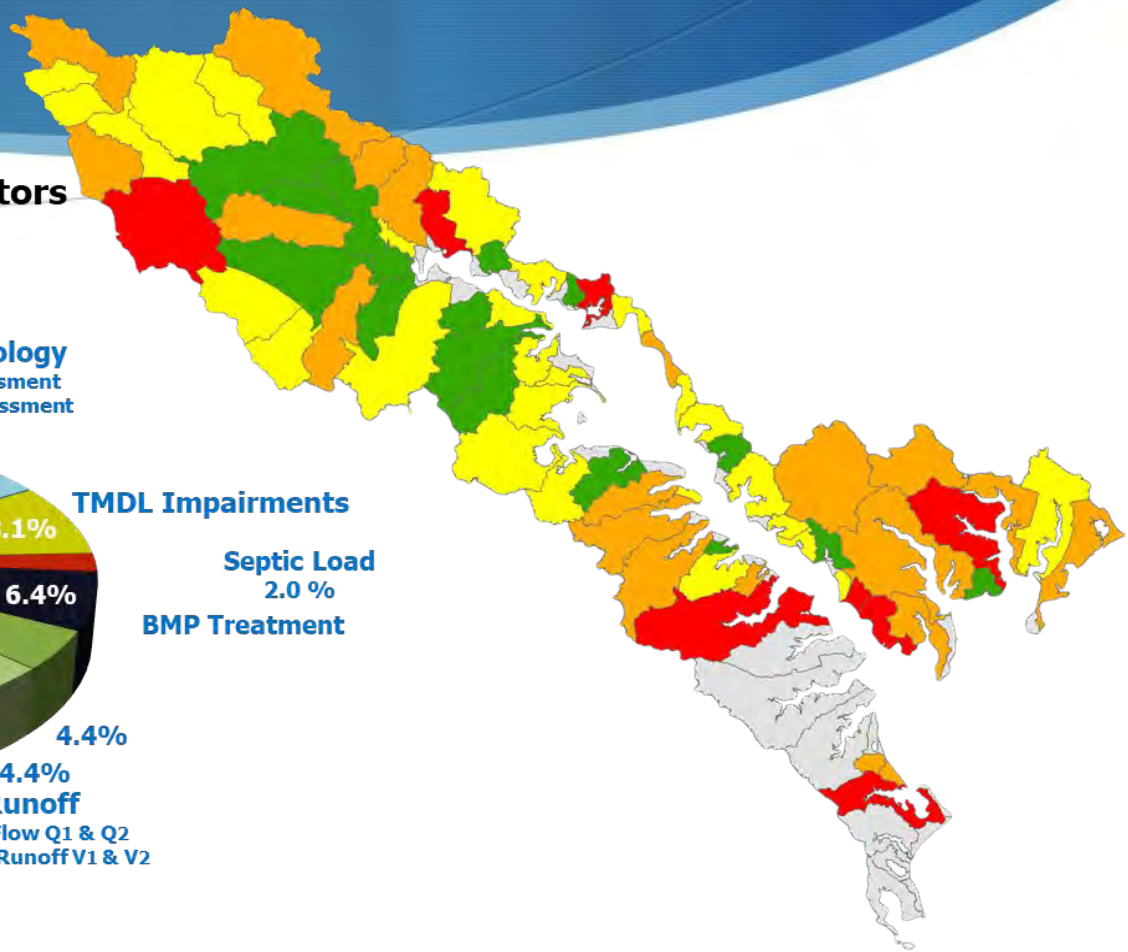
Anne Arundel County's Strategy

Undertook Watershed Assessments for Each of the County's 12 Watersheds.

- Started around 2005.
- Completed in 2017 (Middle Patuxent)
- Involved the expenditure of over $5.8 million.
- Used Assessments to Drive Prioritization for Restoration and Preservation.
- Stagger Restoration Based on Implementation Factors (e.g. Design Complexity, Permitting, Construction Funding).
- Use Monitoring to Drive Restoration Management Decisions.

Problem Areas Identified

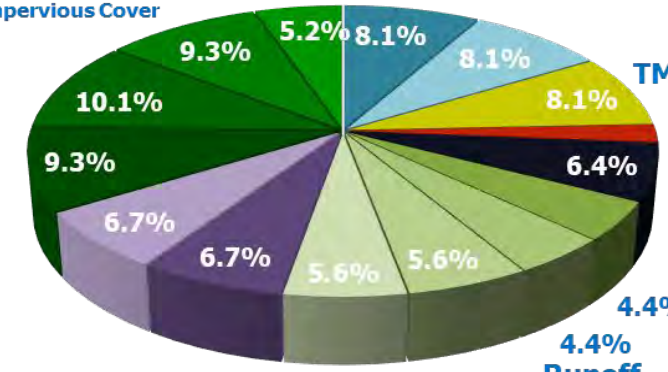
Overall Subwatershed Priority for Restoration



Weighted Prioritization Indicators

Landscape Indicators
Developed Critical Area
Ratio of Existing Wetlands to Potential
Forested Stream Buffers
Impervious Cover

Stream Ecology
Habitat Assessment
Biological Assessment



TMDL Impairments

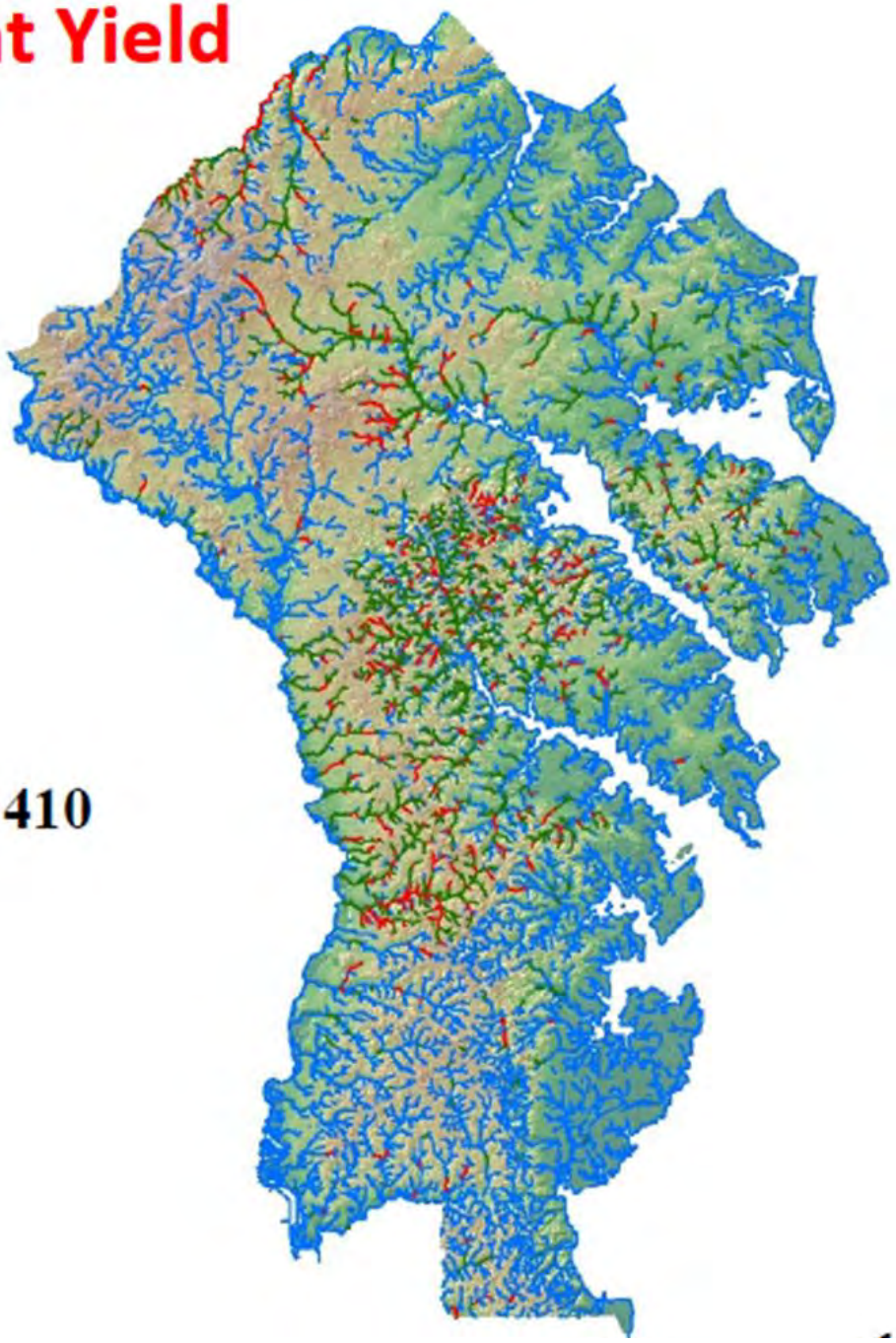
Septic Load
2.0 %

BMP Treatment

Runoff
Peak Flow Q1 & Q2
Volume Runoff V1 & V2

Modeled Pollutant Loads
TN, TP
Based on EPA simple method for calculating pollutant loads. Inputs from annual precipitation, land cover EMCs and runoff coefficient as a function of impervious surfaces for determining pollutant load

Perennial Stream Sediment Yield



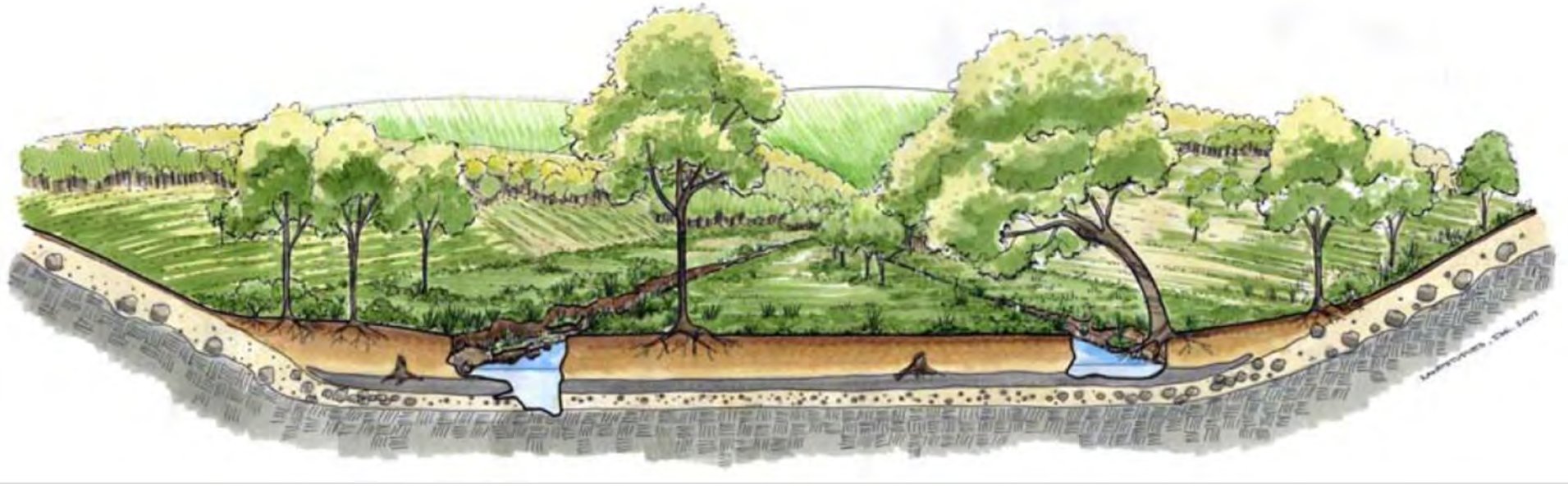
Assessed Perennial Stream Miles = 410

Sediment Yield	Miles
High	134
Moderate	210
Low	66

Study Summary

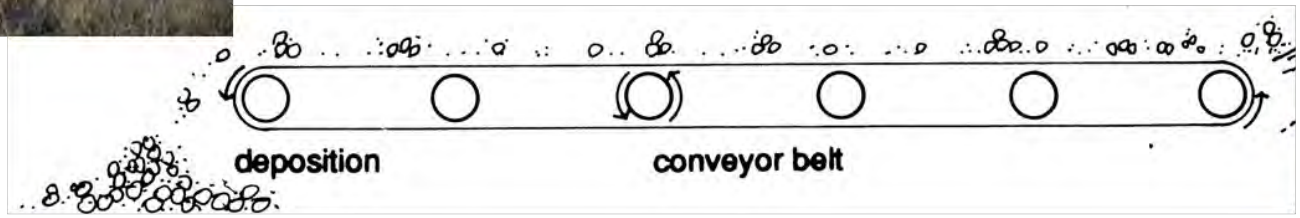
- Geomorphically "stable" precolonial conditions
  - Characterized by peaty sediments
  - Little evidence of large erosion, despite fire/Native American agriculture
  - Precolonial sediment dates cover centuries/millennia; Colonial cover decades
- Massive amounts of legacy sediment present in floodplains but hidden from sight beneath floodplain and channel
  - Up to 11 feet beneath floodplain, buried multiple feet beneath streambed.
  - Distinguishable by color, enriched in mined metals

USGS science for a changing world



Our Broken Stream Systems Function as Major Sources & Conveyors of Sediment & Phosphorus

Zone of
Erosion/Transport



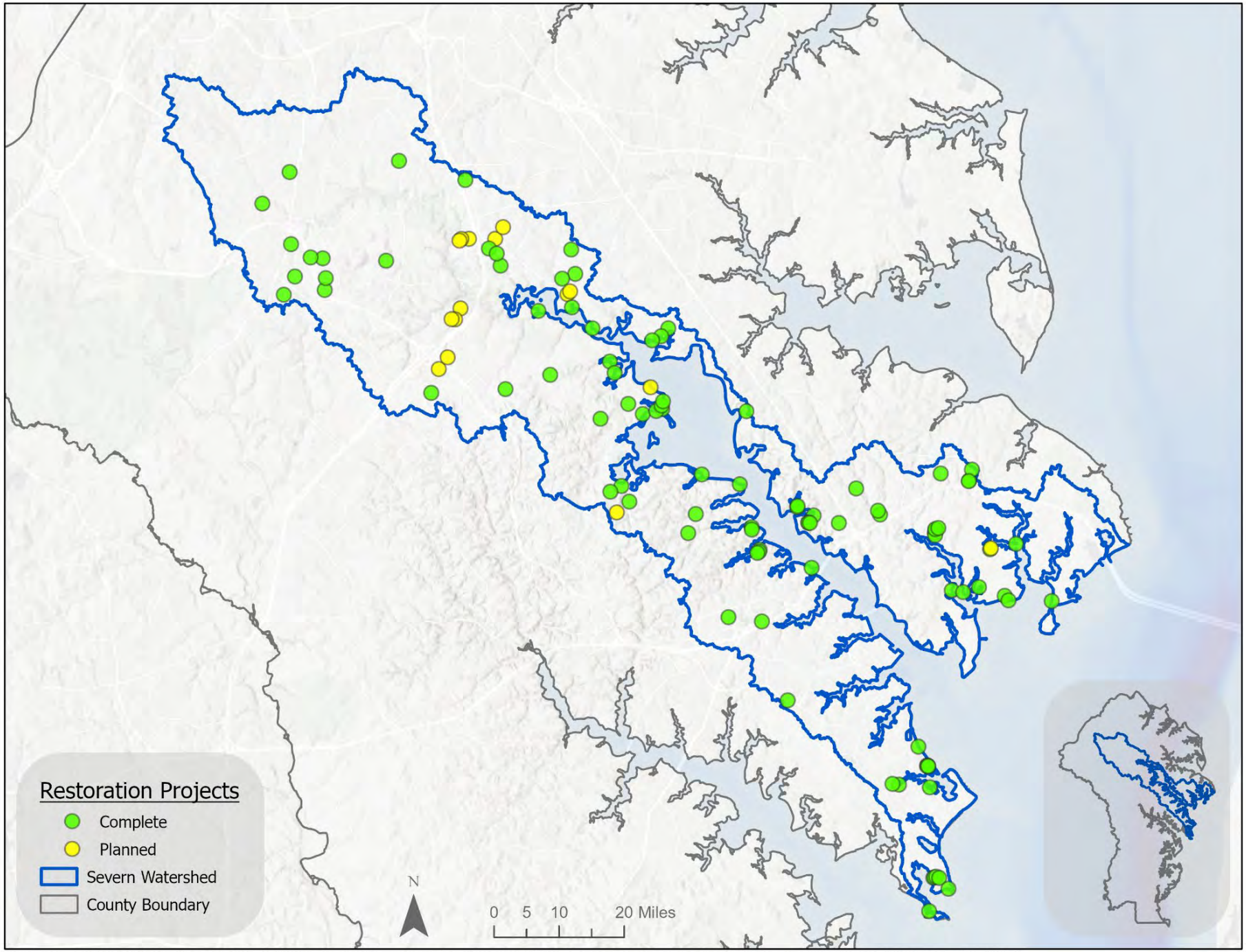
Zone of
Deposition

Adapted from Kondolf, M. (1997). Environmental Management, 21, 533-551.


I-97
BENFIELD
BOULEVARD
WALLACE
7/13/03

Overall Severn River Watershed Tier 1 Core Strategy Pollutant Reductions through 2025 (Phase II WIP)

Retrofit Type	Quantity	Units	Treatment Area	Impervious Treatment	Pollutant Reduction			Severn Watershed Cost ($)	Countywide Cost ($)
					TN (lbs/yr)	TP (lbs/yr)	TSS (Tons/yr)		
Restoration of 1st Order Streams	21.74	Miles	7,722	1,079	12,519	2,464	247	97,036,368	282,423,860
Restoration of 2nd Order and Higher Streams	11.86	Miles	2,498	462	12,521	4,257	9,704	37,676,706	186,211,259
Pond Retrofits	84	Ponds	1,191	334	1,880	322	50	15,166,029	82,614,351
Restoration Outfalls	334	Outfalls	3,789	1,060	9,434	1,712	196	61,285,485	386,532,519
Totals			15,200	2,935	36,354	8,755	10,197	211,164,588	937,781,989



Map created 07/19/2022. Credits: Esri, CGIAR, USGS, County of Anne Arundel, VGIN, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

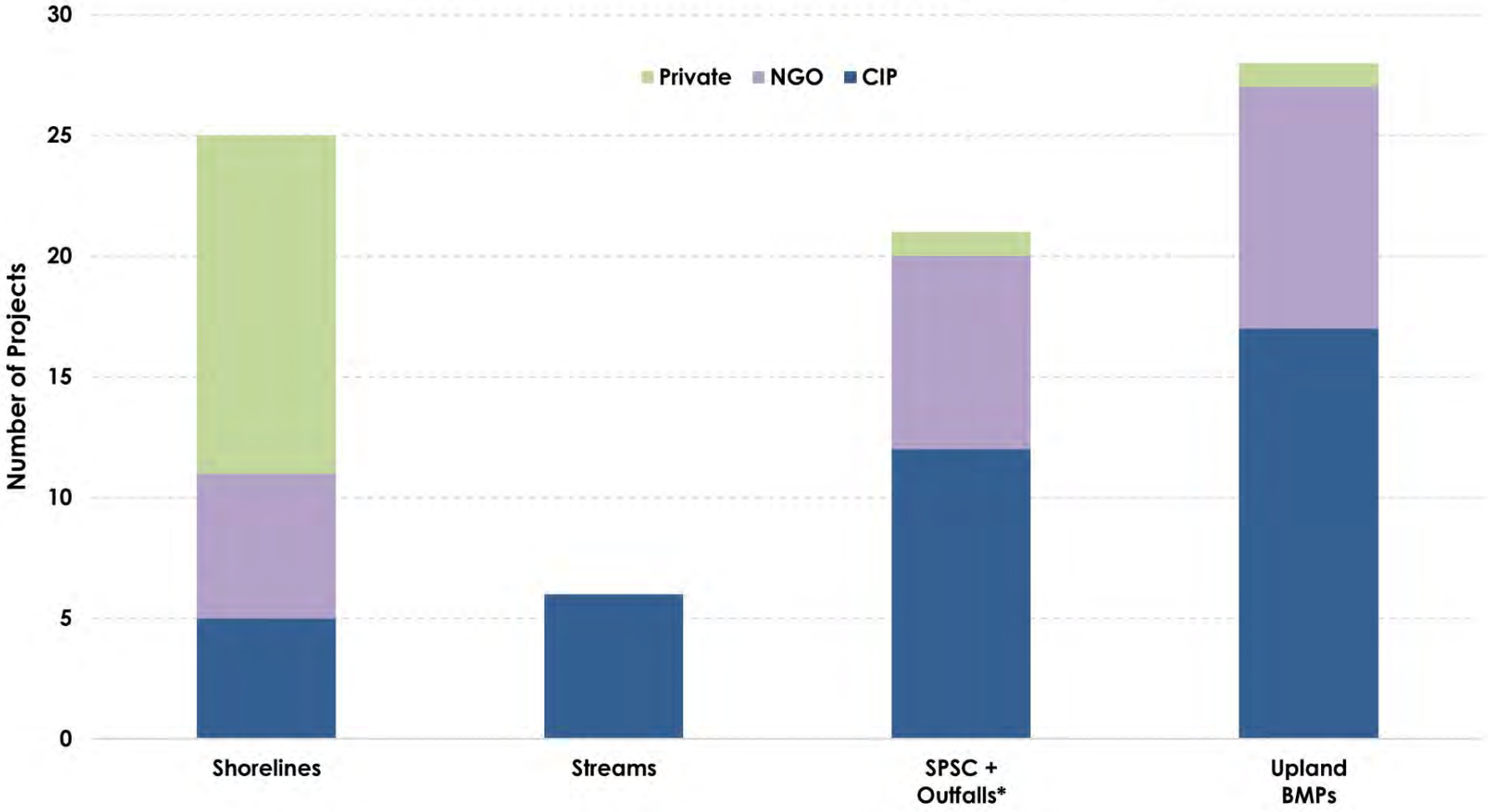
Millrace Stormwater Wetland Retrofit


VEGETATED BENCH
INFLOW CHANNEL
TREE WALL
PR. ACCESS GATE (TYP.)
PR. RECREATION FIELD
PERMEABLE PAVER WALKWAY
WETLAND PLANTS
RECREATION FIELD
SITE PLAN
Bay Land Consultants & Designers, Inc.
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS
MILLRACE
DETENTION POND RETROFIT
CONSTRUCTED WETLAND DESIGN
SITE PLAN

Pre and Post Restoration Conditions

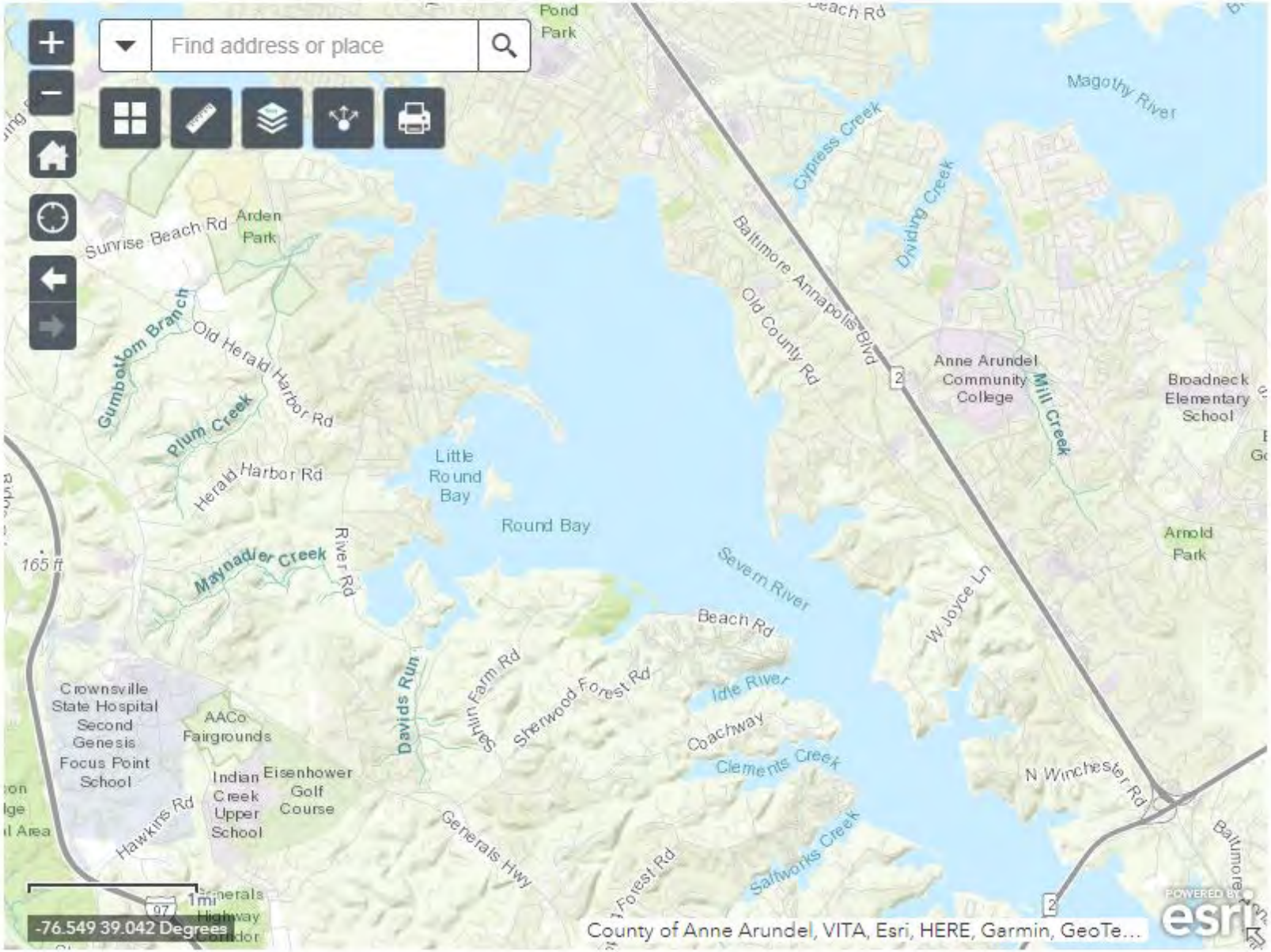
Table 1: Summary of Pre- and Post- Restoration Wetlands and Streams							
Resource	Unit	Pre Restoration		Post Restoration		Percent Change	
		In LOD area or length	Valley area or length	In LOD area or length	Valley area or length	In LOD	Valley
Nontidal Wetland	SF	26,465	52,539	88,997	121,795	336.3%	231.8%
	AC	0.61	1.21	2.04	2.80		
Intermittent Stream	SF	141	160	73	73	51.8%	45.6%
	LF	68	77	60	60	88.2%	77.9%
Perennial Stream	SF	5,661	6,037	8,101	9,097	143.1%	150.7%
	LF	1,452	1,602	1,585	1,920	109.2%	119.9%
Total Stream	SF	5,802	6,197	8,174	9,170	140.9%	148.0%
	LF	1,520	1,679	1,980	1,980	108.2%	117.9%

Severn Watershed - Completed Projects by Type



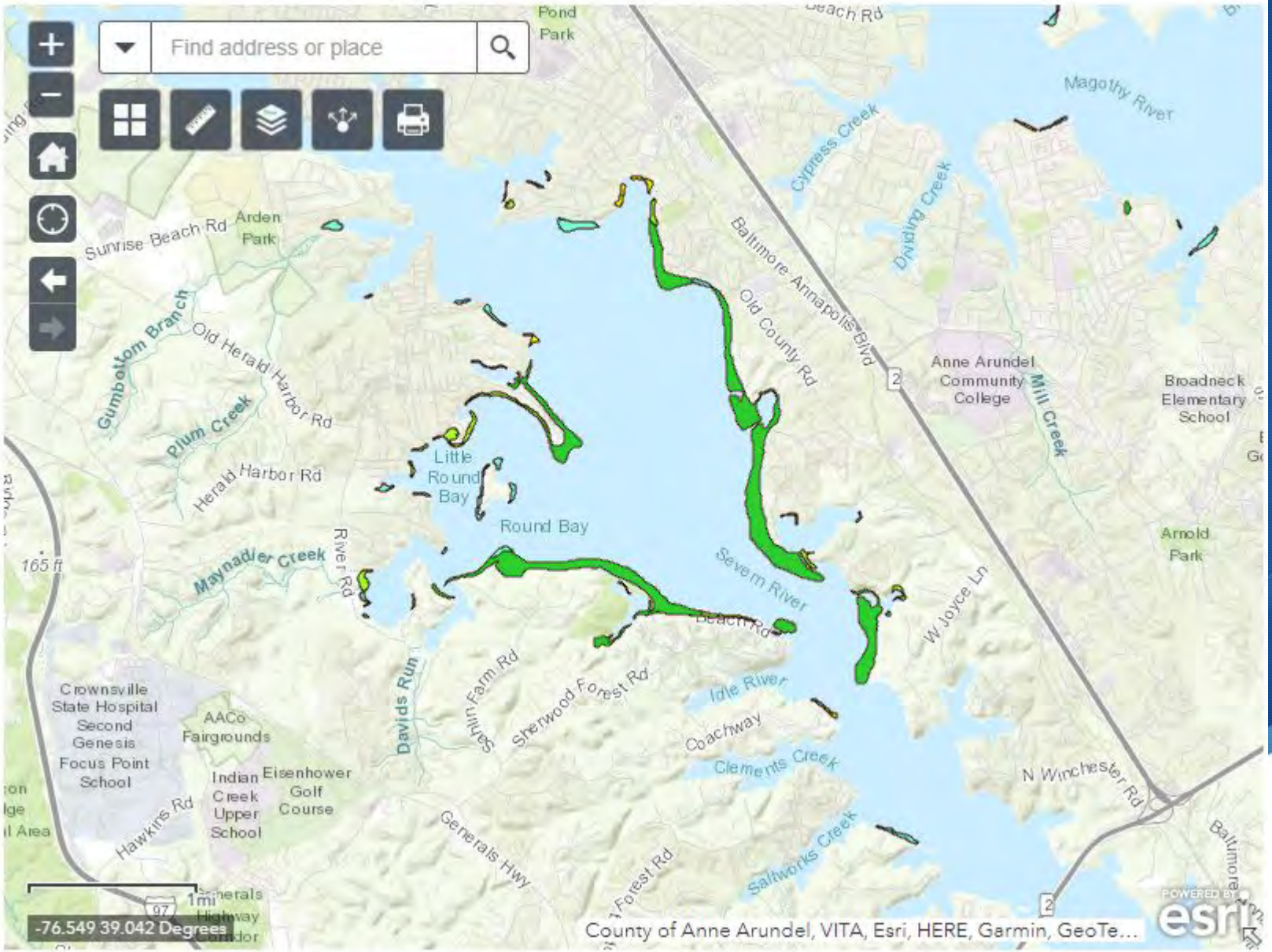
Interactive SAV Map

1985



Interactive SAV Map

2020



Questions?

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