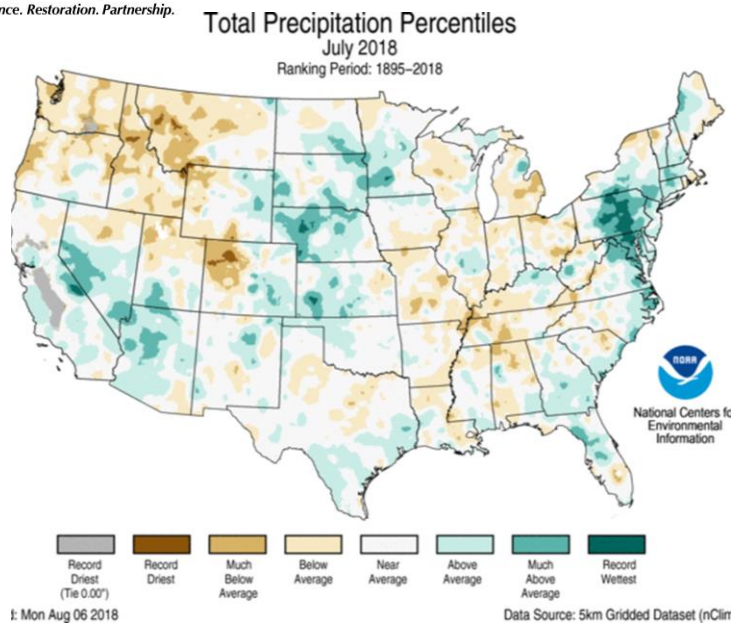

Ellicott City, MD 2018 NY Times

Susquehanna Flats Aug 2018 MD DNR

Summer Storms 2018: Chesapeake Bay watershed conditions and early monitoring results

Chesapeake Bay Program Management Board 12/6/2018

- Peter Tango and Scott Phillips, USGS on behalf of STAR

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Outline

- River flow into the Bay during 2018
- Initial monitoring results of Bay and living resource conditions
- Potential and measured impacts compared to other high-flow years
- Implications for nutrient and sediment management

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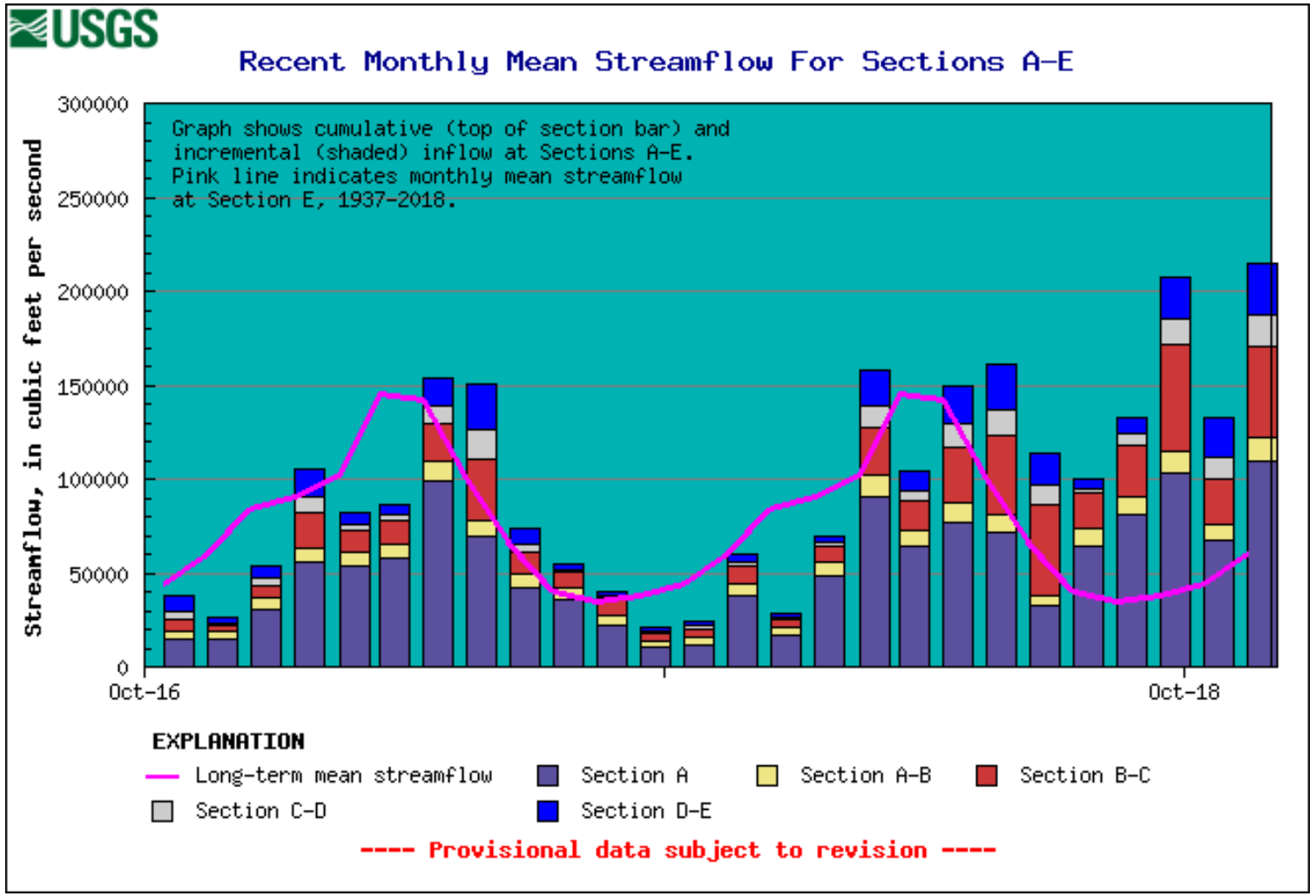
2018 River Flow: A Very Unusual Summer

- High precipitation totals
- Multiple storms
- Above normal flow since May
- Monthly flow records: Aug, Sept, Nov
- WY: Oct-Sept



https://md.water.usgs.gov/waterdata/chesinflow/

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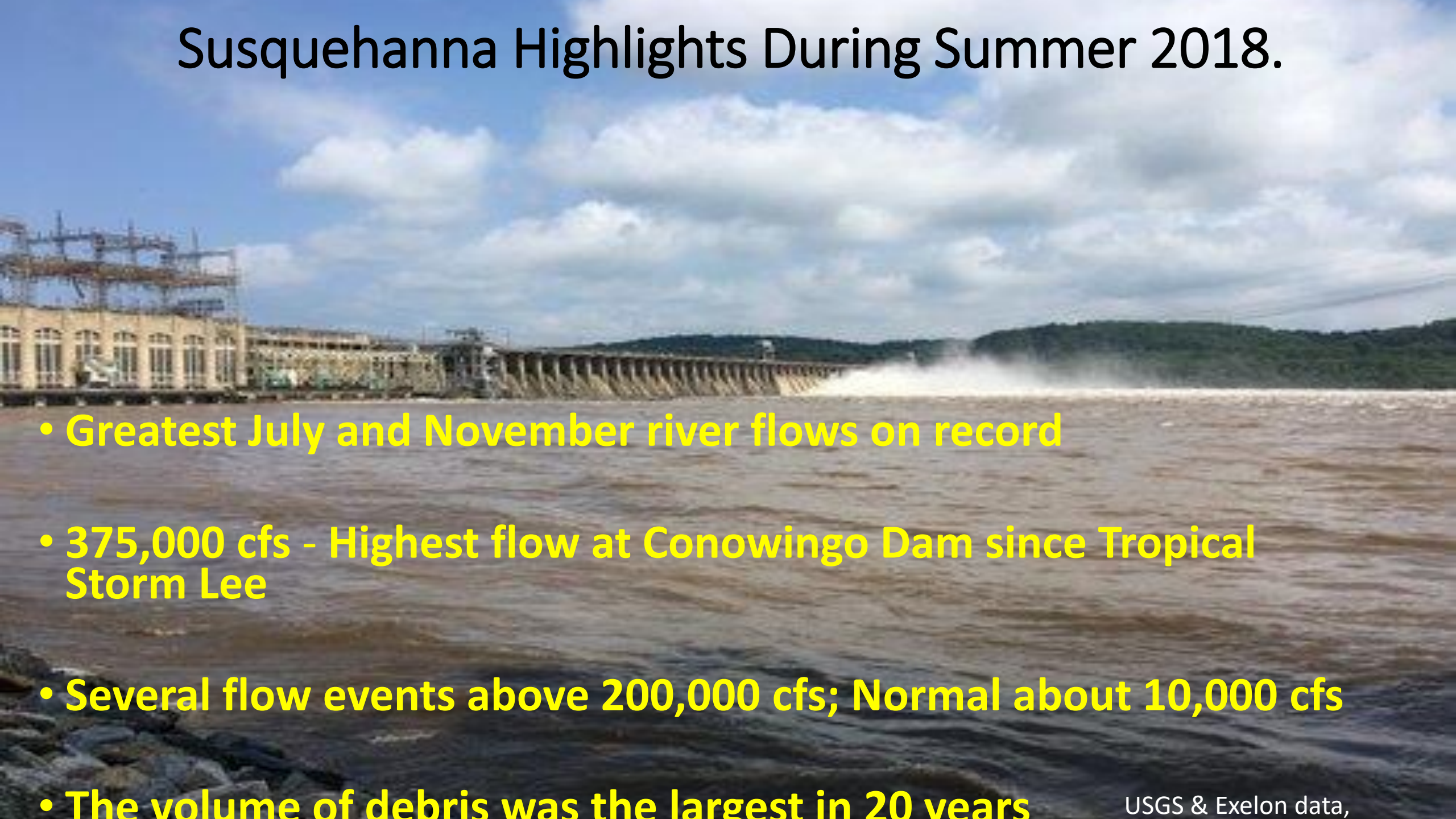
USGS
science for a changing world

Susquehanna Highlights During Summer 2018.

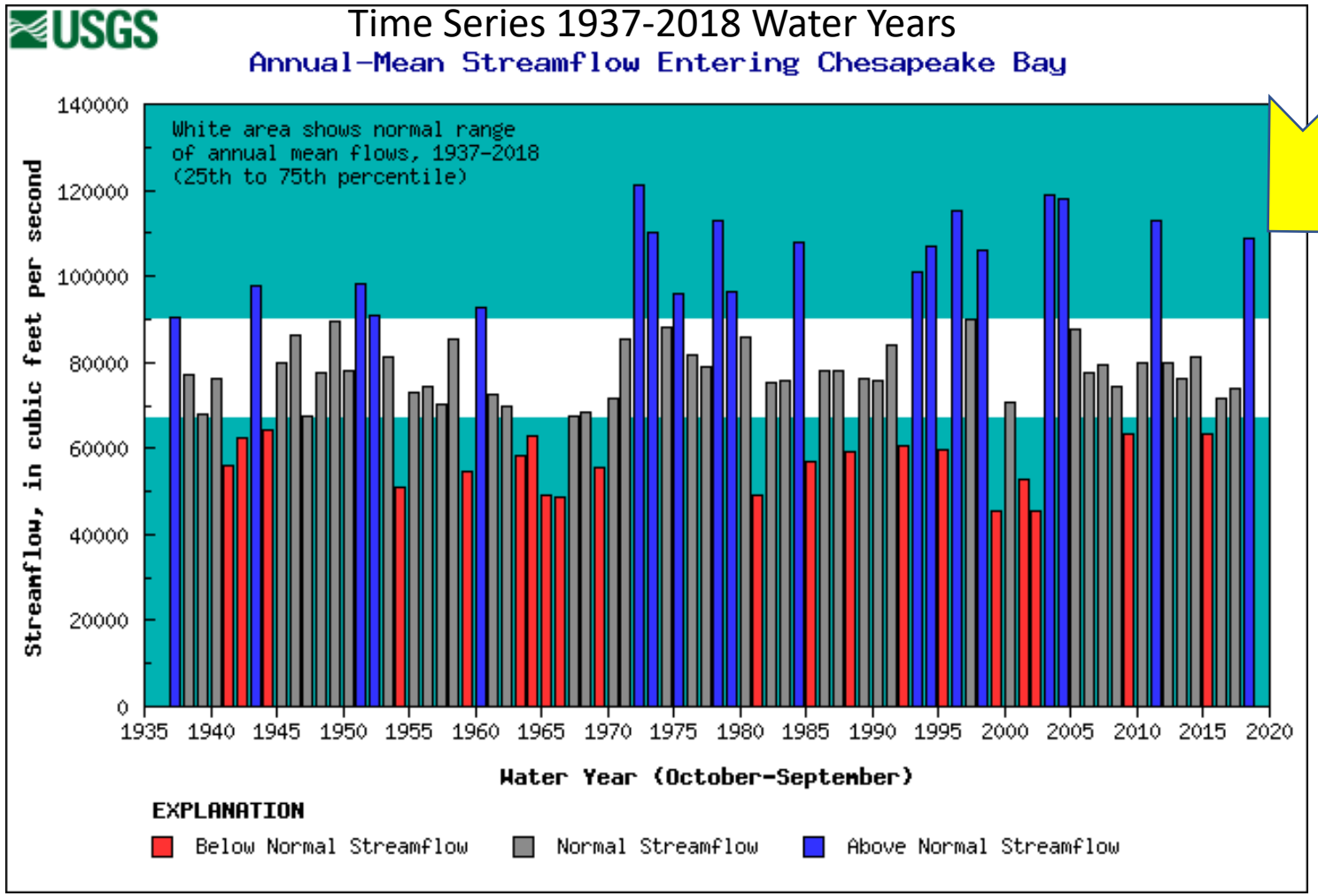


- **Greatest July and November river flows on record**
- **375,000 cfs - Highest flow at Conowingo Dam since Tropical Storm Lee**
- **Several flow events above 200,000 cfs; Normal about 10,000 cfs**
- **The volume of debris was the largest in 20 years**

USGS & Exelon data,

2018: Above normal for the Water Year.

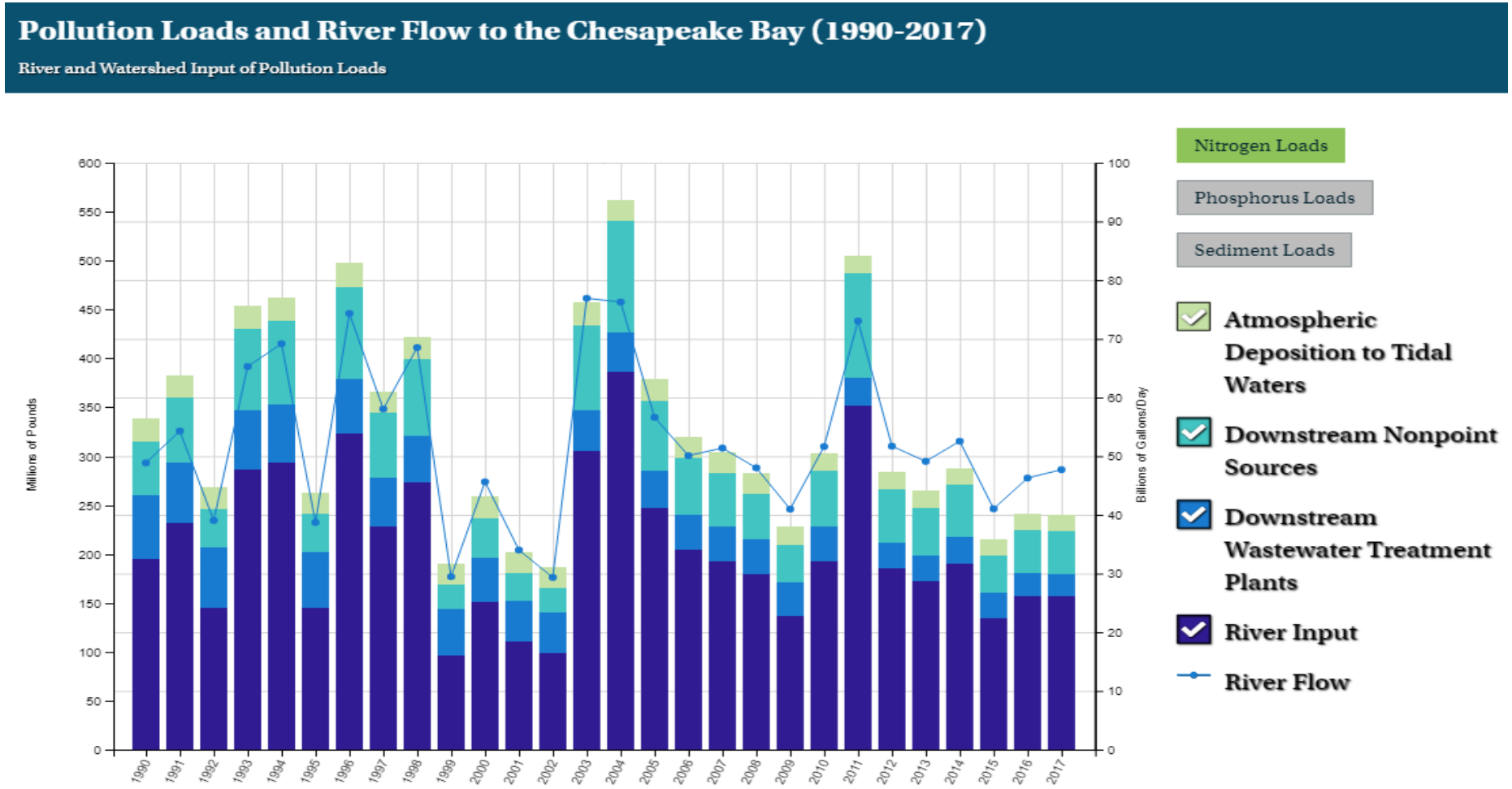
- Only 2nd year above normal in over a decade
- Last was 2011
- Negative impacts on Bay



10/16/2018 https://md.water.usgs.gov/waterdata/chesinflow/

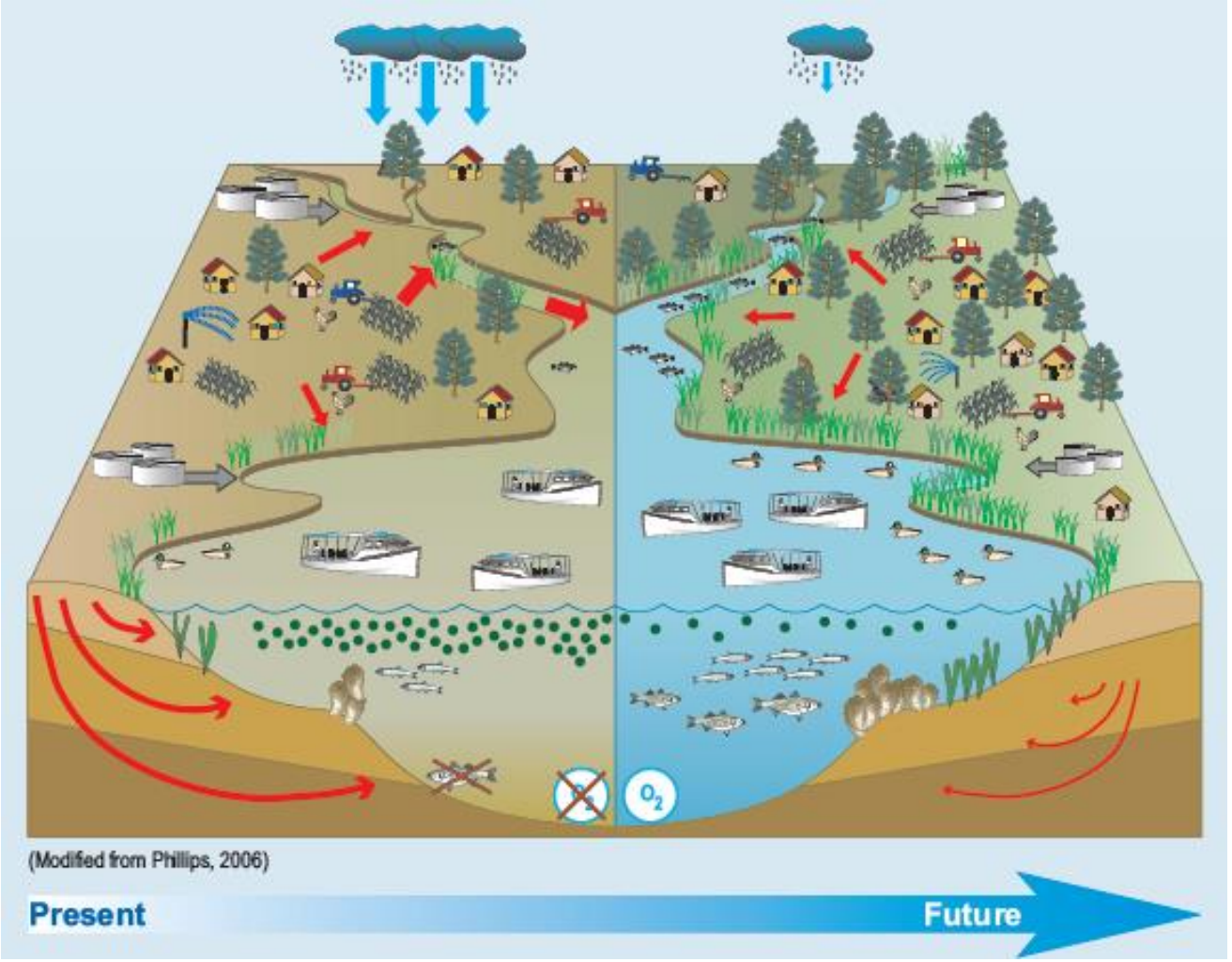
High Flows Deliver More Nutrients and Sediment

- High Flow years: 2011; 2003 & 2004
- Greater nutrient and sediment loads
- Usually lower DO
- May be near average in 2018
  - July wind events
  - More BMPs in place



Potential Bay Impacts

- Greater pollutant loads:
  - Poorer water clarity
  - Loss of SAV
  - Lower dissolved oxygen
- High amounts of fresh water
  - Oyster mortality
  - Migration of crabs and fin fish
- Monitoring providing early results



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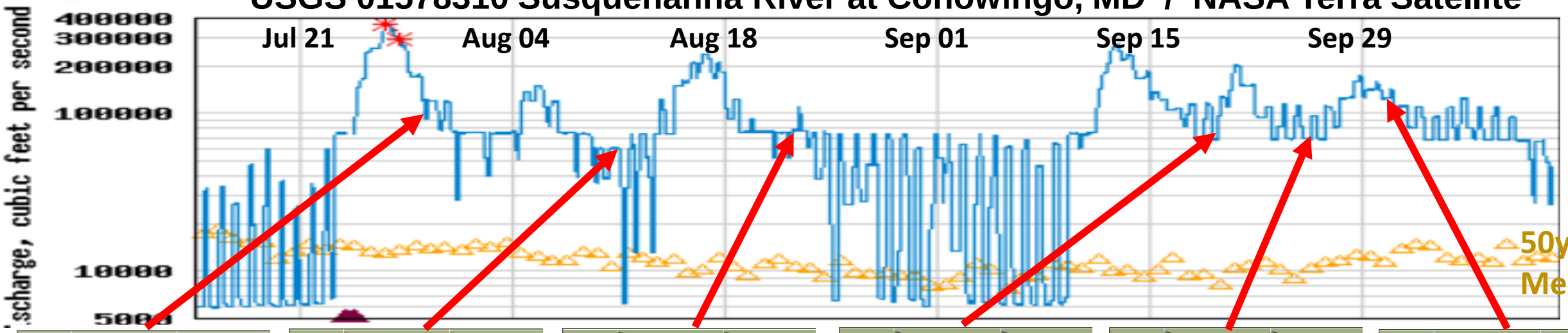
Outline

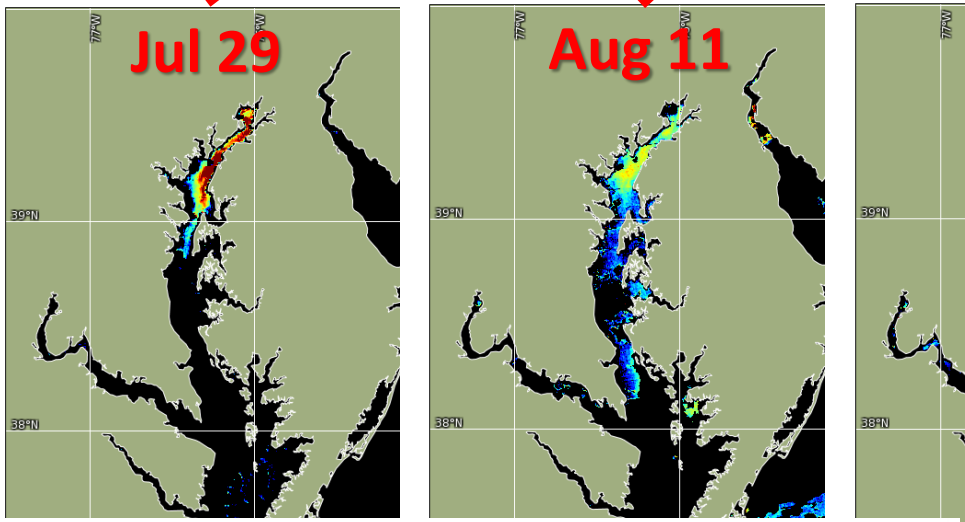
- River flow into the Bay during 2018
- Initial monitoring results of Bay conditions
  - STAR: Multiple-agency monitoring effort
    - Clarity
    - Salinity
    - SAV
    - Hypoxia
- Potential impacts compared to other high-flow years
- Summary and implications

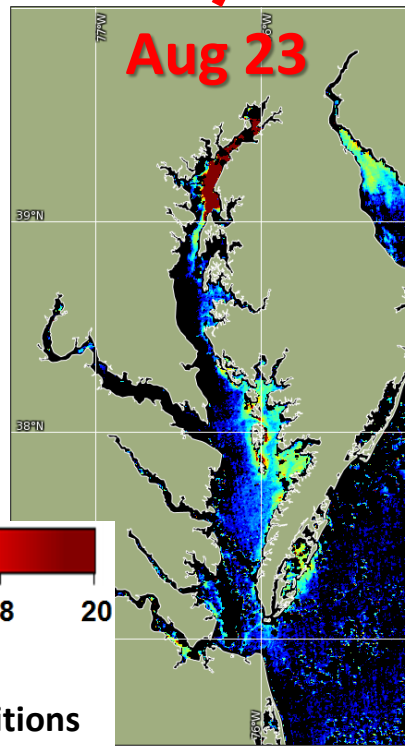
2018 Sediment plumes per peak discharge event

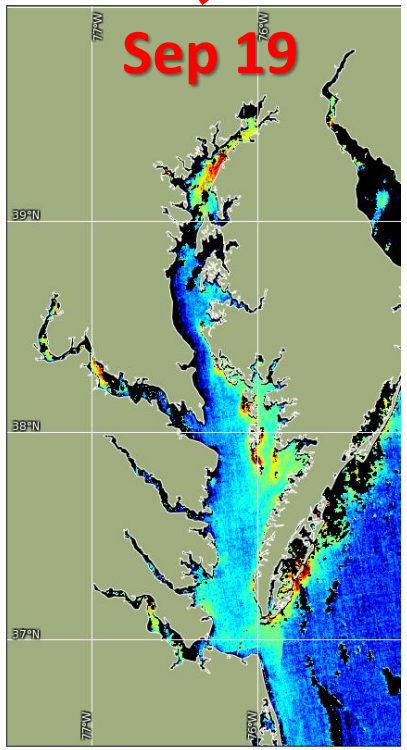
– as seen by satellite

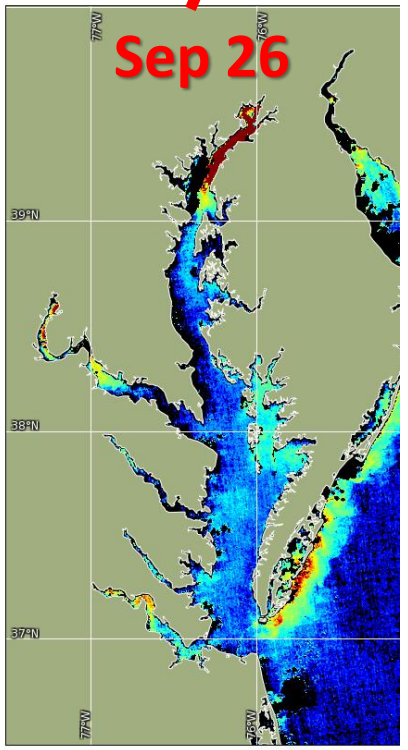
USGS 01578310 Susquehanna River at Conowingo, MD / NASA Terra Satellite

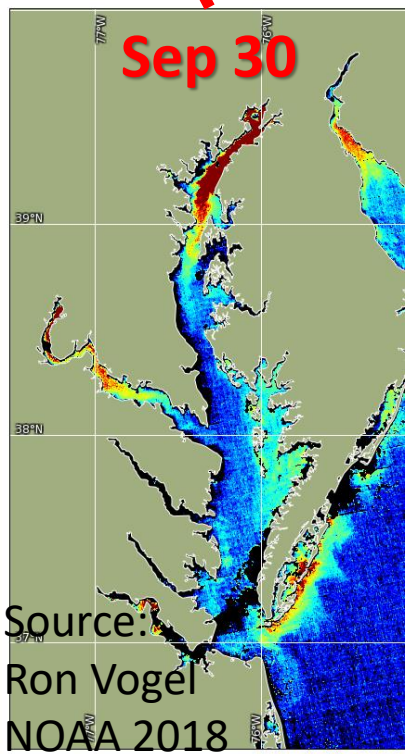


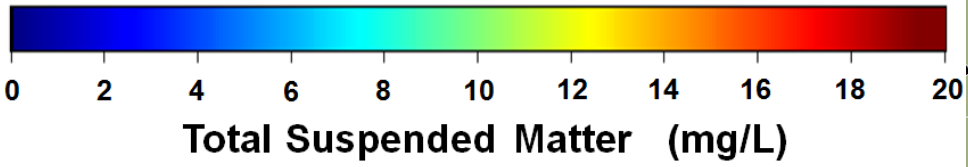










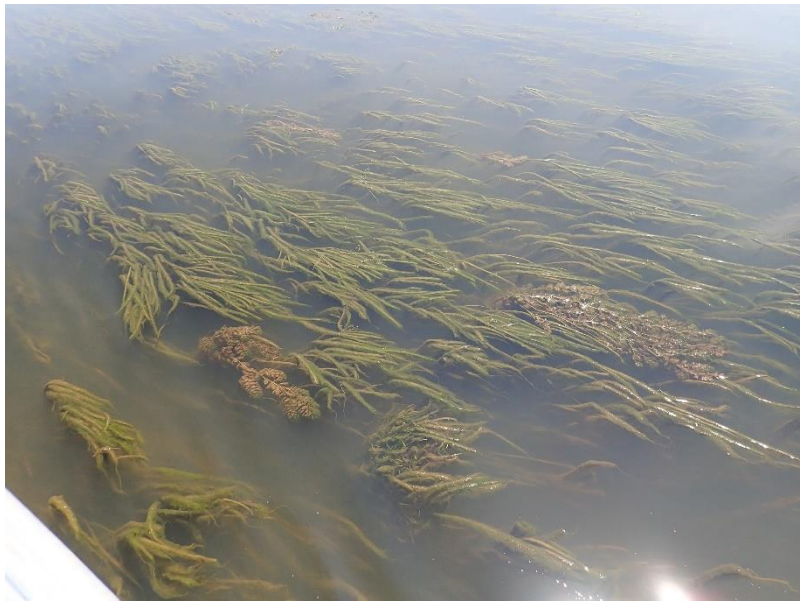


Note: satellite view only available in cloud-free conditions

Source:
Ron Vogel
NOAA 2018

SAV: Poor Water Clarity in Upper Bay but Grasses Still Present in the Susquehanna Flats

Turbidity 8-10-2018
out in the channel



Bay Grass 8-10-2018
Perimeter of beds with epiphytes

Bay Grass 8-10-2018
Clear water in the beds

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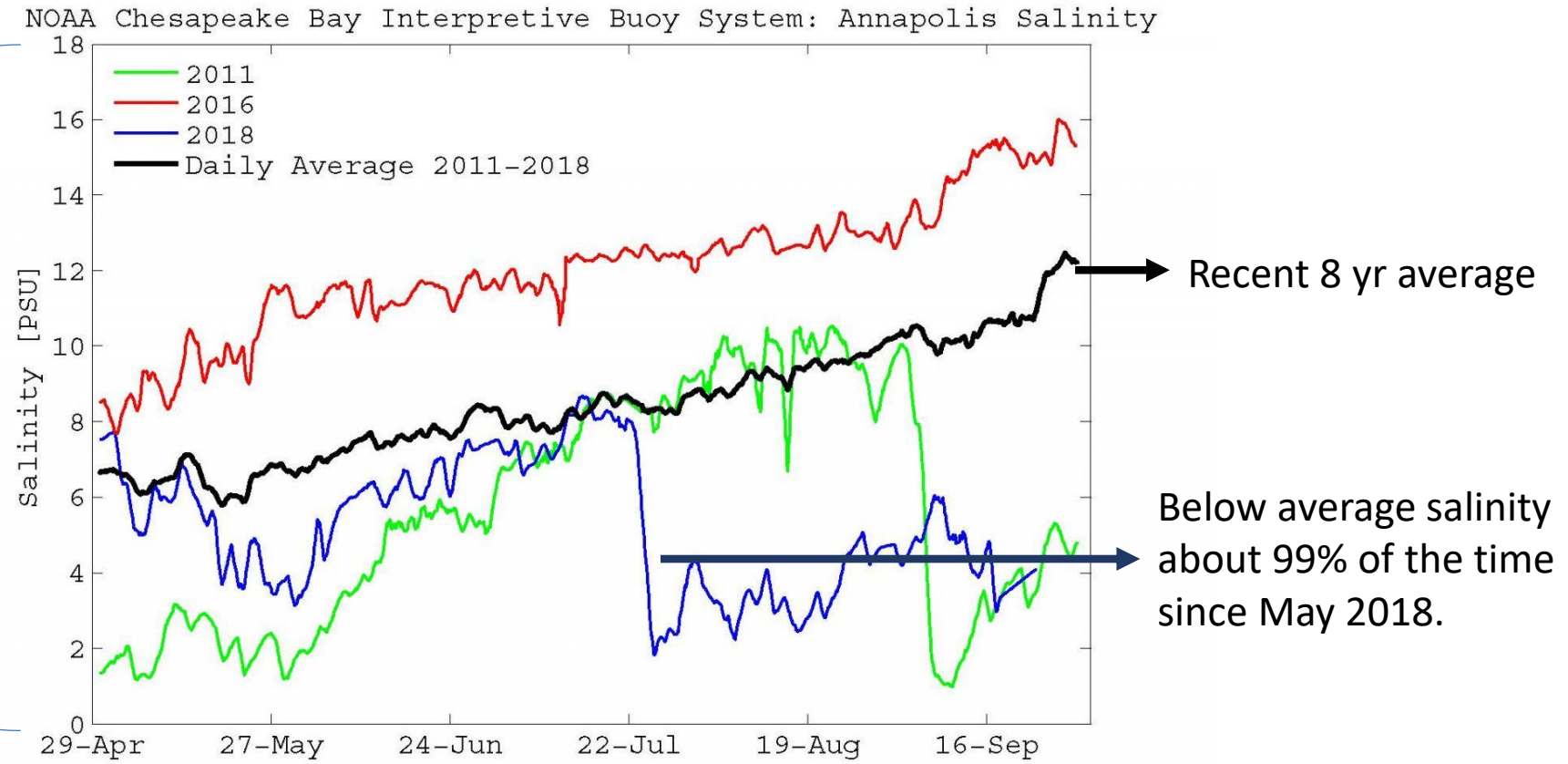
Photos by Brooke Landry, MD DNR

Annapolis MD – Mainstem Chesapeake Bay salinity affects habitat distributions for living resources.

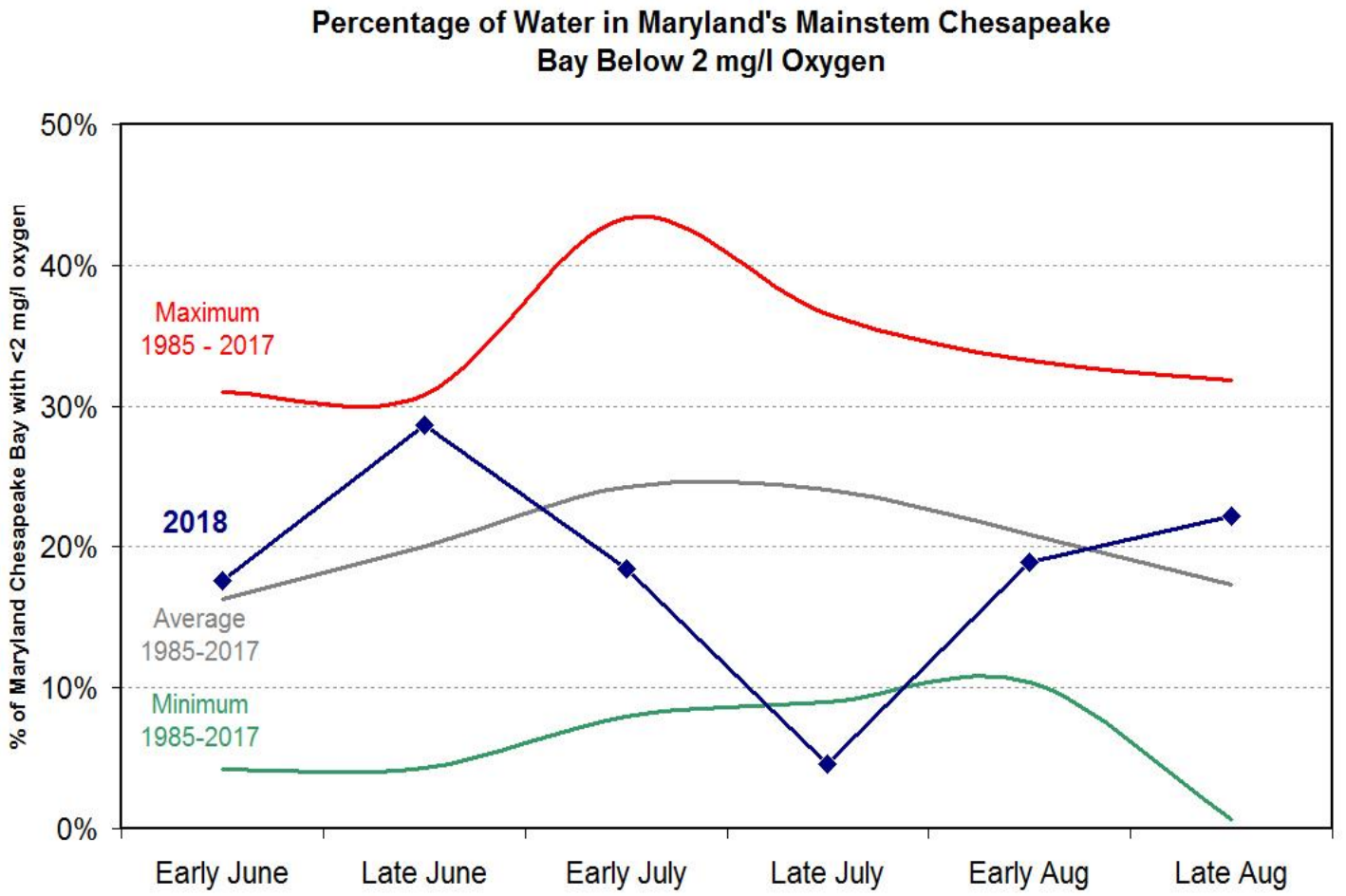


Recent 8 yr average

Below average salinity about 99% of the time since May 2018.

Summer MD Hypoxia: Variable Conditions

- June: above average
- July: Below average
  - Due to winds
- August: near average



M. Trice. MD DNR

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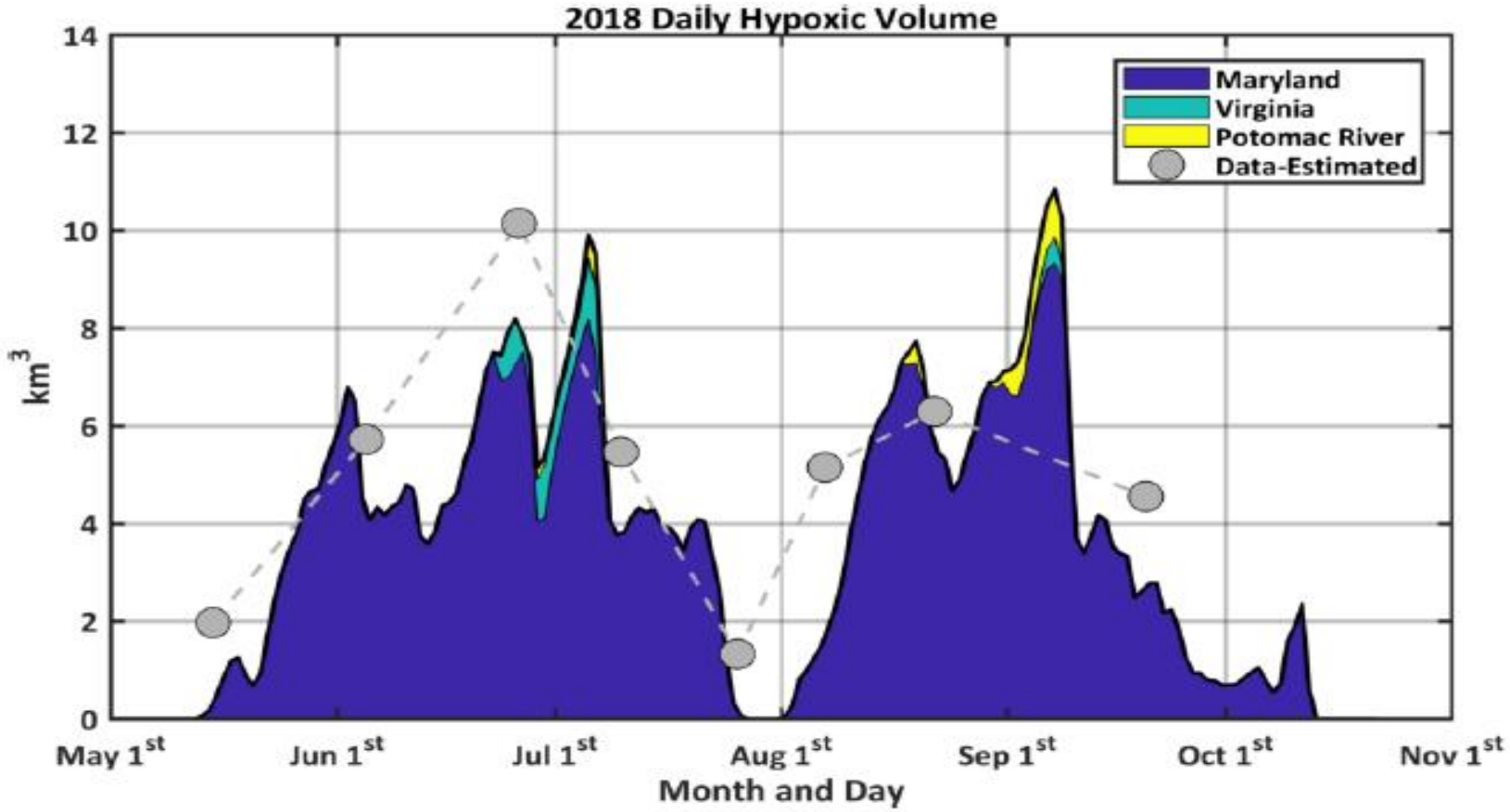
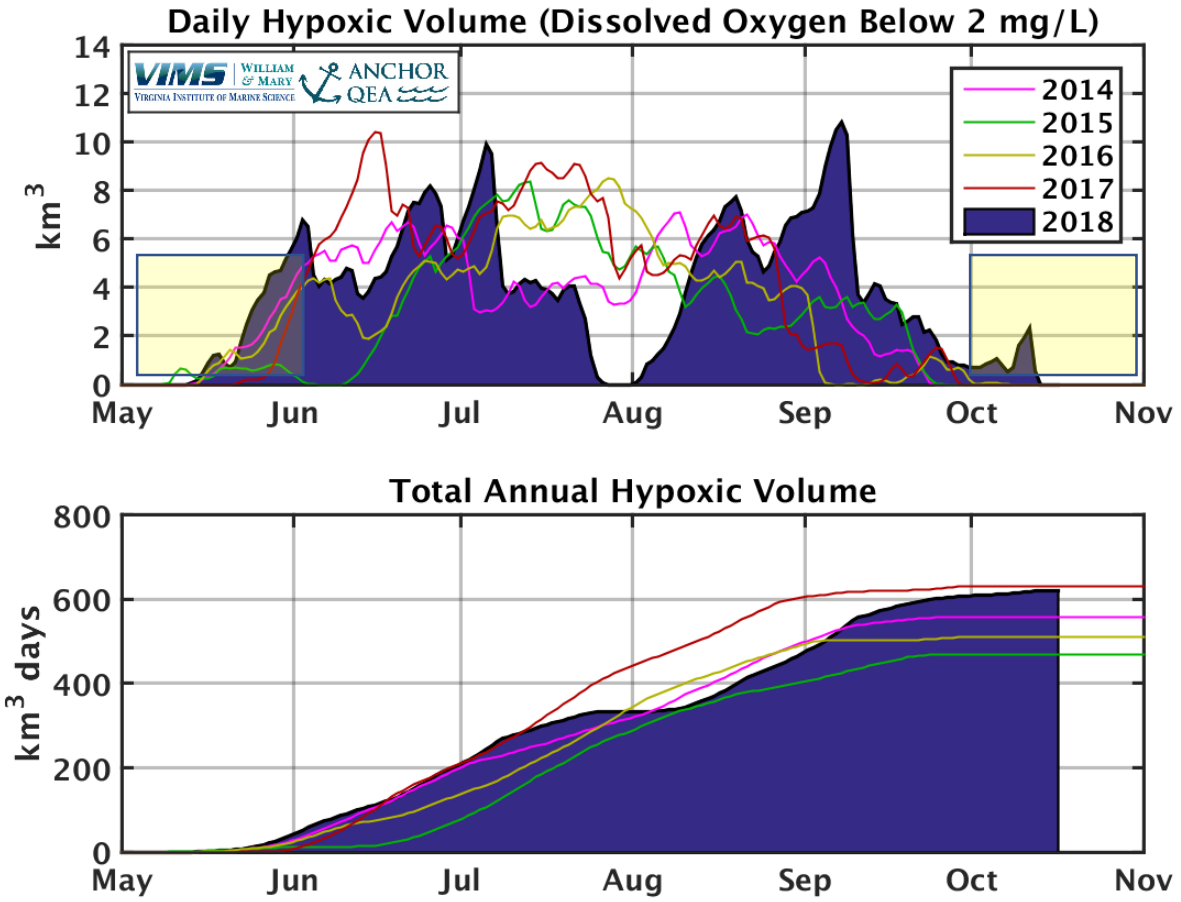
VIMS Forecast Compared to Discrete Sampling Events

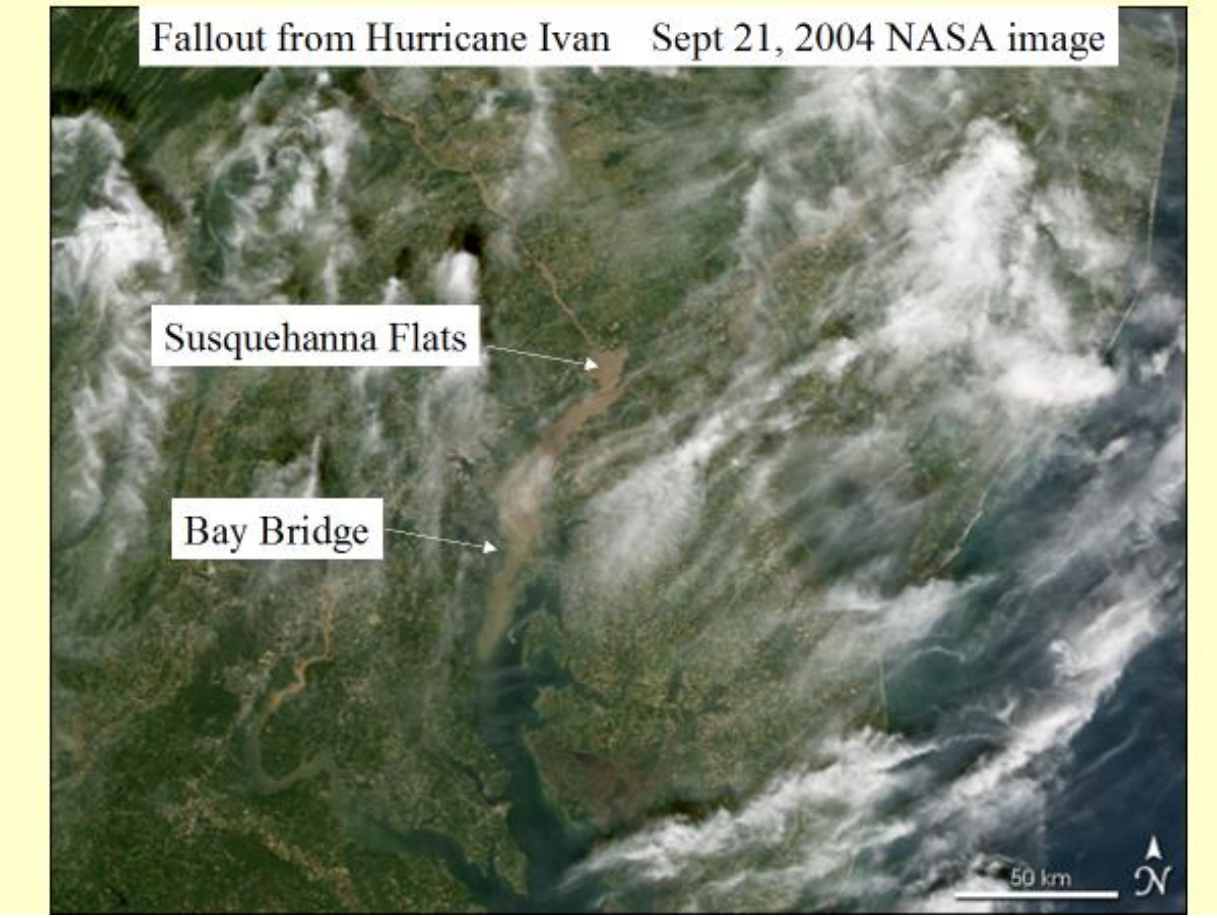


2018 Hypoxia
Full duration goes beyond the summer season



http://www.vims.edu/research/topics/dead_zones/forecasts/cbay/hypoxic-volume/index.php

Outline



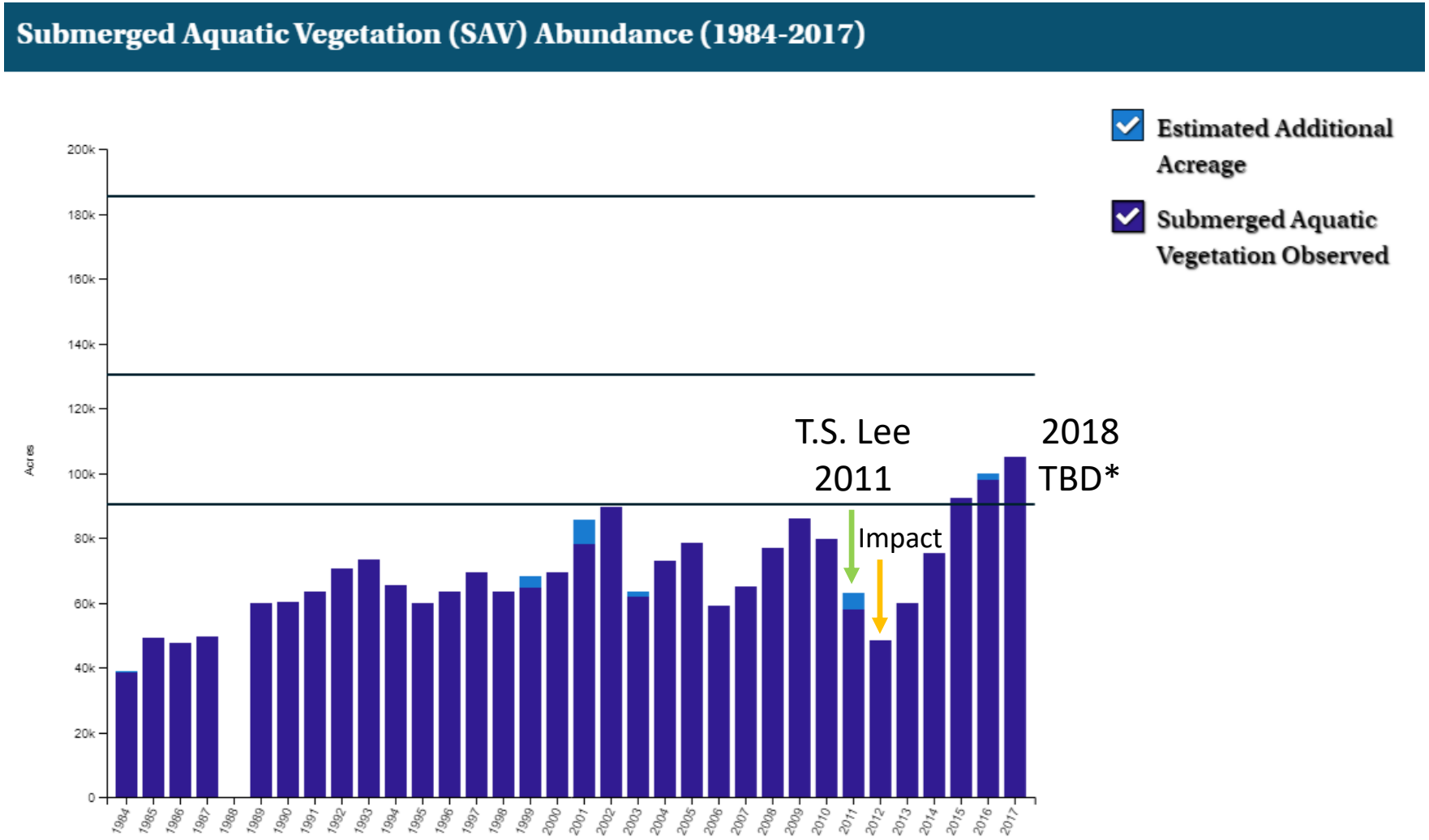
- River flow into the Bay during 2018
- Initial monitoring results of Bay conditions
- Potential and measured impacts compared to other high-flow years
  - SAV
  - Jellyfish
  - Oysters (+ and -)
- Summary and implications

2018 - Potential Loss of SAV

- 2011 High Flows
- Declines in SAV for two years

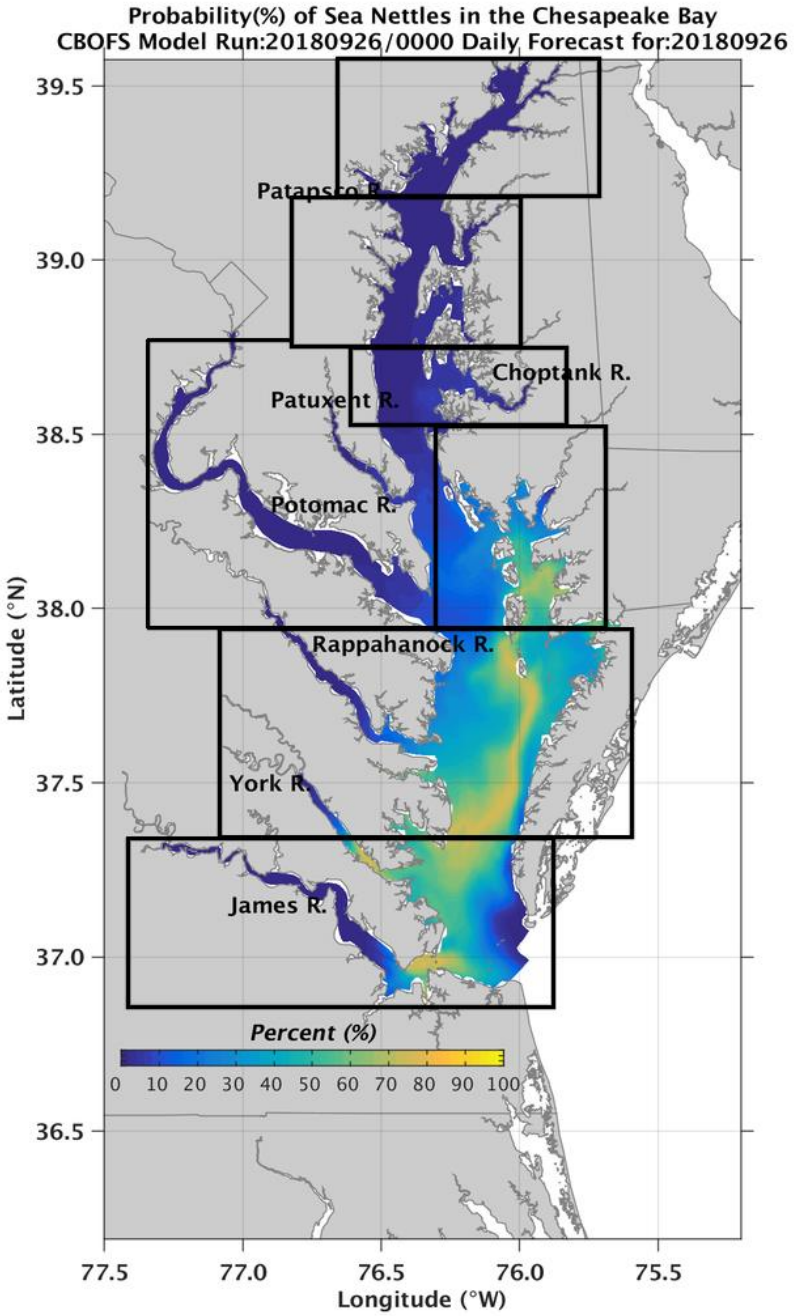
- SAV beds larger so may be more resilient
- More BMPs in place
- Less overall loss?

- *Satellite estimation is being investigated



Freshwater flow impacts

- Mortality of some oysters (-)
  - Less disease down bay (+)?
- Crabs migrating south
- Fin fish moving to stay in salinity ranges
- Fewer jellyfish in the northern bay



https://www.opc.ncep.noaa.gov/Loops/SeaNettles/prob/SeaNettles.shtml

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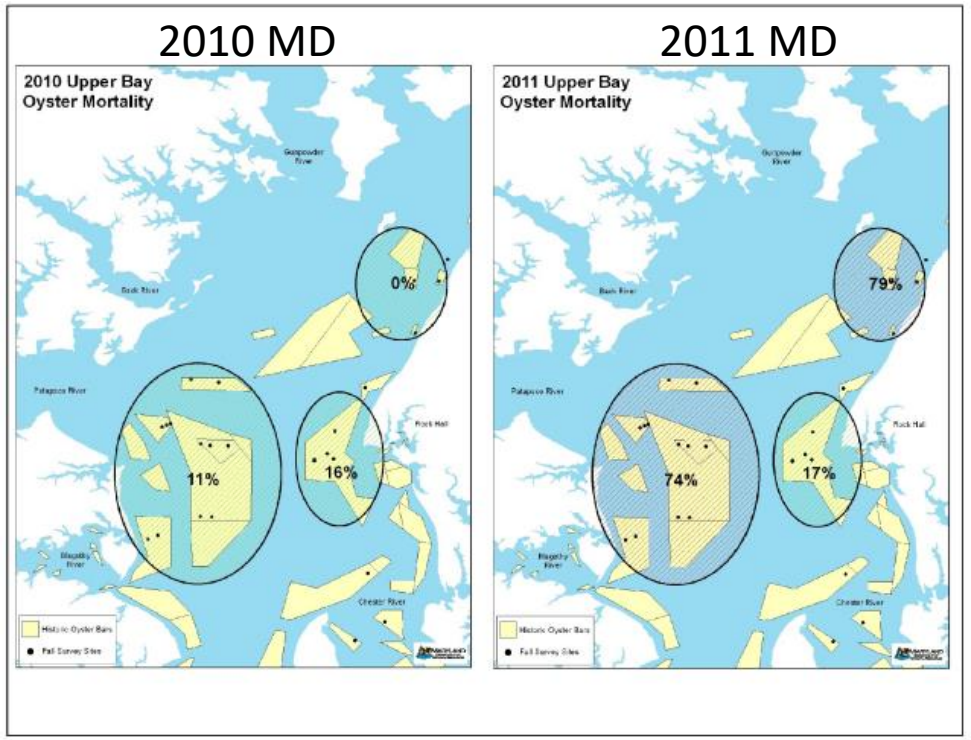
Living Resource Effects in High Flows: Historical inference for oysters and benthos

- Oysters 2011 (TS Lee):
  - High mortality in the upper Bay
  - Excellent baywide survival
  - MSX/Dermo record lows (M. Naylor MD DNR)

- Baywide benthos 2011
  - Showed little impact from the storms.

(R. Llanso VERSAR Inc.)



Oct 2018 Potomac River. PRFC news.

- High oyster mortality in the upper river (rotational) bars, and
- Low mortality but impacted growth in the lower river.
- No significant reproduction was found on any of the surveyed bars.
- Good news ZERO mortality at all three of the OMR triploid spat on shell plantings (Cobb Island Bar 2016, Ragged Point Bar 2017, and Ragged Point Bar 2018)

Rainy Year in Maryland Doesn't Dampen State Oyster Aquaculture Forecast

Rona Kobell • November 13, 2018

Maryland's oyster aquaculture harvest so far this year has already exceeded last year's, despite a deluge of fresh water from storms that scientists and managers worried would stymie growth.

So far, the Maryland harvest for 2018 is just over 80,000 bushels of farm-raised oysters; in 2017, it was 75,000. In 2016, it was 65,000 bushels, and that was a 1,000 percent increase since 2012.

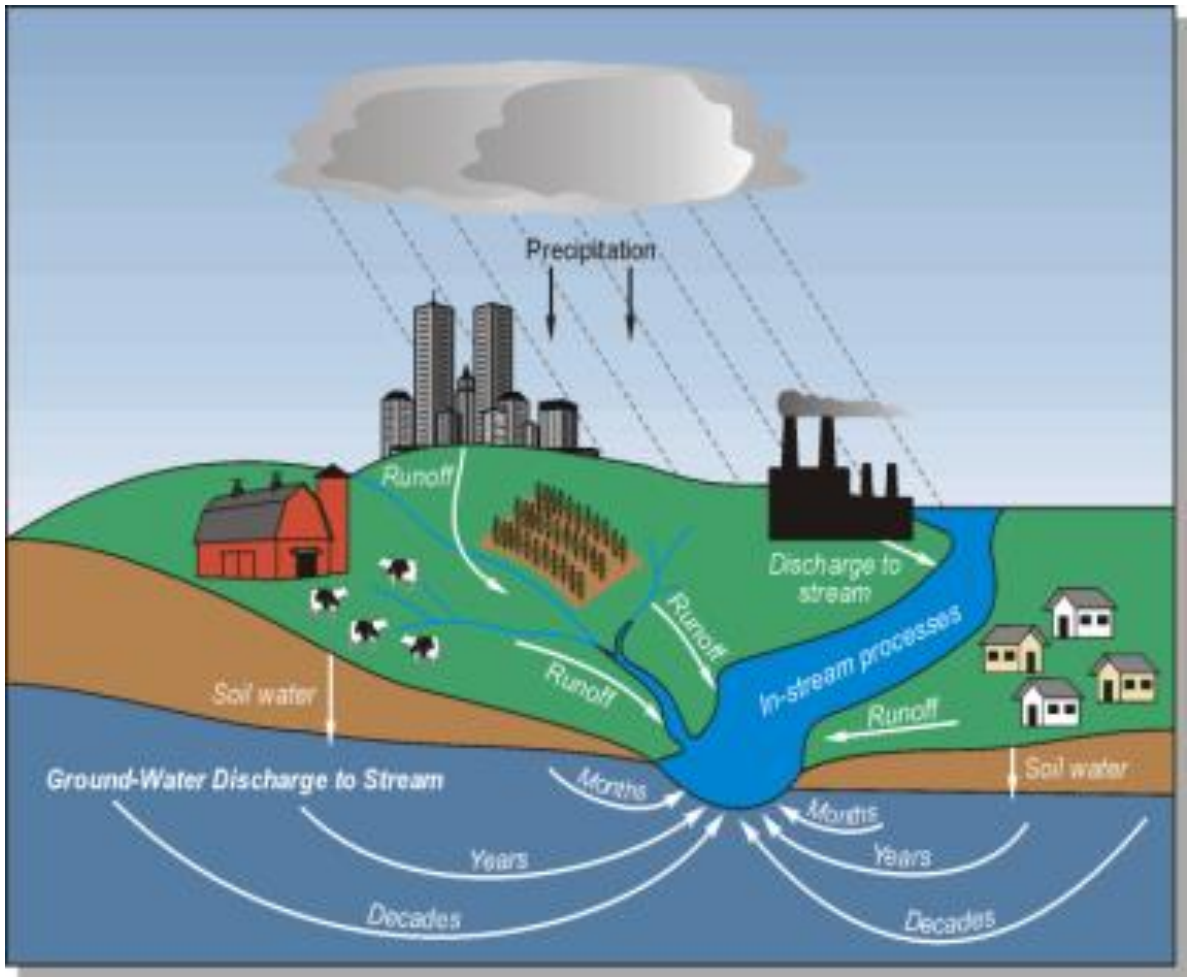
The oyster aquaculture harvest has increased steadily since 2010, when oyster leasing became legal in every county in the state, and the legislature lifted many of the other barriers to farming, such as limits on acreage or the ability to lease to out-of-state corporations. Most Maryland oyster farmers are still homegrown; about half hold crabbing

What's New
Chesapeake Quarterly
On the Bay: Chesapeake Quarterly's Blog
Fellowship Experiences: A Students' Blog
News Releases
Sea Level Rise Special Report
Headwaters Newsletter
Videos
Our Communications Staff and Products
Our Policy on Online Comments

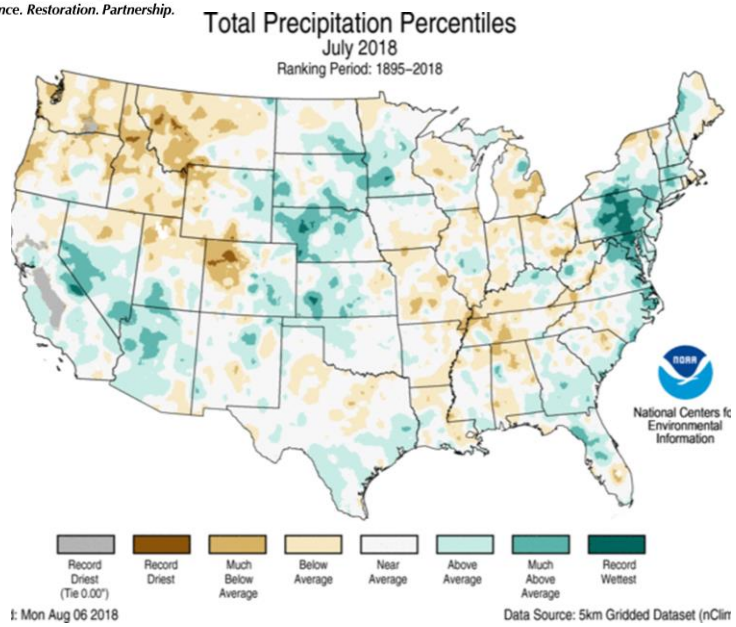
PROGRAM ANNOUNCEMENTS

Maryland Sea Grant seeks to hire an Assistant Director for Communications and Engagement to lead our team of writers and content producers. More

Summary and Implications



- More climate and flow variability
  - N, P and S loads from storms need to be mitigated
- More emphasis on water-quality practices to address storm events
  - Urban storm water
  - Runoff from ag lands
- Monitoring to explain watershed and estuary response
  - Assess changes from high flows vs. management practices
  - Resilience of SAV and living resources
- Many thanks to field and lab teams for the long hours and storm chasing!



Ellicott City, MD 2018 NY Times

Susquehanna Flats Aug 2018 MD DNR

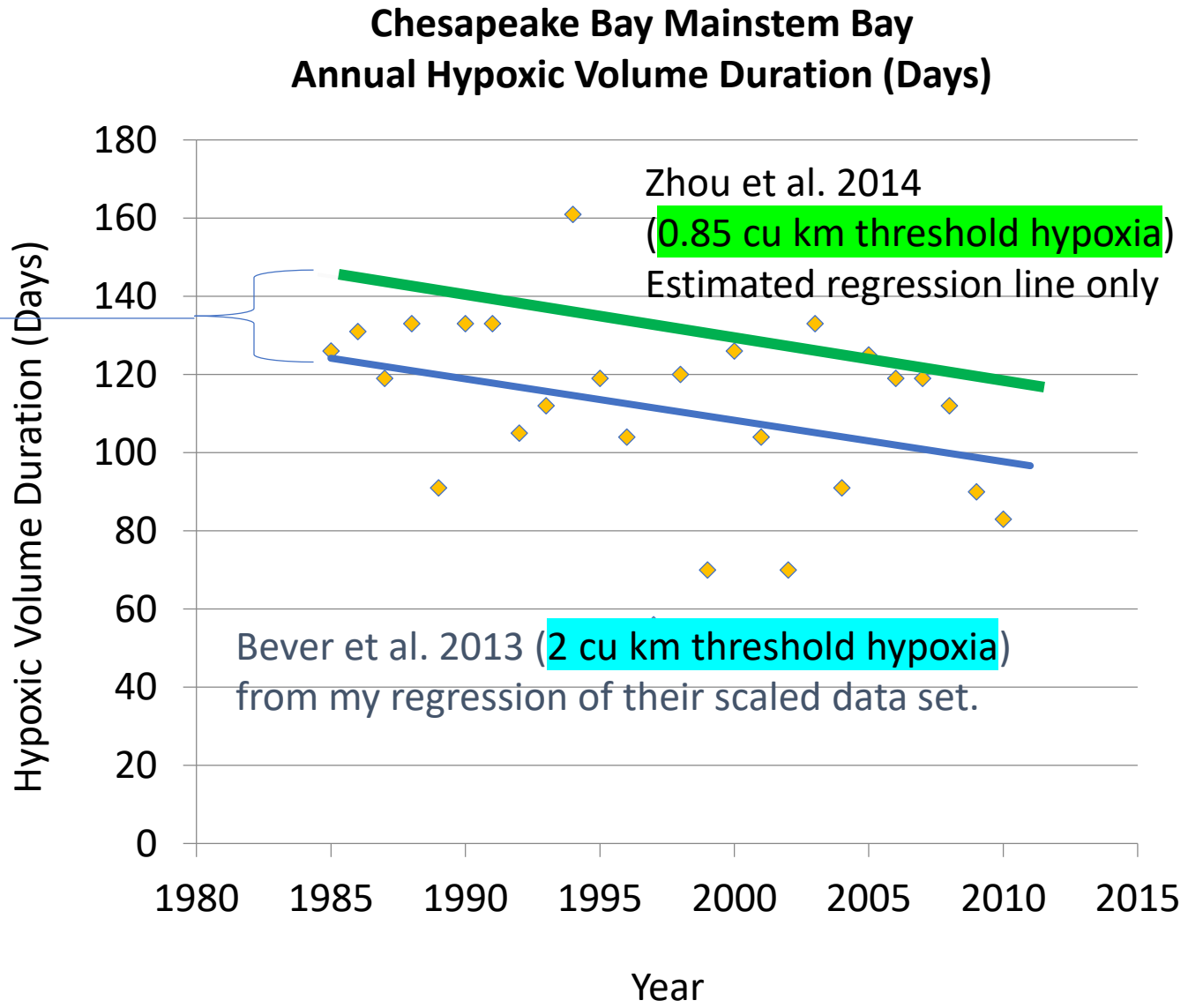
Thank you

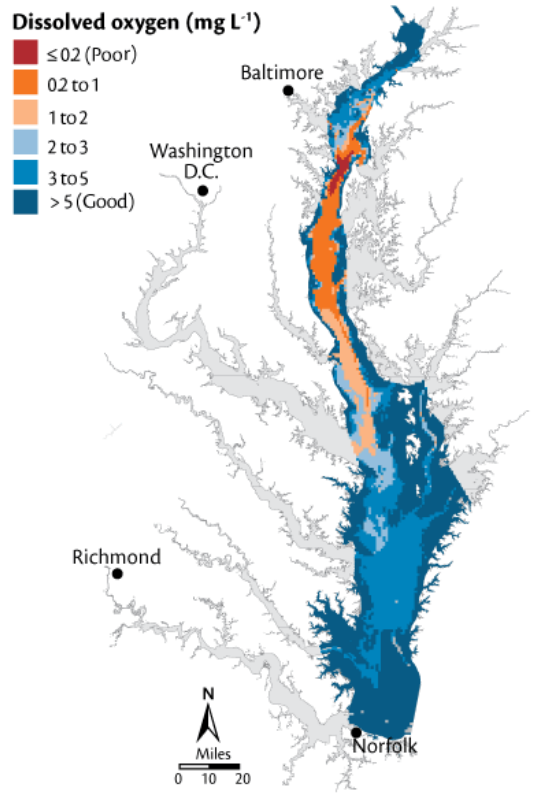
Chesapeake Bay Program Management Board 12/6/2018

- Peter Tango and Scott Phillips, USGS on behalf of STAR

Duration: It depends on your threshold volume definition for when hypoxia exists in the bay

About a 20 day difference





Chesapeake Bay Hypoxia Summer 2012

USGS science for a changing world

Chesapeake Bay Program
A Watershed Partnership