Web-based 4D Visualization of Habitat Condition of Living Resources

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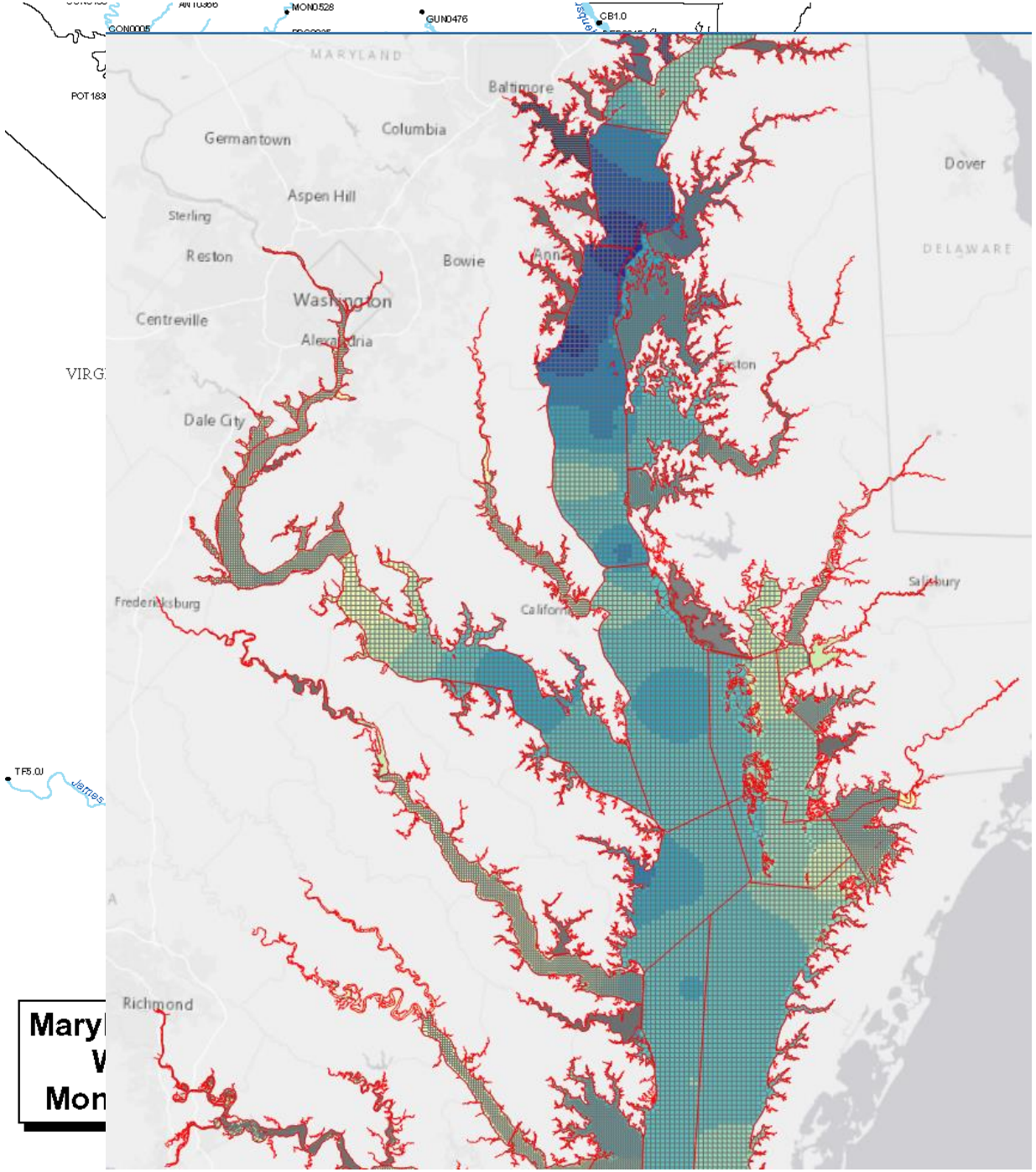
Data - Chesapeake Bay Interpolator

- Version: developed by NOAA in 2006
- Cell based interpolator (VOL3D)
  - use water quality concentrations measured at monitoring stations in monthly cruises as input
  - interpolation output for the entire Bay
- Cell size mostly 1km x 1km horizontal, 1m vertical from surface to bottom
  - shallow 50m x 50m



Water Quality Data

- 10 Years Interpolator Outputs: 1991- 2000

  3 Parameters, 4 Scenarios*

	No Action	WIP3	1985 Progress	2017 Progress
DO	No Action	WIP3	1985 Progress	2017 Progress
Salinity	Observation	Observation	Observation	Observation
Temperature	Observation	Observation	Observation	Observation

* All scenarios are created by modifying the DO observations

Habitat Requirements

- Measurements: DO, Salinity, Temperature
- Temporal: 10 years monthly (1991 – 2000)

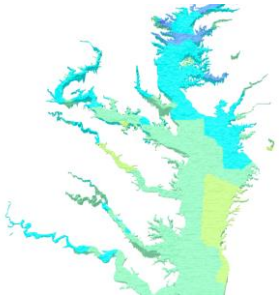
- Habitat Requirements for Chesapeake Bay Living Resources (1991,EPA)

Life stage:
E=Eggs;
L=Larvae;
J=Juvenile;
A=Adult

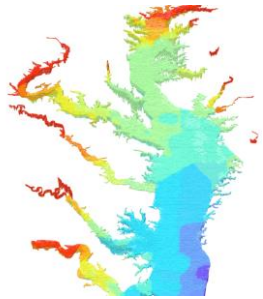
	Striped Bass	**Blue Crab**
DO (mg/L)	**>5**	**>3**
Salinity (ppt)	0.5-10 (E) 1-10.5 (L) 0-16 (J)	>20 (L) **0 - 30 (A)**
Temperature (°C)	12-23 (E,L) 10-27 (J) **20 - 22 (A)**	**5 -39**

Water Quality and Habitats

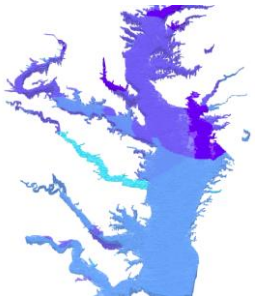
Method



Dissolved Oxygen



Salinity

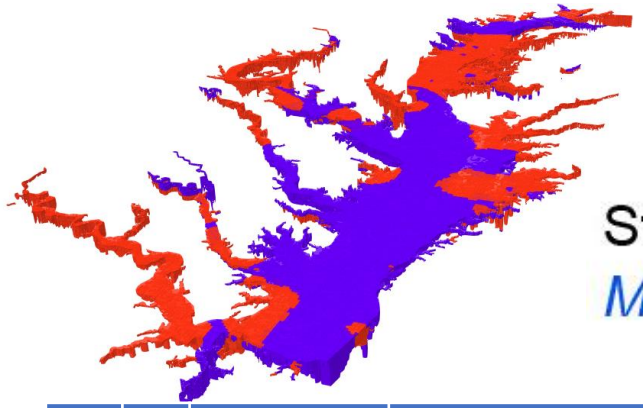


Temperature

Dissolved Oxygen > 5.0
Temp 20 - 22 (A)

Dissolved Oxygen > 3.0
Temp 5 - 39
Salinity 0 - 30 (A)

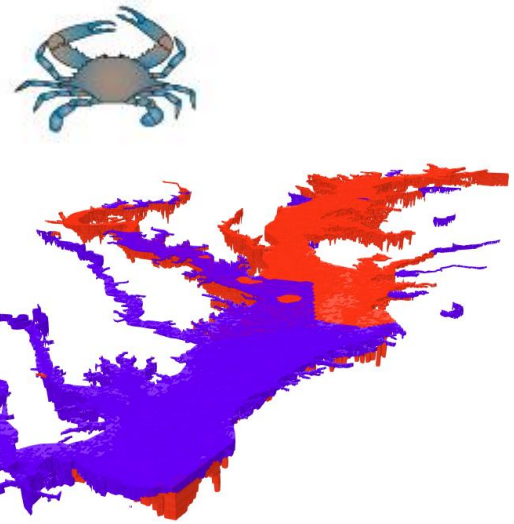
Habitat Requirements for Chesapeake Bay Living Resources (1991, EPA)



Striped Bass
Morone saxatilis

Species Occurrence

Blue Crab
Callinectes sapidus



X	Y	Segment	Habitat Status Depth1	Habitat Status Depth2	…

X	Y	Segment	Habitat Status Depth1	Habitat Status Depth2	…

3D BlueCrab Scenarios

Home ▾ BlueCrab NoAction 1991 Sign In

No Action

Monthly Habitat condition

Select the Year below:

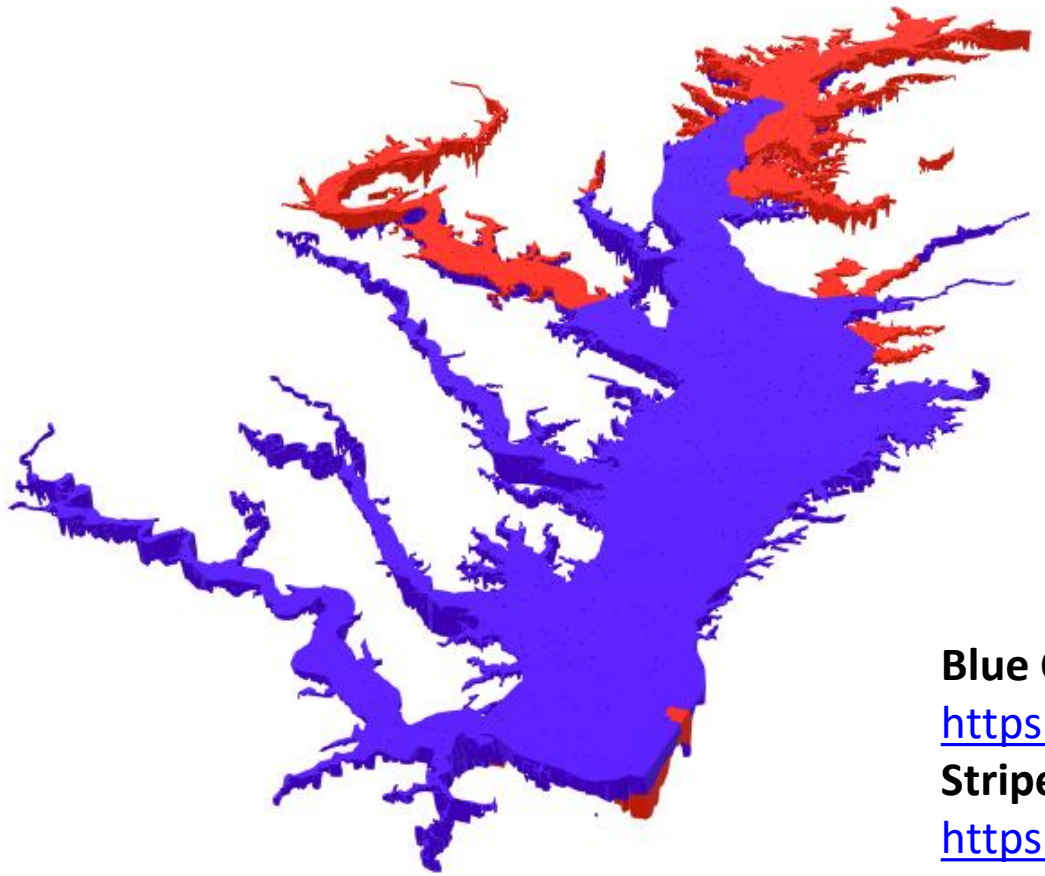
1991 1992 1993 1994 1995

Legend

Summary

- Non-habitat
- Habitat

Click to View Time Series Plot



WIP3

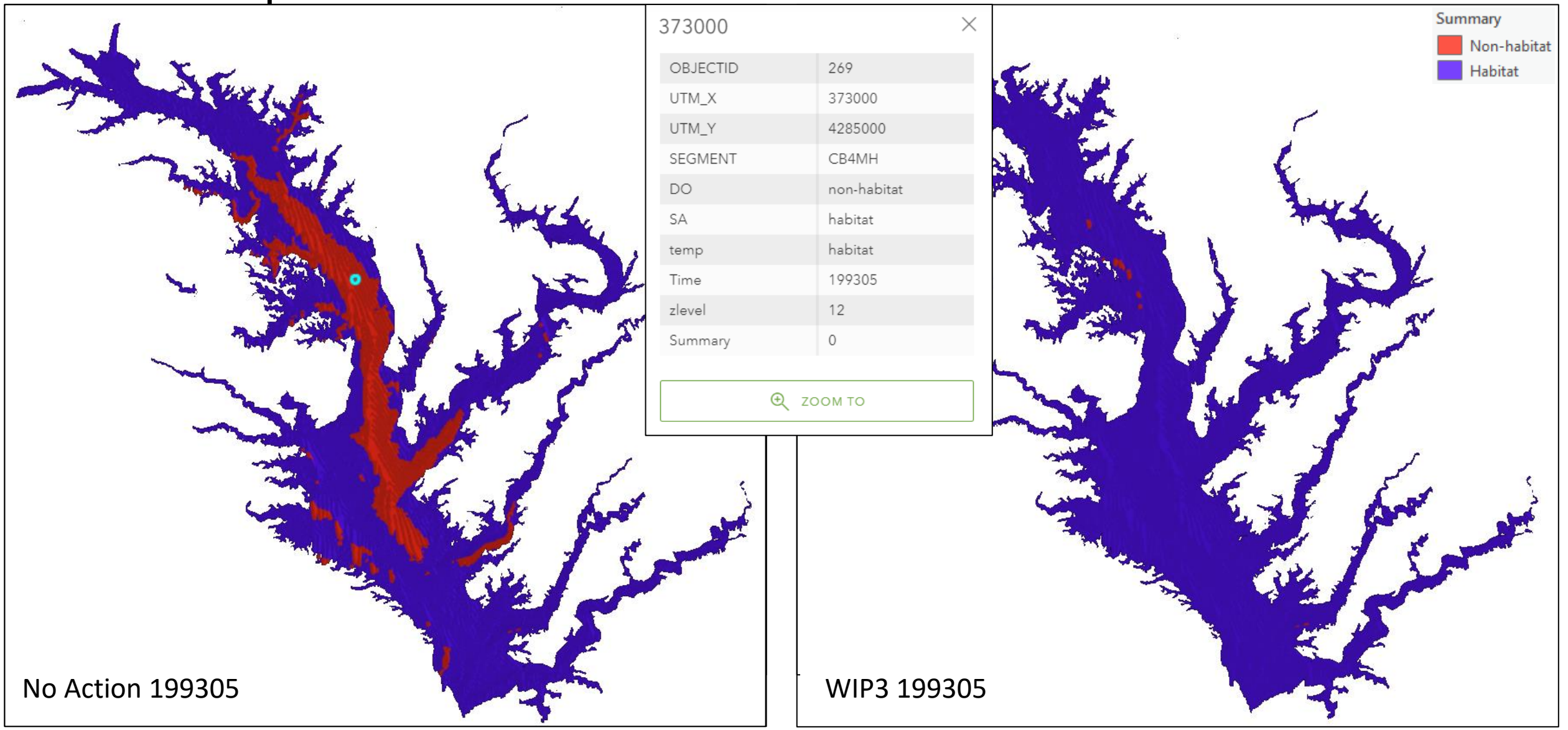
1985 Progress

2017 Progress

Blue Crab Scenarios
https://bit.ly/3NclCEM
Striped Bass Scenarios
https://bit.ly/3tV6o0q

Example - Bottom Blue Crab

500x Vertical Exaggeration



Habitat Volume Days Metric Calculation

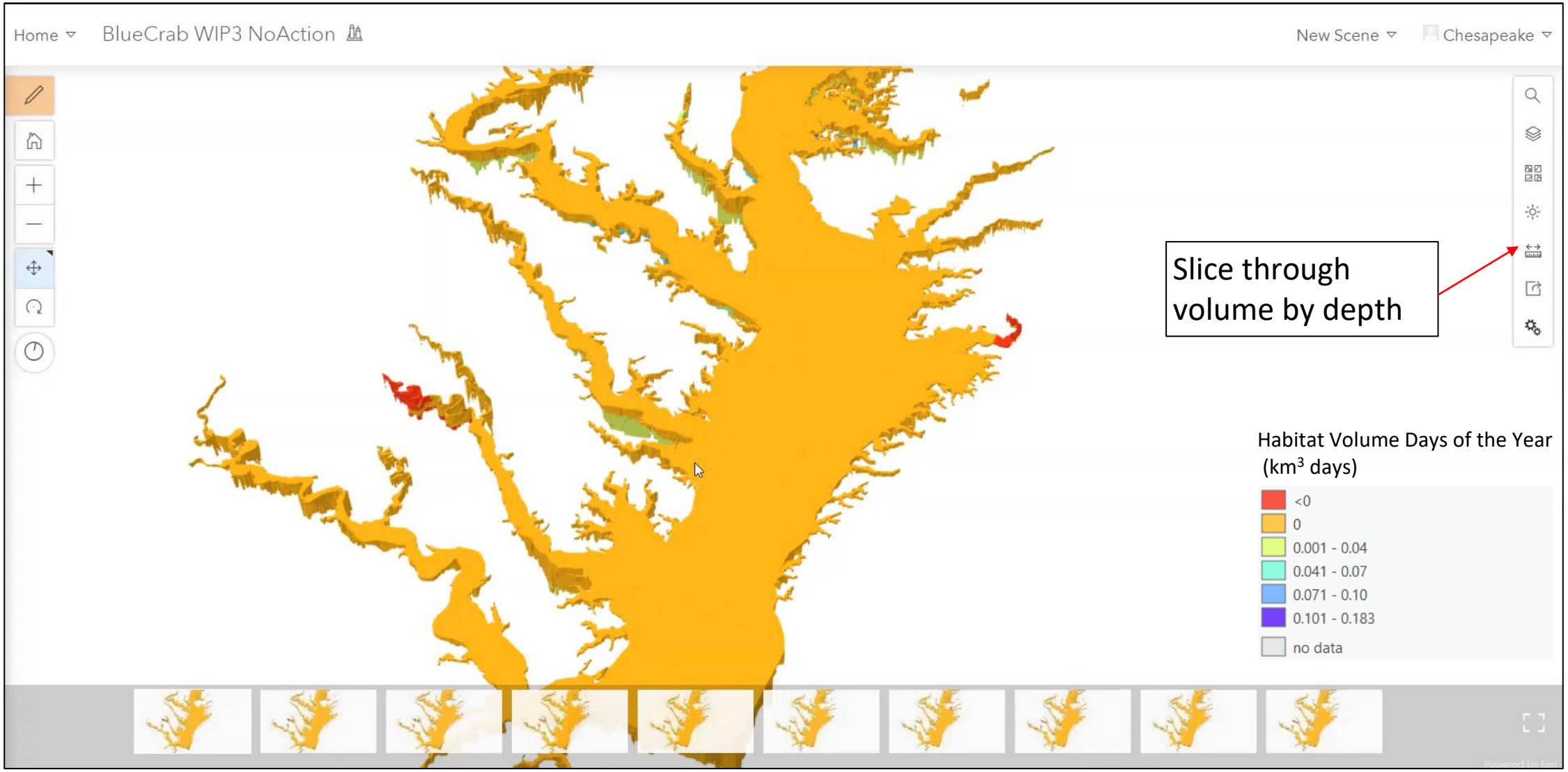
- Vol days: unit (km^3 days)

Vol days in the Month i= Monthly Vol * #days of Month i

Vol days in the Year = $\sum_{i=1}^{12}$ Vol days in the Month i

Example - Surface

500x Vertical Exaggeration



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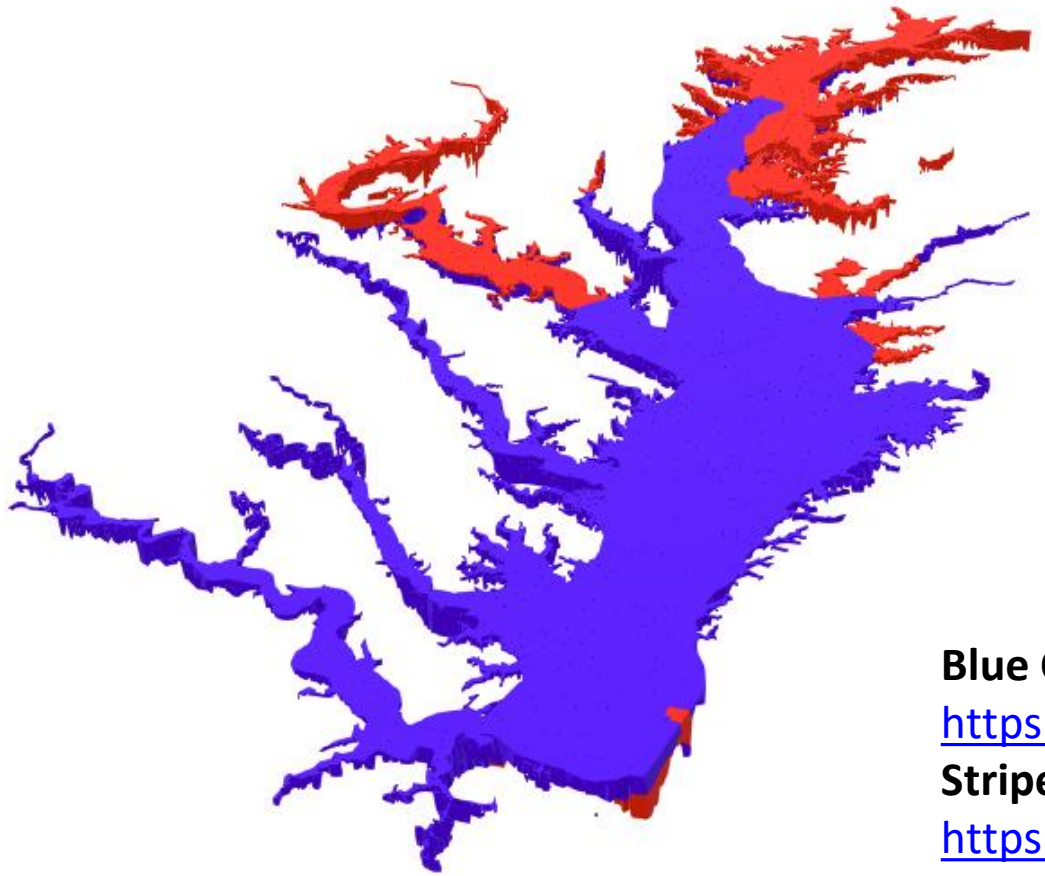

WIP3

1985 Progress

2017 Progress

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Striped Bass Scenarios
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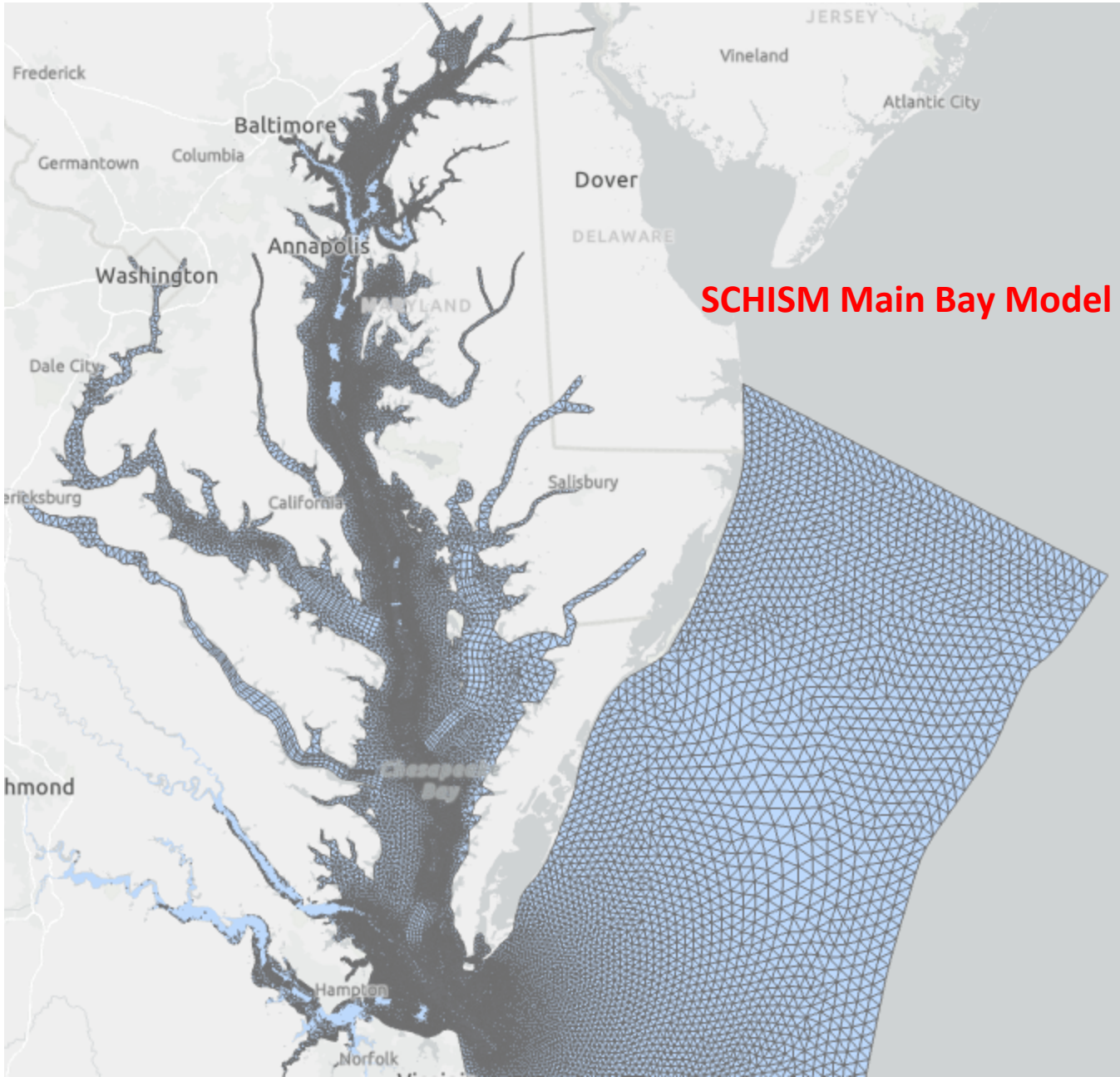
3D Chesapeake Bay Segment Explorer

Zhaoying (Angie) Wei, John Wolf,
Nicole Cai, Lew Linker

Data – refined SCHISM

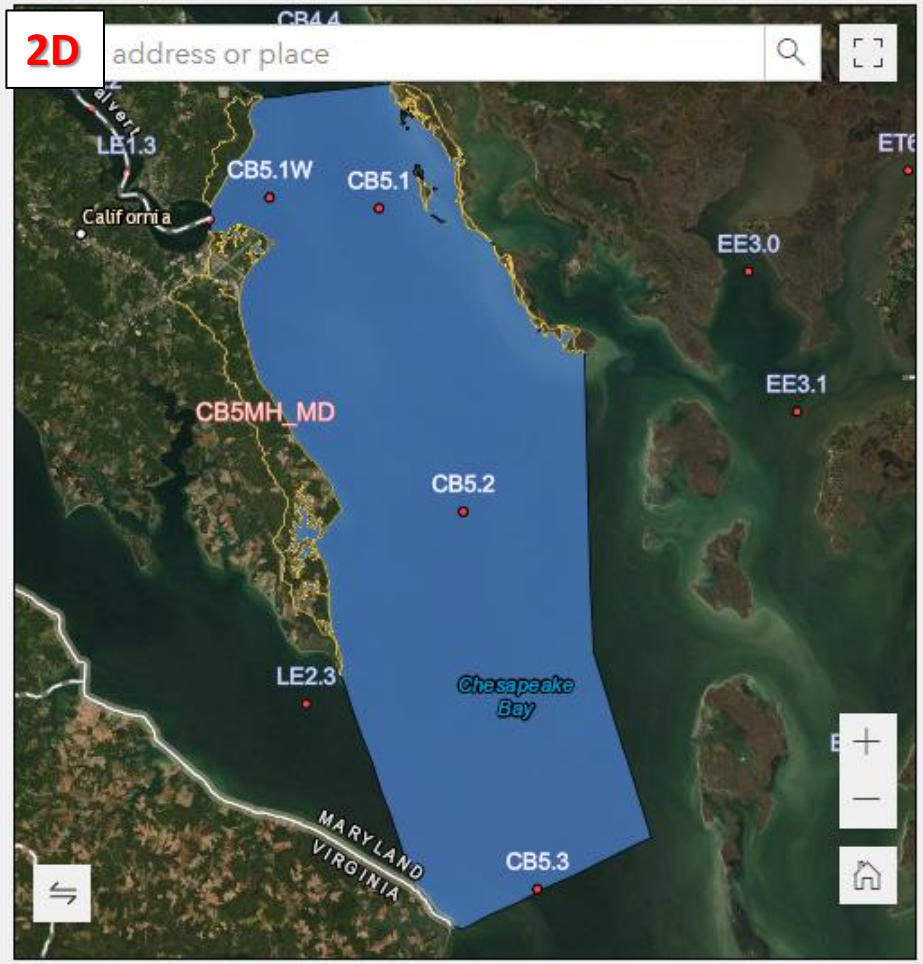
- Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM)
  - Finite element/volume formulation
  - Unstructured mixed triangular/quadrangular grid in the horizontal dimension
- Finer grids currently available in Mainstem, James River and York River

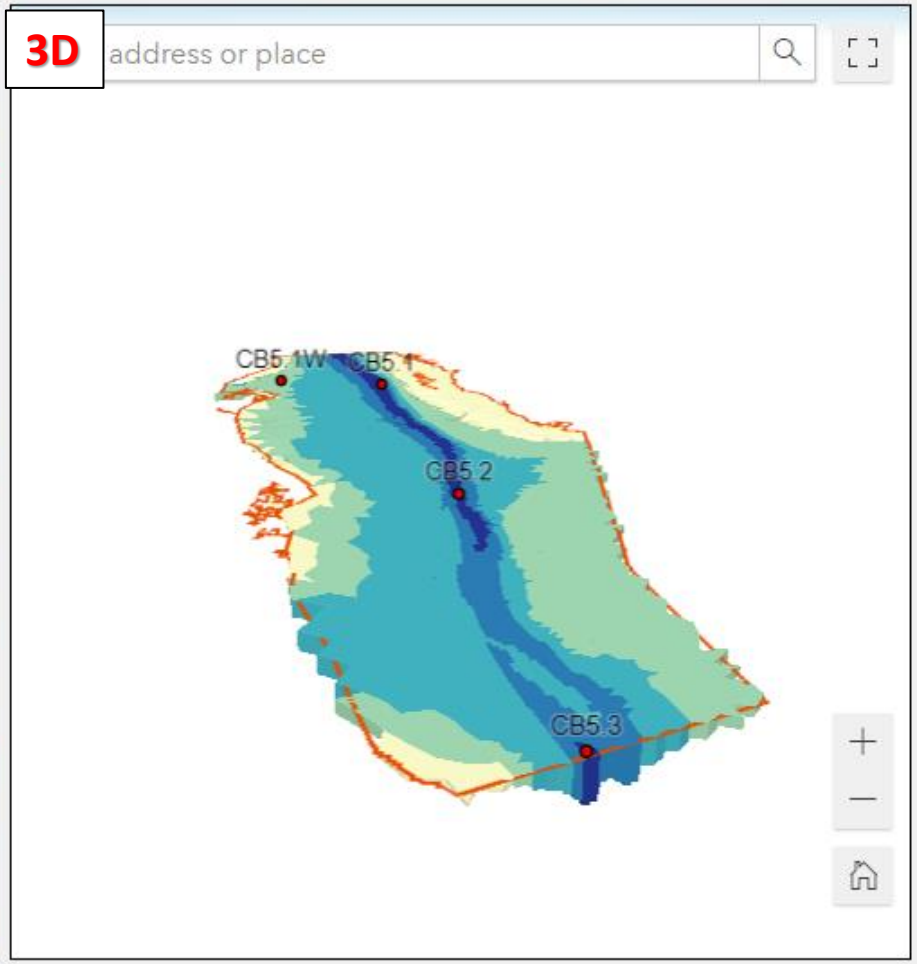


Chesapeake Bay Segment Explorer

https://bit.ly/3HrawLc

- CB1TF
- CB2OH
- CB3MH
- CB4MH
- CB5MH_MD
- CB5MH_VA
- CB6PH
- CB7PH
- CB8PH
- CHKOH
- CHOMH1
- CHOMH2





Lower Central Chesapeake Bay - MD

River Basin

MD MAIN

Salinity Regime

MH

Surface Area (square meters - from Modeling Team)

920.5M m2

Mean Depth (m) (from Topobathymetric data)

11.1 m

High-resolution 2016 USGS CoNED Topobathymetric Model

Maximum Depth (m) (from Topobathymetric data)

50.3 m

Maximum Depth (m) (from Weinberg - mean low water)

50.2 m

Historical soundings

Total Volume (cubic meters) (from Weinberg UTM 18N)

10,045.5M m3

Shoreline Meters

High-res shoreline (Albers Equal Area Projection)

205.9 Km

Features

- 2D map shows boundaries of the segment, any tidal water quality monitoring stations found in the segment, and TMDL segmentsheds
- 3D scene depicts the extent of the segment in refined SCHISM grids, color-coded by bathymetric depth with 100x vertical exaggeration
- Both synced and interactive
- Potential integration of the segment explorer with water quality standards attainment information currently presented in the Watershed Data Dashboard. https://gis.chesapeakebay.net/wip/dashboard