

CHARACTERIZING THE ROLE OF JUG BAY WETLANDS ON THE WATER QUALITY OF THE PATUXENT RIVER



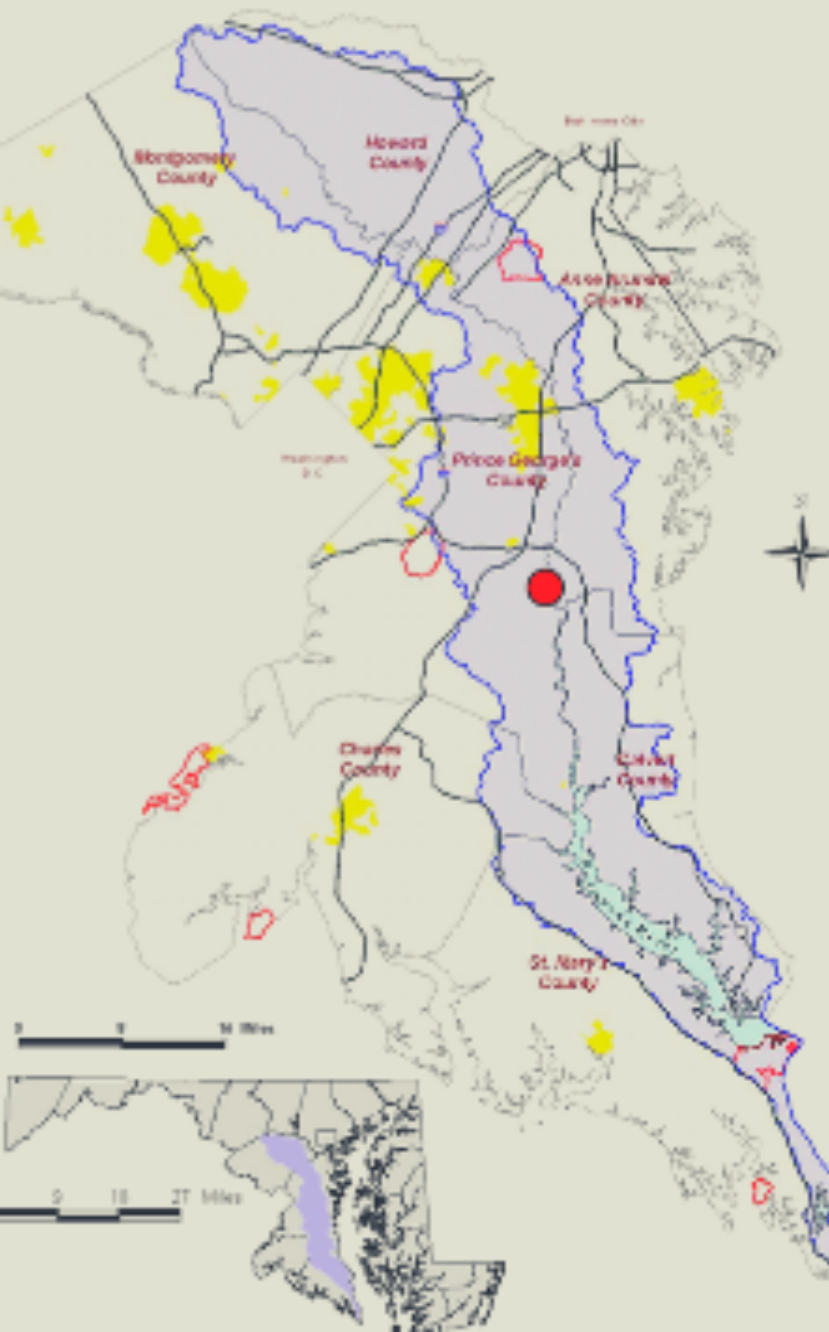
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Jug Bay Wetlands Sanctuary



MARSH RESILIENCE SUMMIT
FEBRUARY 5-6, WILLIAMSBURG, VIRGINIA

PATUXENT RIVER

- Largest river entirely within Maryland
- 110 miles in length
- Drains 900 square miles of land
- Land use is mainly forest, with significant urban and agriculture
- Jug Bay is located about 45 miles upriver
- Seven counties border the river



ABOUT JUG BAY TIDAL FRESHWATER WETLANDS



"829
hectares of
filtering
capacity"



- Shallow environment
- Salinity generally <0.5 ppt
- Semidiurnal tides; tidal range about 0.75 meters
- Vegetation dies off during the winter - some dead standing biomass remains
- A network of vegetation and water channels

ABOUT JUG BAY SUBMERGED AQUATIC VEGETATION



"38 hectares of
seasonal filtering
capacity"



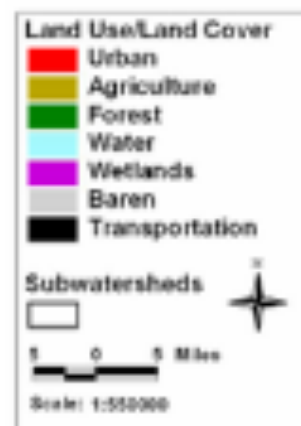
- Seven species: coontail, common waterweed, hydrilla*, watermilfoil*, spiny naiad*, southern naiad, horned pondweed
- Growing season: May-October
- Peak biomass: July

SOURCES OF POLLUTION



POINT SOURCES

Wastewater treatment plants



2010

NON POINT SOURCES

Runoff: fields, farms, developed land

MONITORING WATER QUALITY

- Nutrients
- Sediments

Sentinel Site for Climate Change Infrastructure:
Three Continuous Water Quality
Monitoring Stations

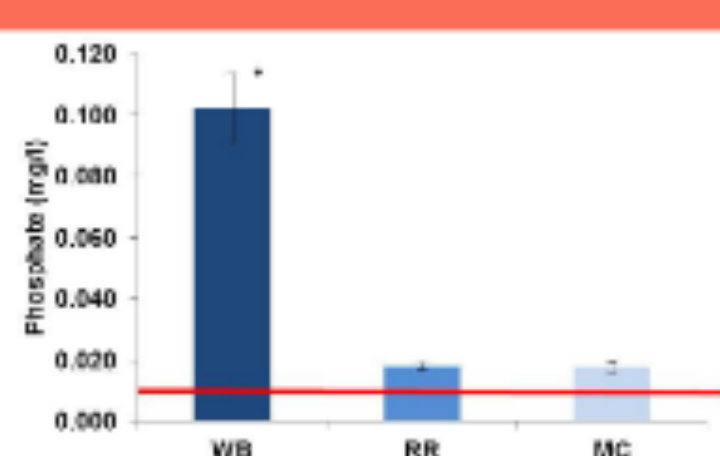
15 years of data (2003-2018)



Jug Bay Wetlands:

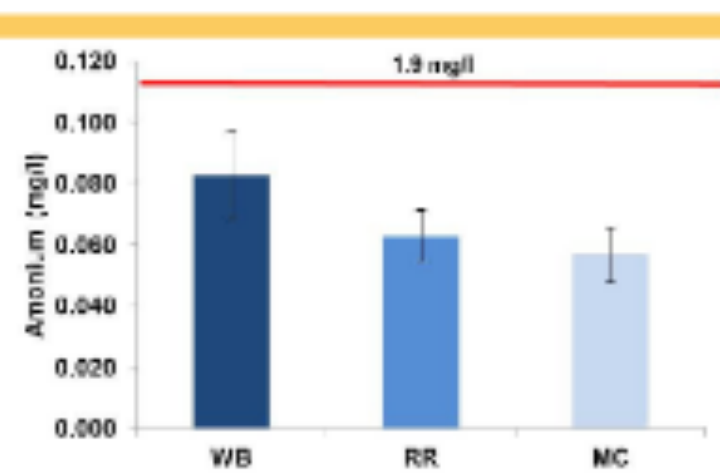
"kidneys" of the
Patuxent River

Nutrients



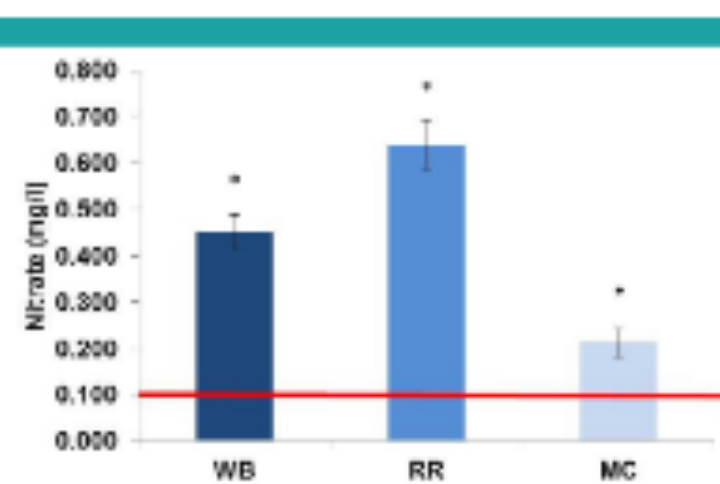
PHOSPHATE

Significantly greater concentration at Western Branch



AMONIUM

No significant difference among stations



NITRATE

Significantly different concentrations at all stations

“

WASTEWATER TREATMENT PLANT OVERFLOWS AND STORM EVENTS

**A NUTRIENT OVERLOAD TO THE
SYSTEM?**

”

SCENARIOS



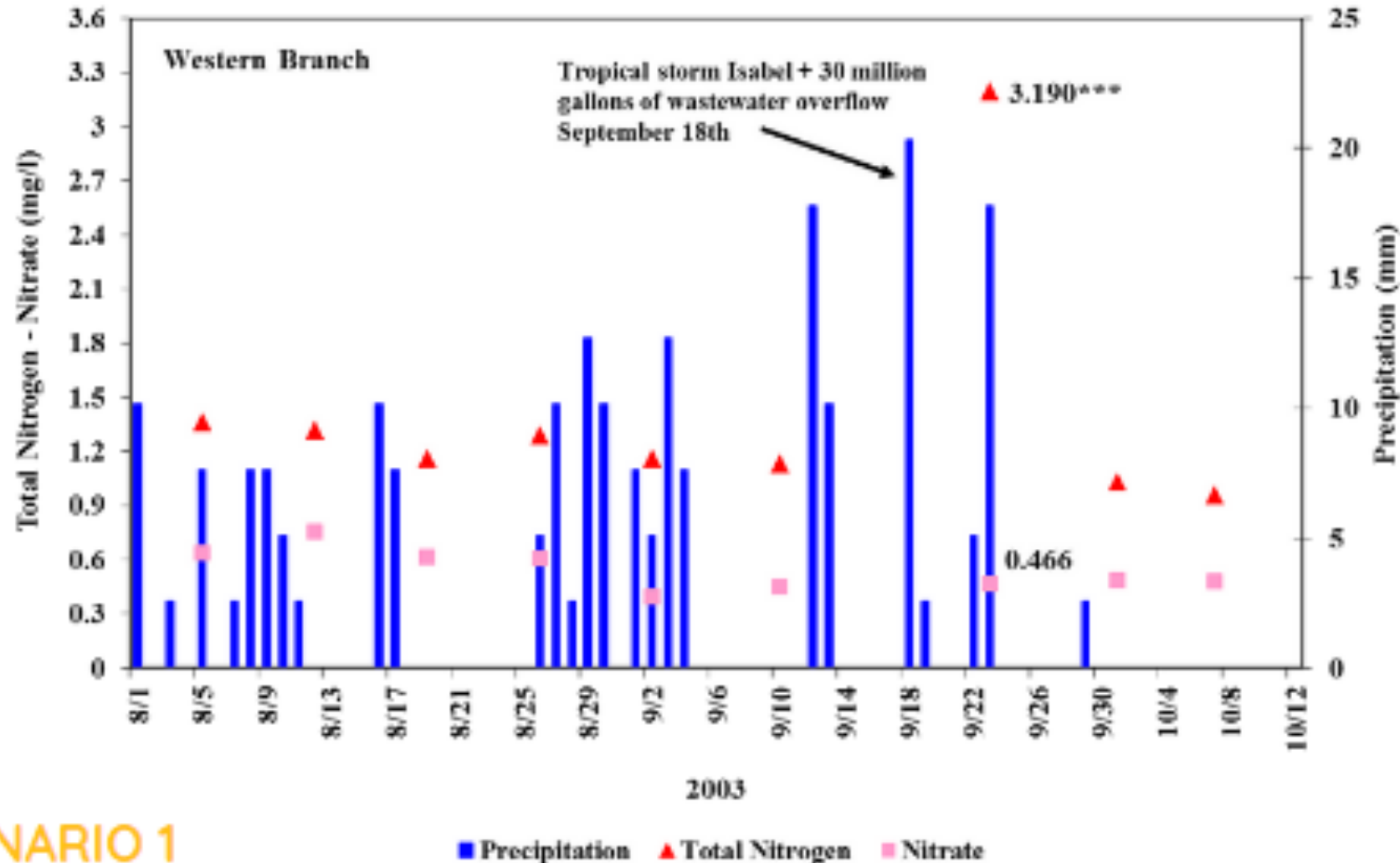
1

30 MILLION GALLONS
OVERFLOW +
TROPICAL STORM
ISABEL



2

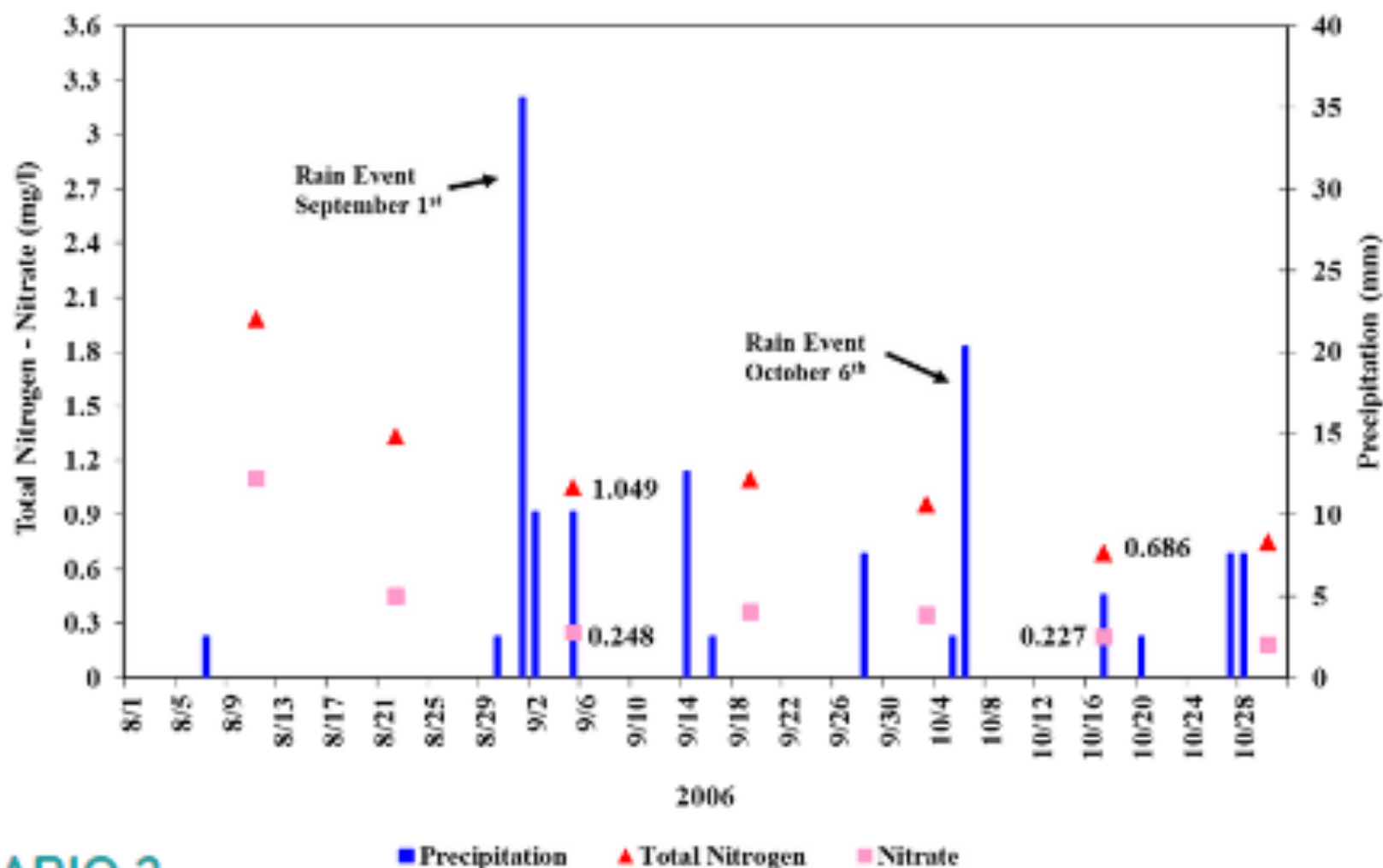
MAJOR STORM
EVENT - NO
OVERFLOW



SCENARIO 1

Single value after
event is compared to
mean values

TN, TP significantly higher after overflow (5
days), but not after next measurement (13 days)



SCENARIO 2

Single value after event is compared to mean values

TN, TP, nitrate and phosphate not significantly higher after either of the rain events



Wetland Sediment Retention

Role of Jug Bay Tidal Freshwater Marshes

Marsh sediment retention capacity: $3.64 \text{ kg} / \text{m}^2 \text{ yr}$



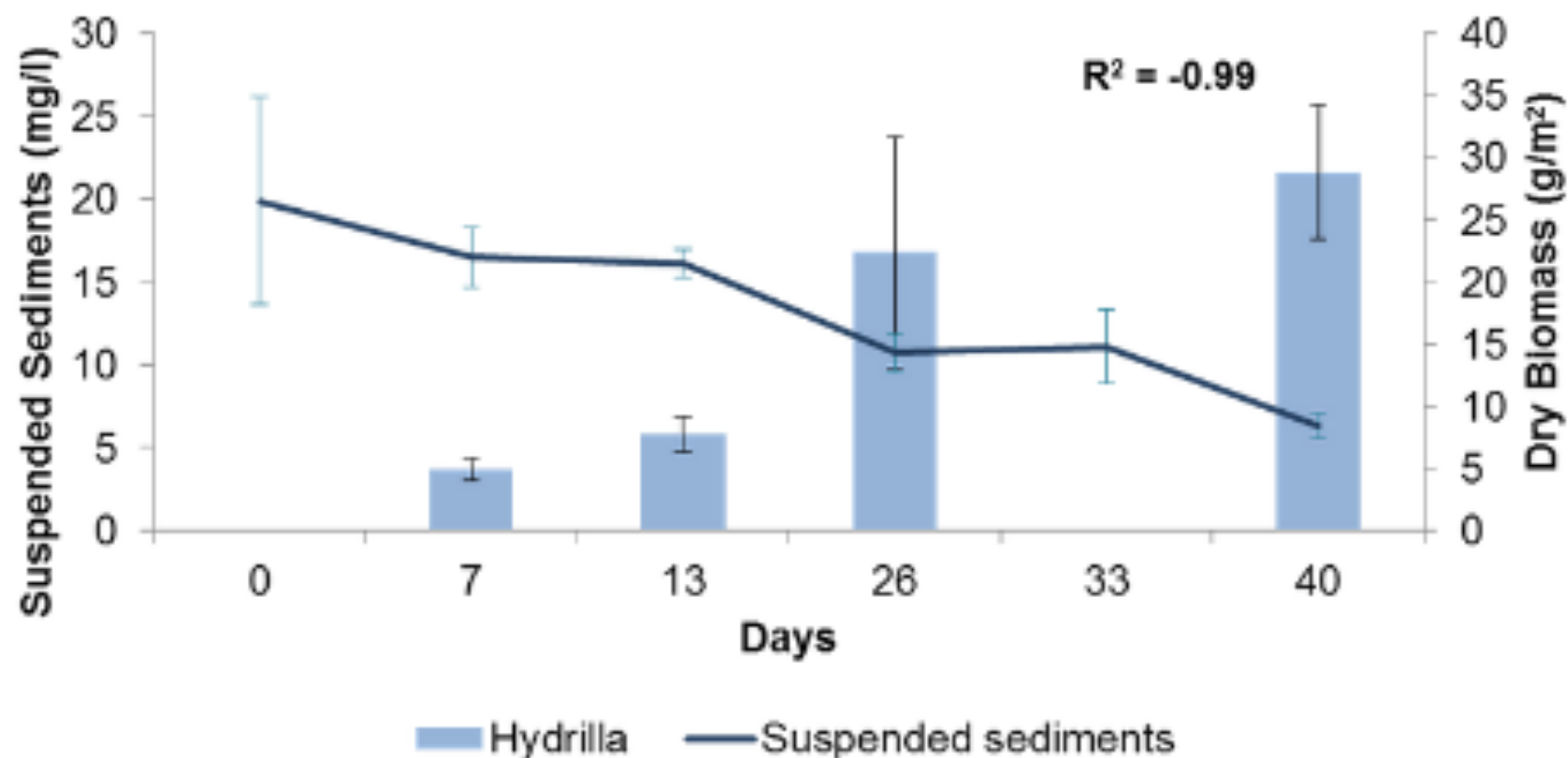


Tidal freshwater marshes in the upper Patuxent River remove about 5,544 elephants worth of sediment per year!

Approximately 25% of annual average suspended sediments in the Patuxent



Role of Hydrilla



Hydrilla sediment retention capacity: 4.75 g/g dry biomass



SAV in the Patuxent River removes about 44 elephants worth of sediment (June-July)

About 1% of annual average suspended sediments in the Patuxent

Patuxent River Section	2015 SAV Coverage (ha)	Estimated Sediment Retention (tons)
Upper (Jug Bay area)	38.20	32.0
Middle	13.13	11.0
Lower	7.13	6.0
TOTAL	58.46	49.0

JUG BAY



30%

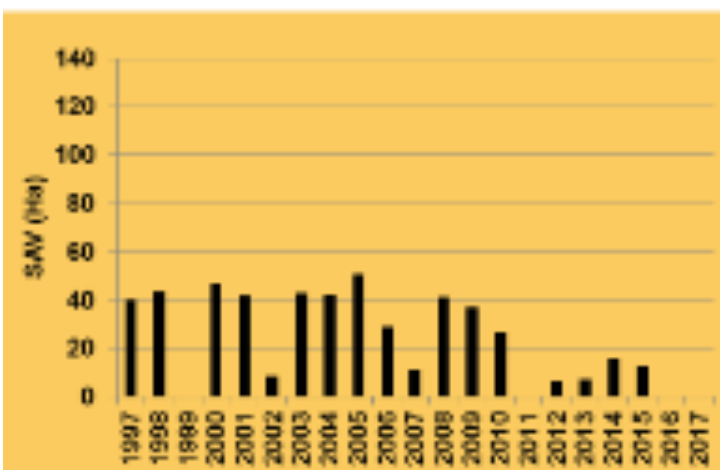
Of the total coastal wetlands of
the Patuxent River

SAV TRENDS

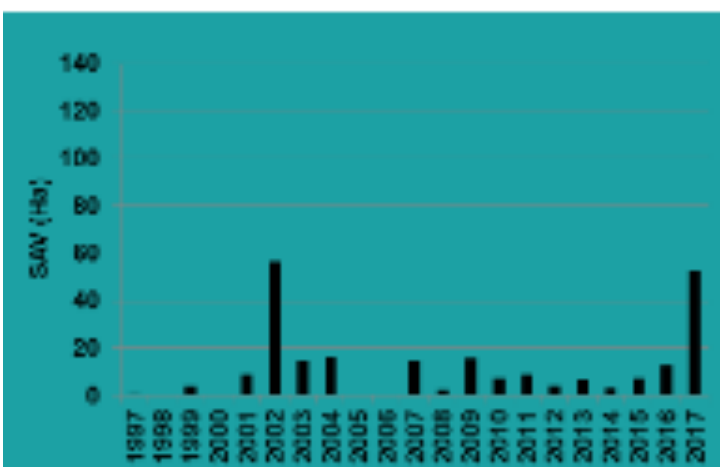
UPPER PATUXENT
Tidal fresh



MIDDLE PATUXENT
Oligohaline



LOWER PATUXENT
Mesohaline



THANK YOU

for listening and for your
questions!

JUG BAY WETLANDS SANCTUARY