

SRA Meeting August 16, 2011

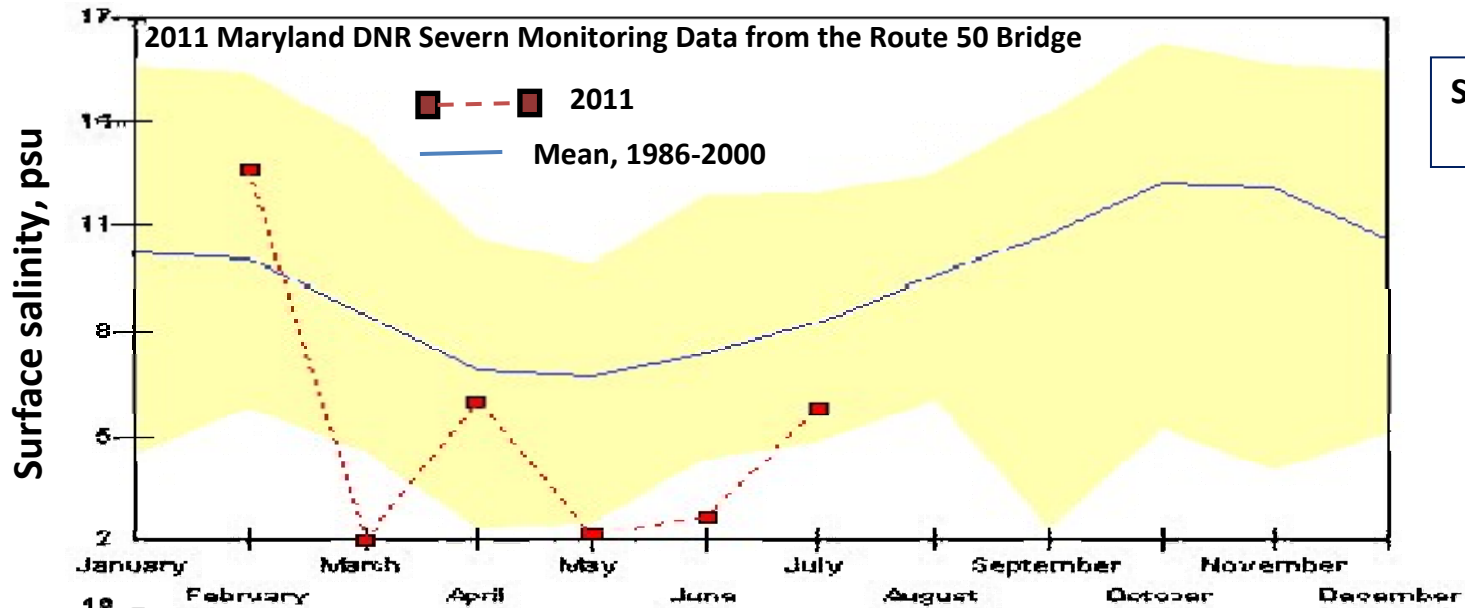
SRK Monitoring Update

Pierre Henkart

Agenda

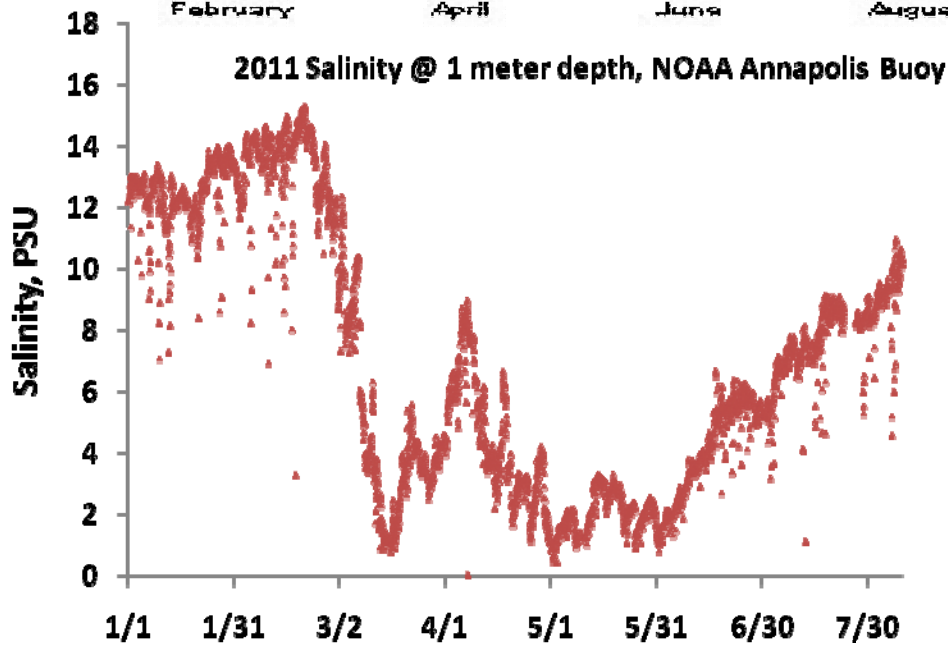
- Salinity in 2011
- Anoxia
- The Bay
- Severn River
- Badlands in the Severn
- Conclusions and concerns

2011 saw record low spring salinity in the Severn

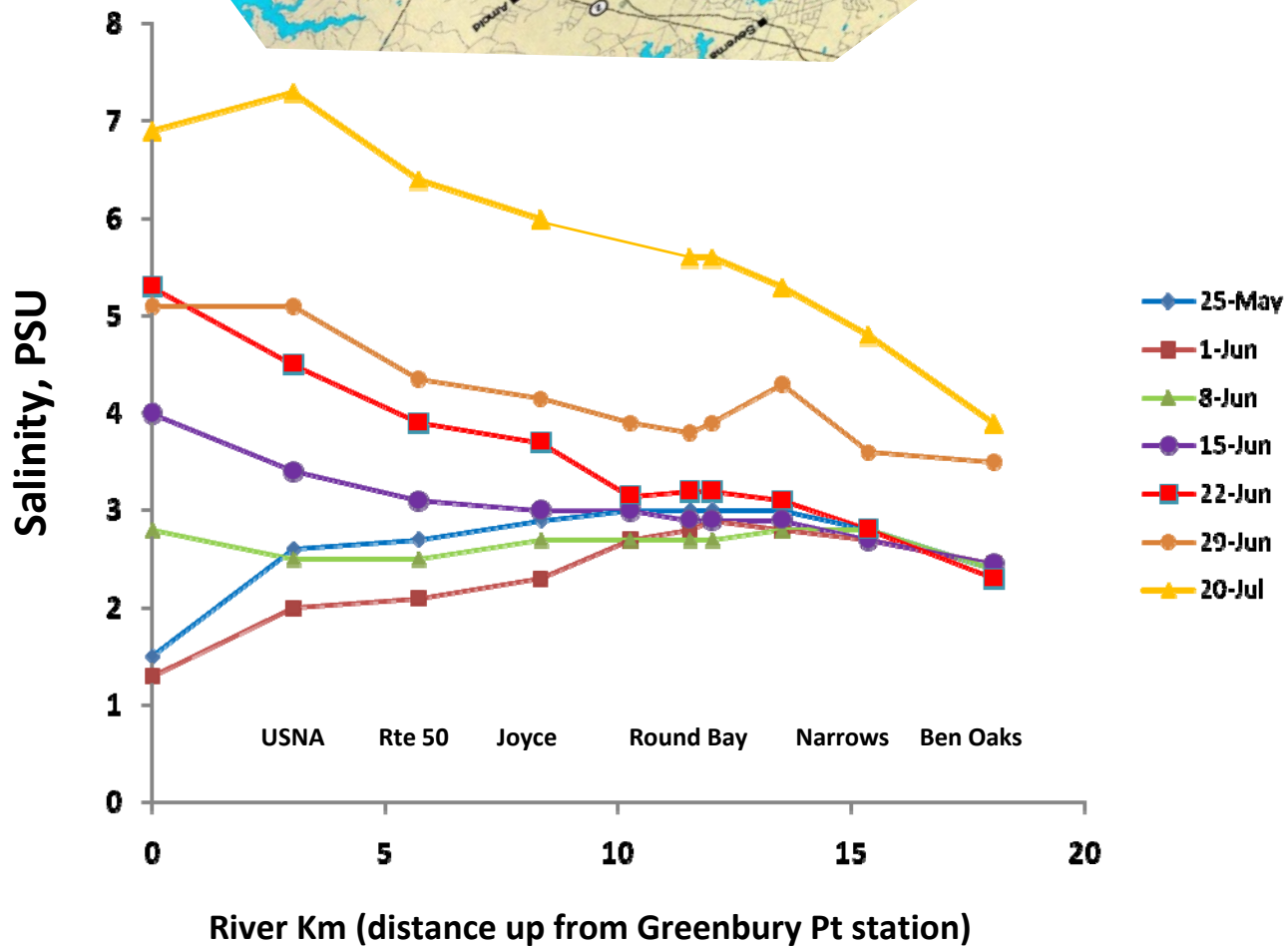


Sea water is ~35 psu

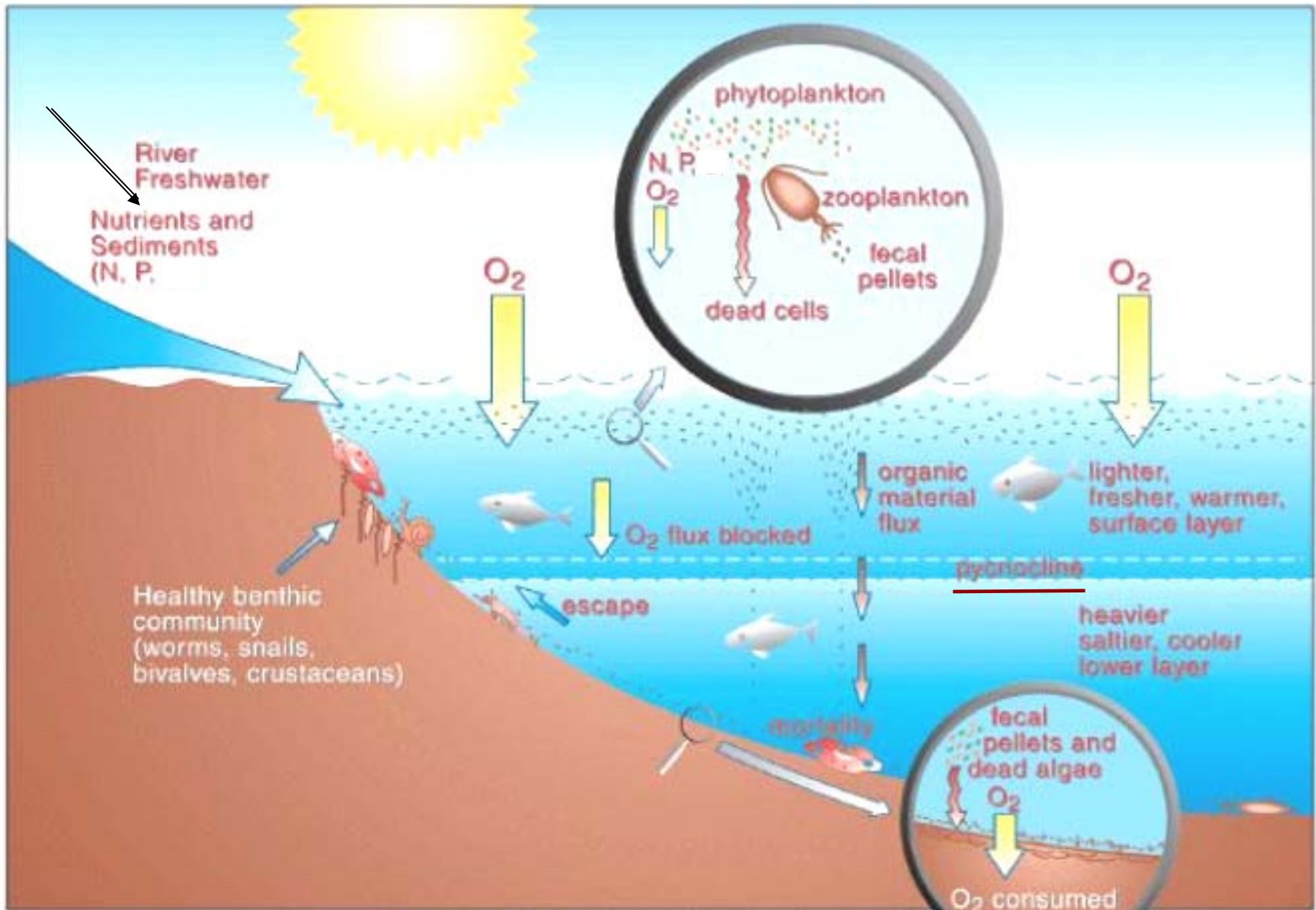
From DNR's "Eyes on the Bay" website



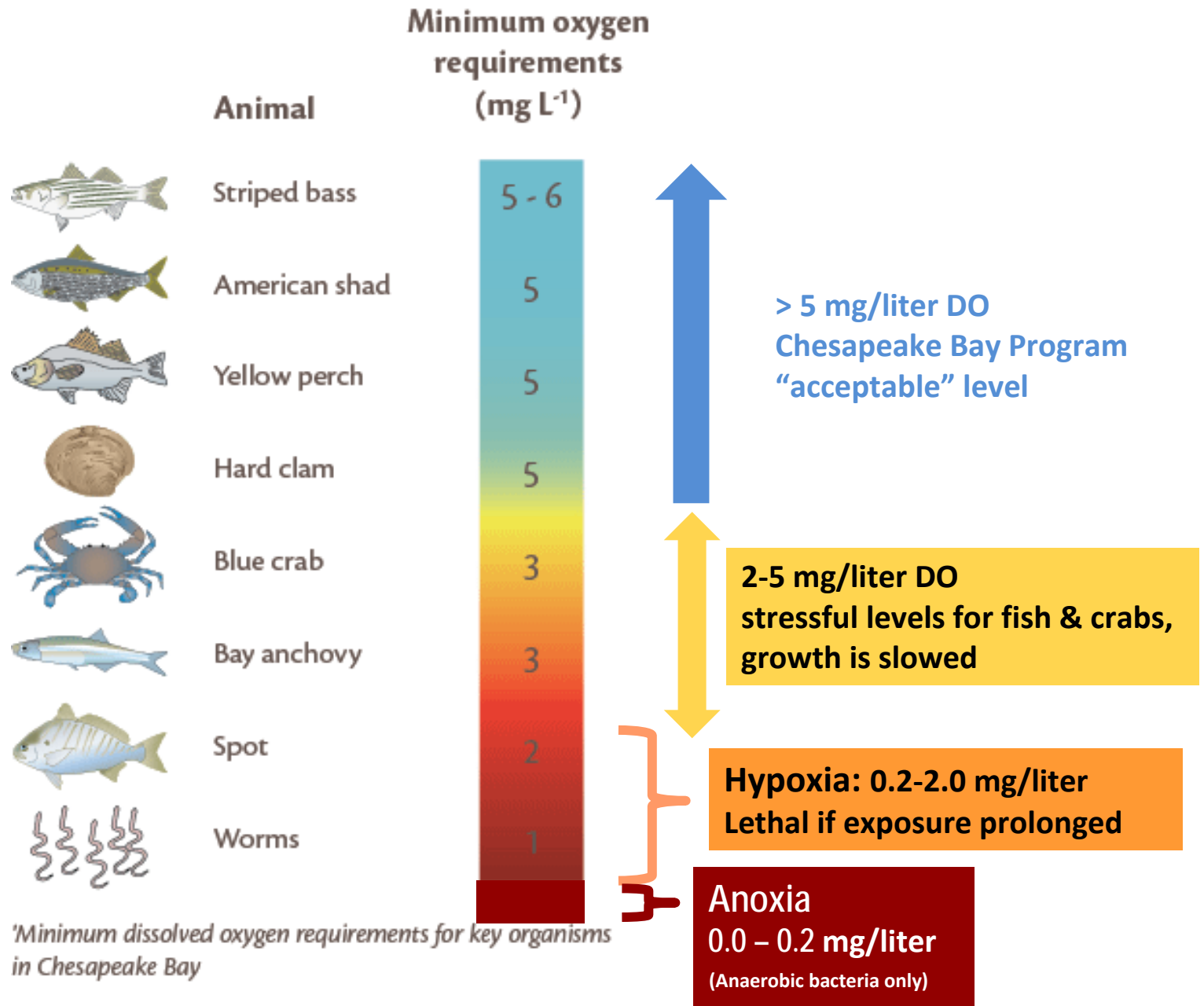
2011 Severn Surface Salinity (depth = 1 meter)



Low Oxygen in estuaries results from nutrient loading driving phytoplankton growth



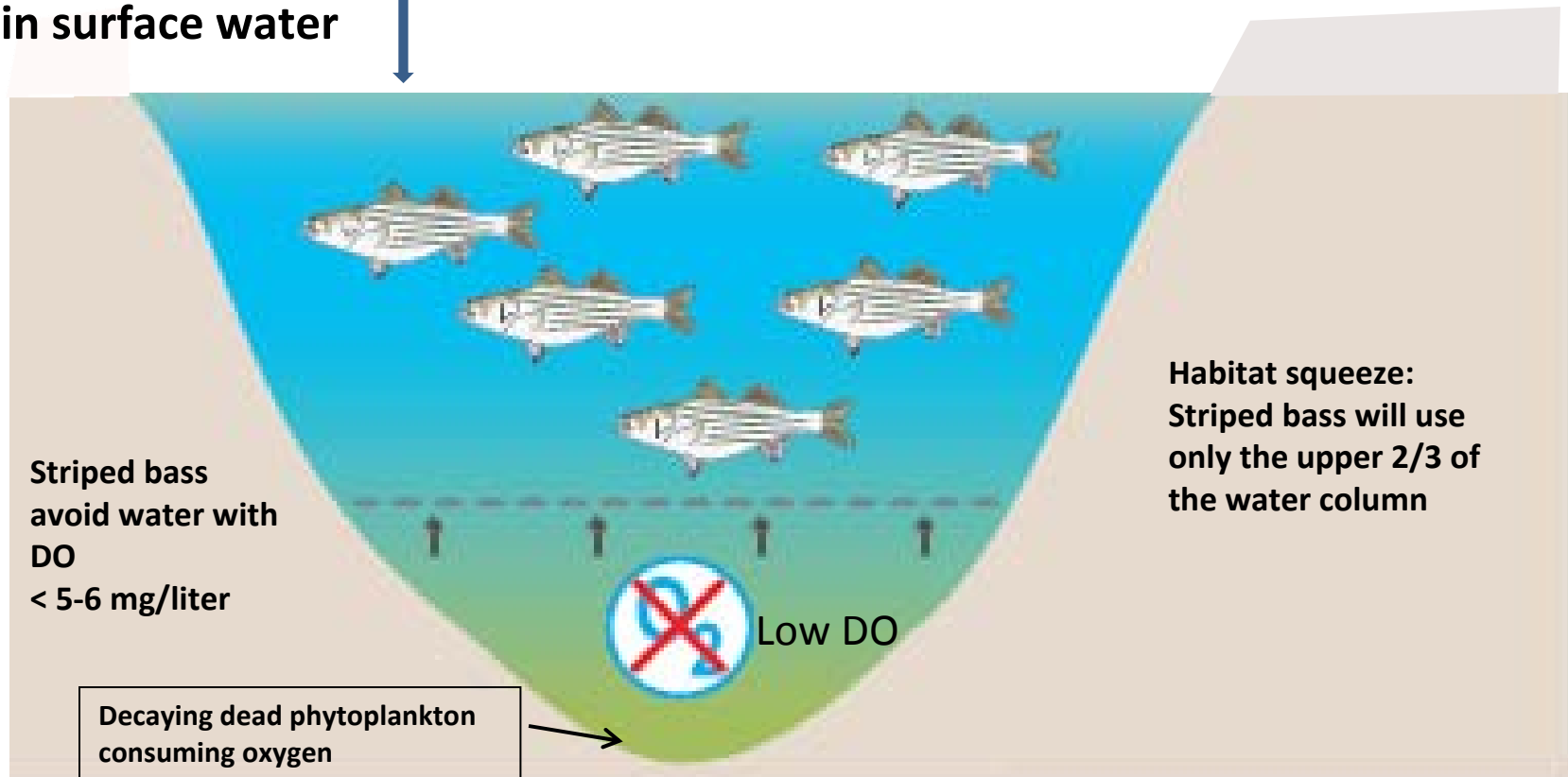
Multicellular organisms require oxygen



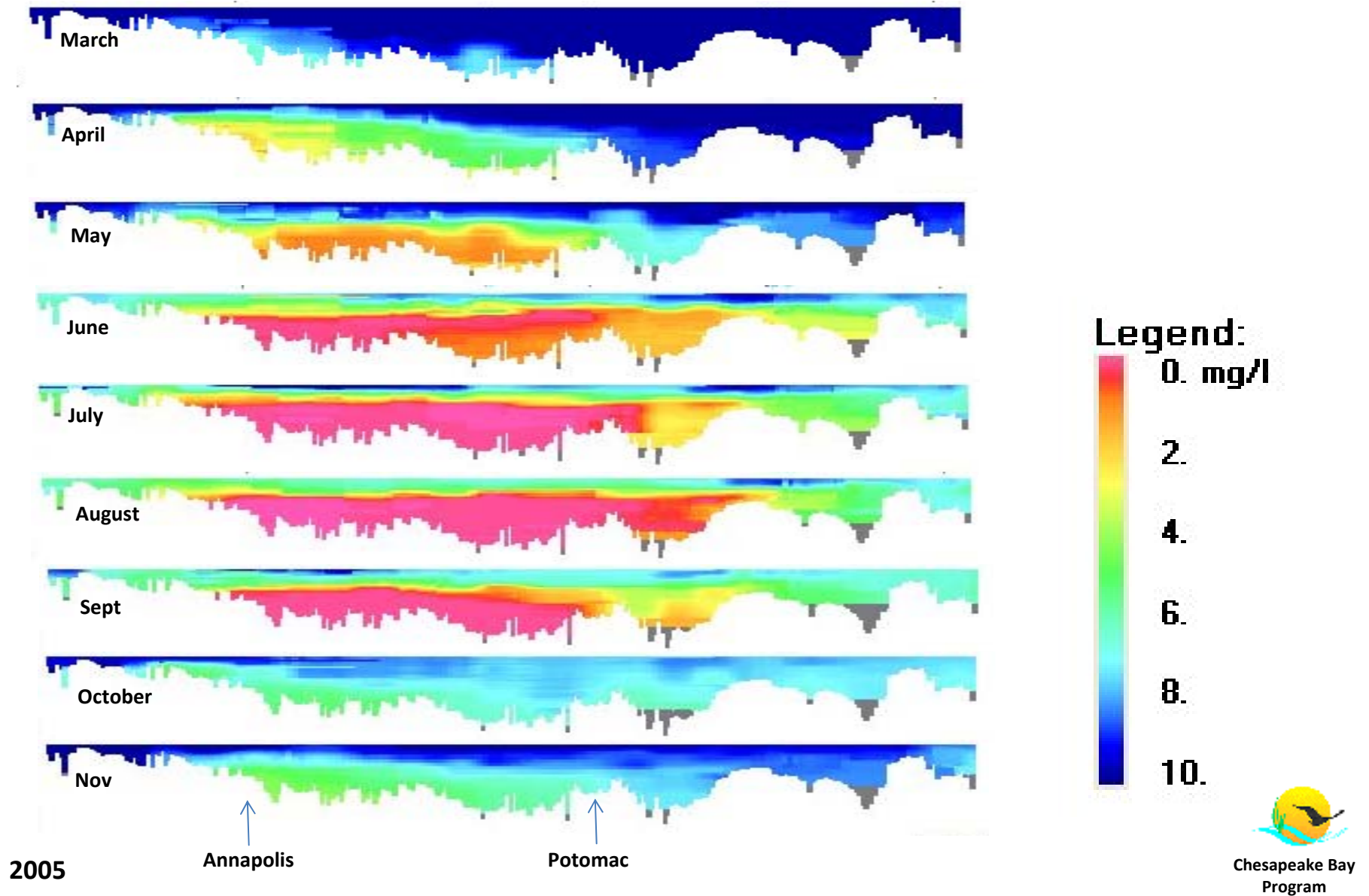
Low bottom dissolved oxygen creates a “habitat squeeze” for fish and crabs

Air: 20% oxygen
Can get over 100%
in surface water

Different estuarine organisms
have different requirements for
dissolved oxygen, varying from
1-6 mg/liter



Hypoxia/Anoxia Develops in the deep Chesapeake in Summer

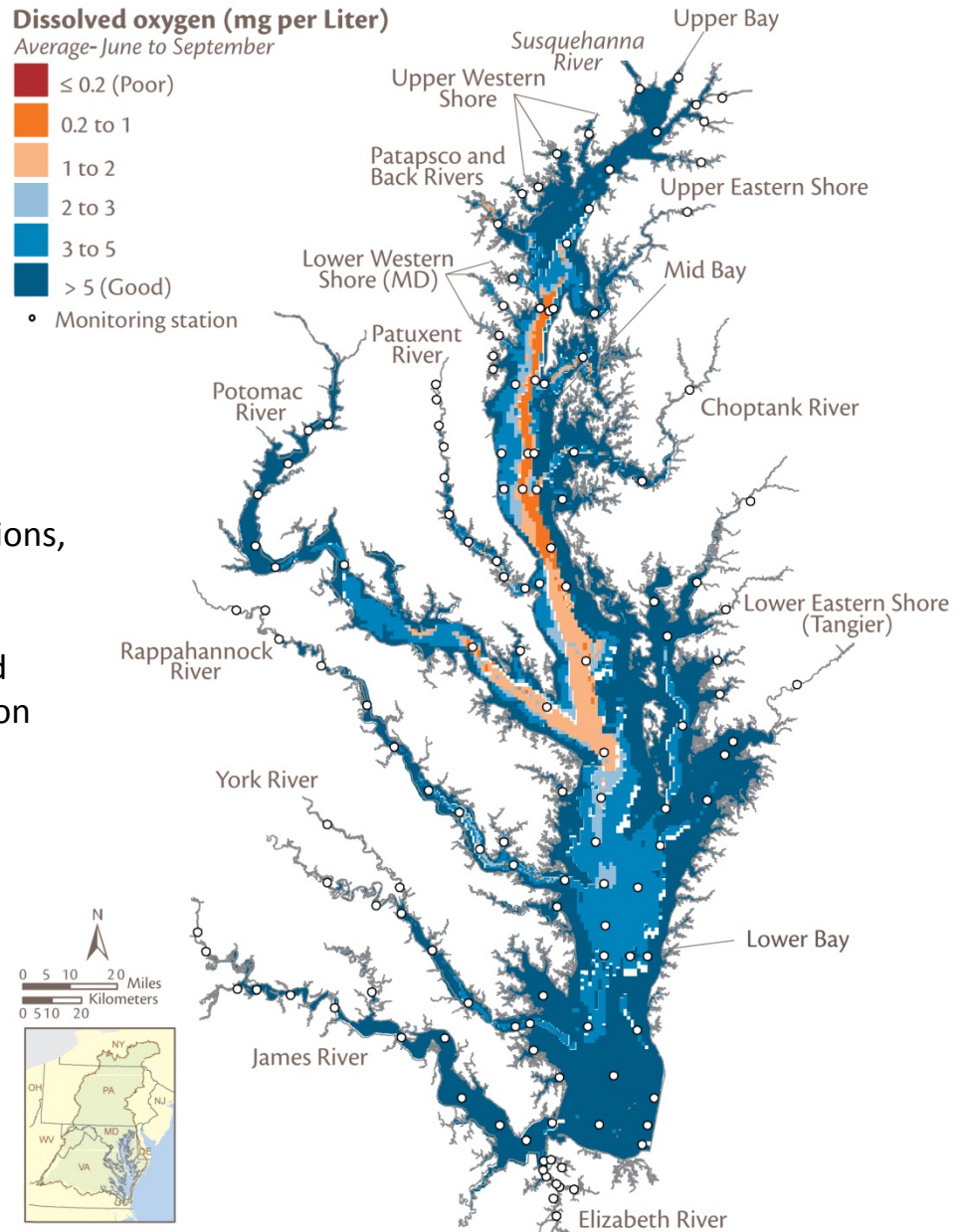


2010 Chesapeake Bay Program bottom dissolved oxygen map

Understanding this map

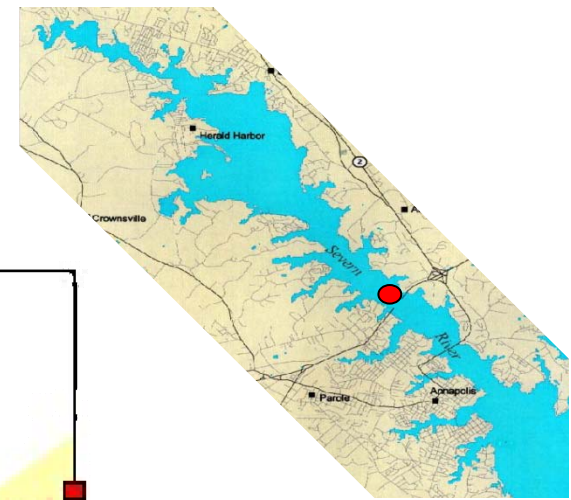
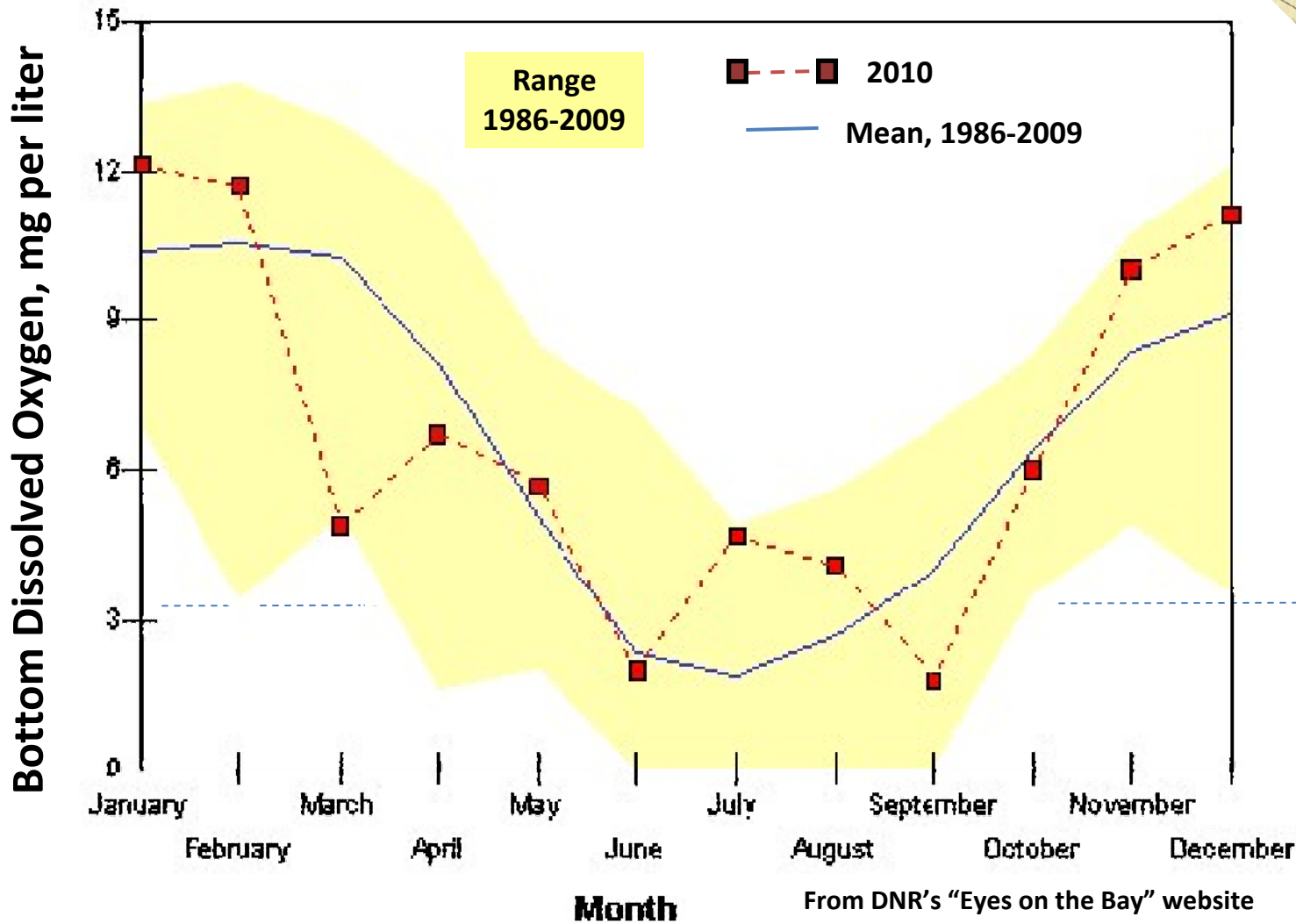
Dissolved oxygen was measured at approximately 144 stations, up to 6 times between June and September, using a water quality probe positioned just above the bottom. Average dissolved oxygen levels at each station were calculated and levels between stations estimated using spatial interpolation software.

Chesapeake Bay Health: 2010 Dissolved oxygen



Map source: Ecocheck (www.eco-check.org/reportcard/chesapeake/)
Data source: Virginia Institute of Marine Science (<http://web.vims.edu/bio/sav/>)

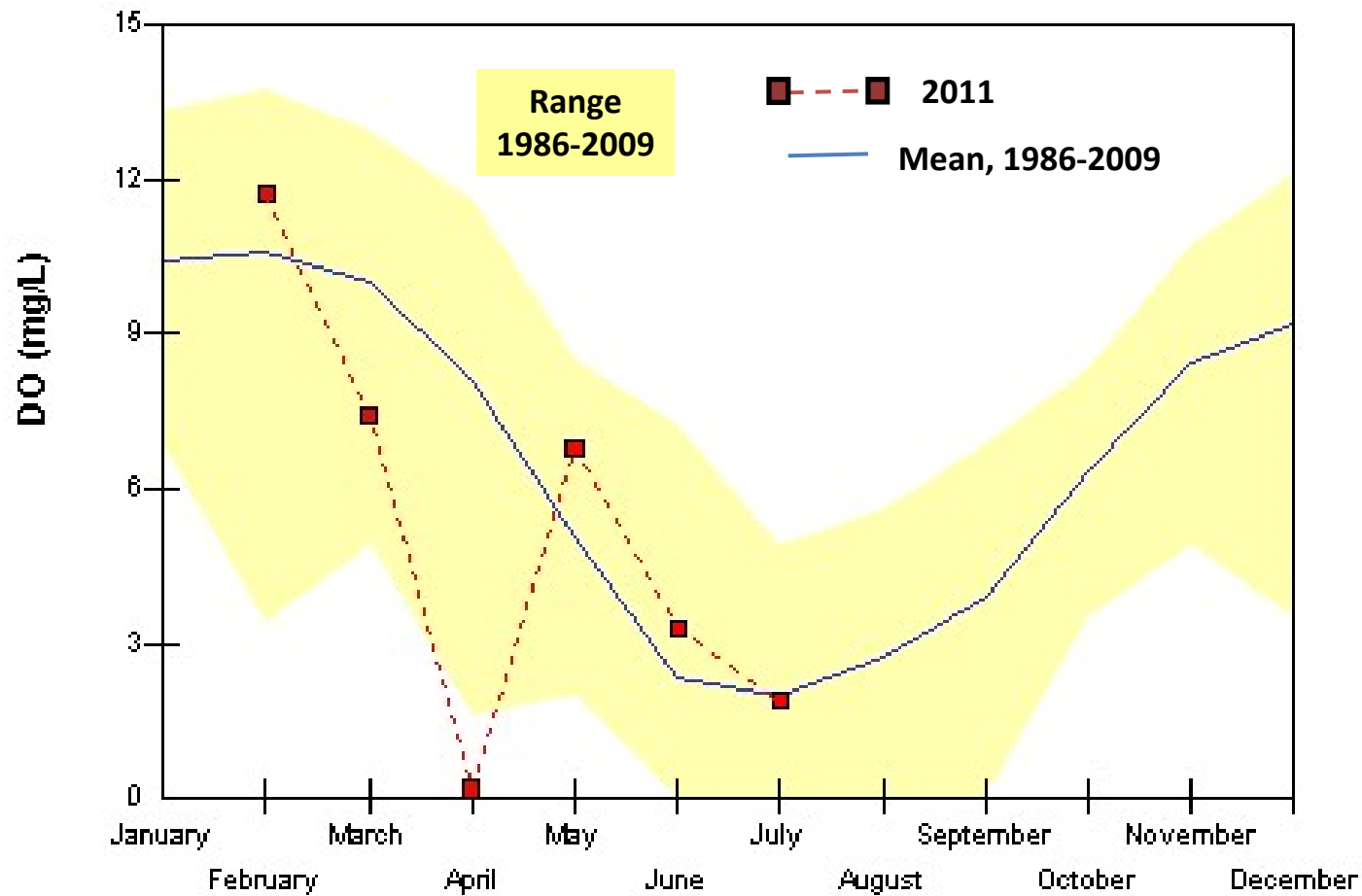
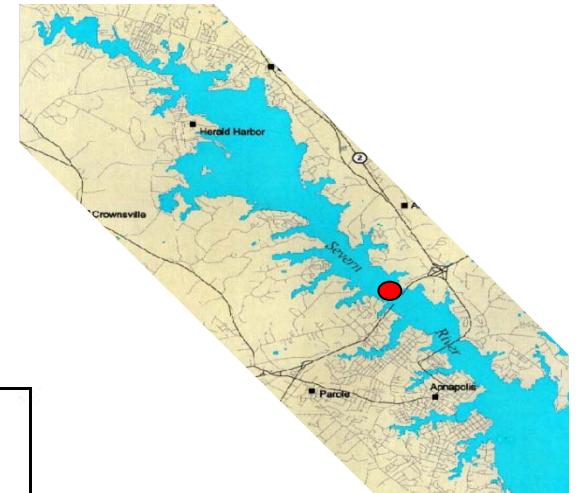
Maryland DNR Severn Monitoring Data from the Route 50 Bridge



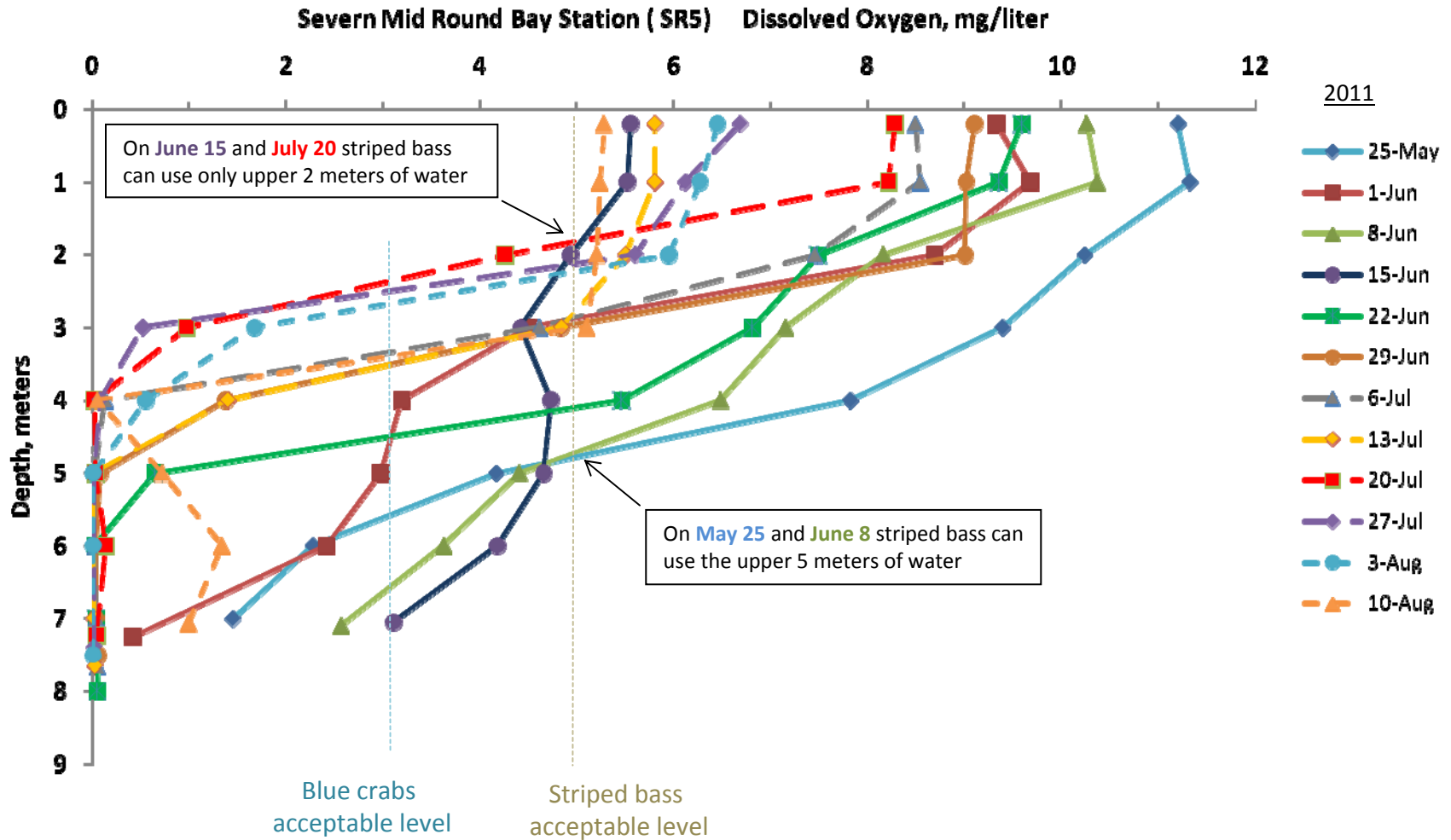
**“Acceptable”
DO = 3 mg/l**

From DNR’s “Eyes on the Bay” website

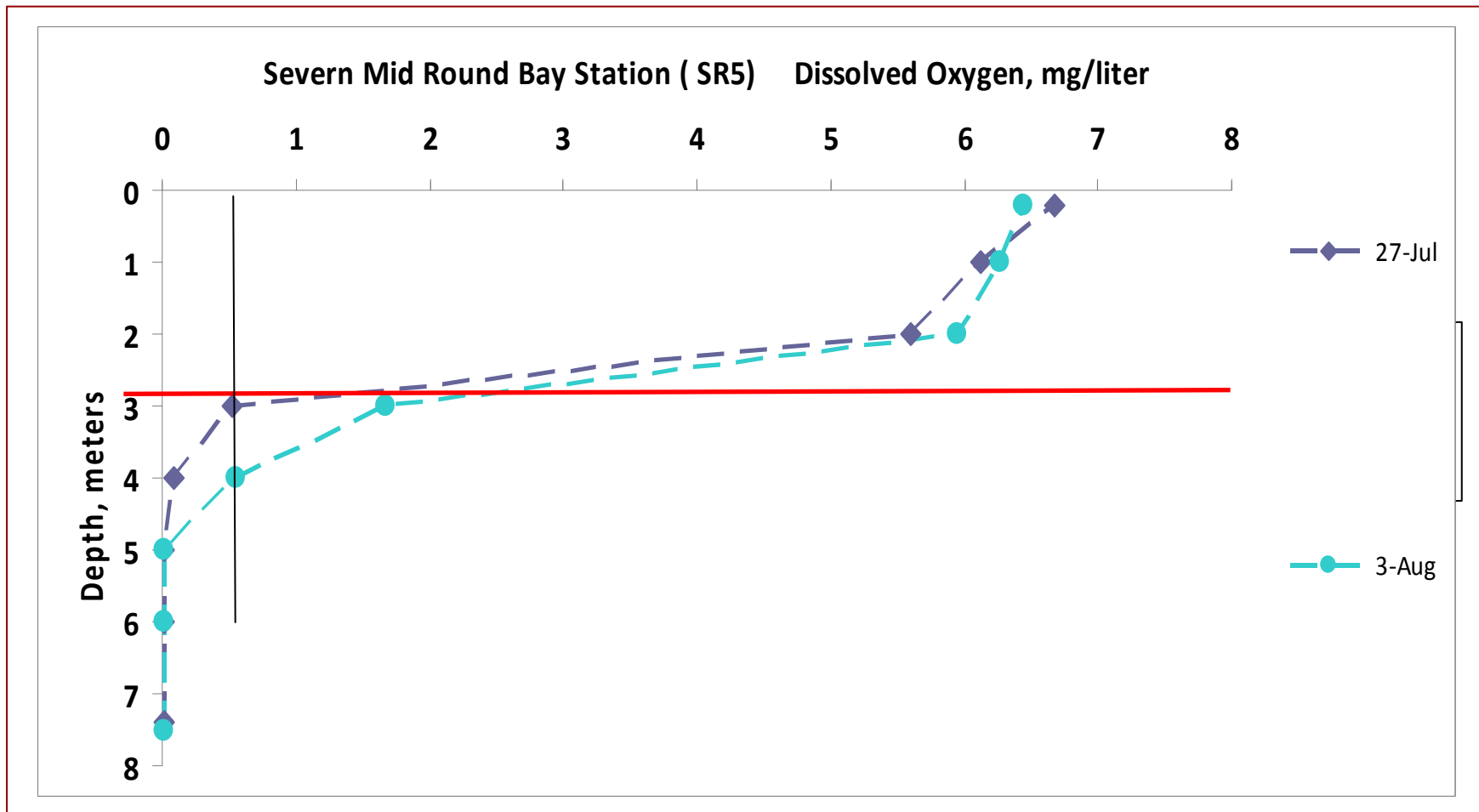
Maryland DNR Severn Monitoring Data from the Route 50 Bridge



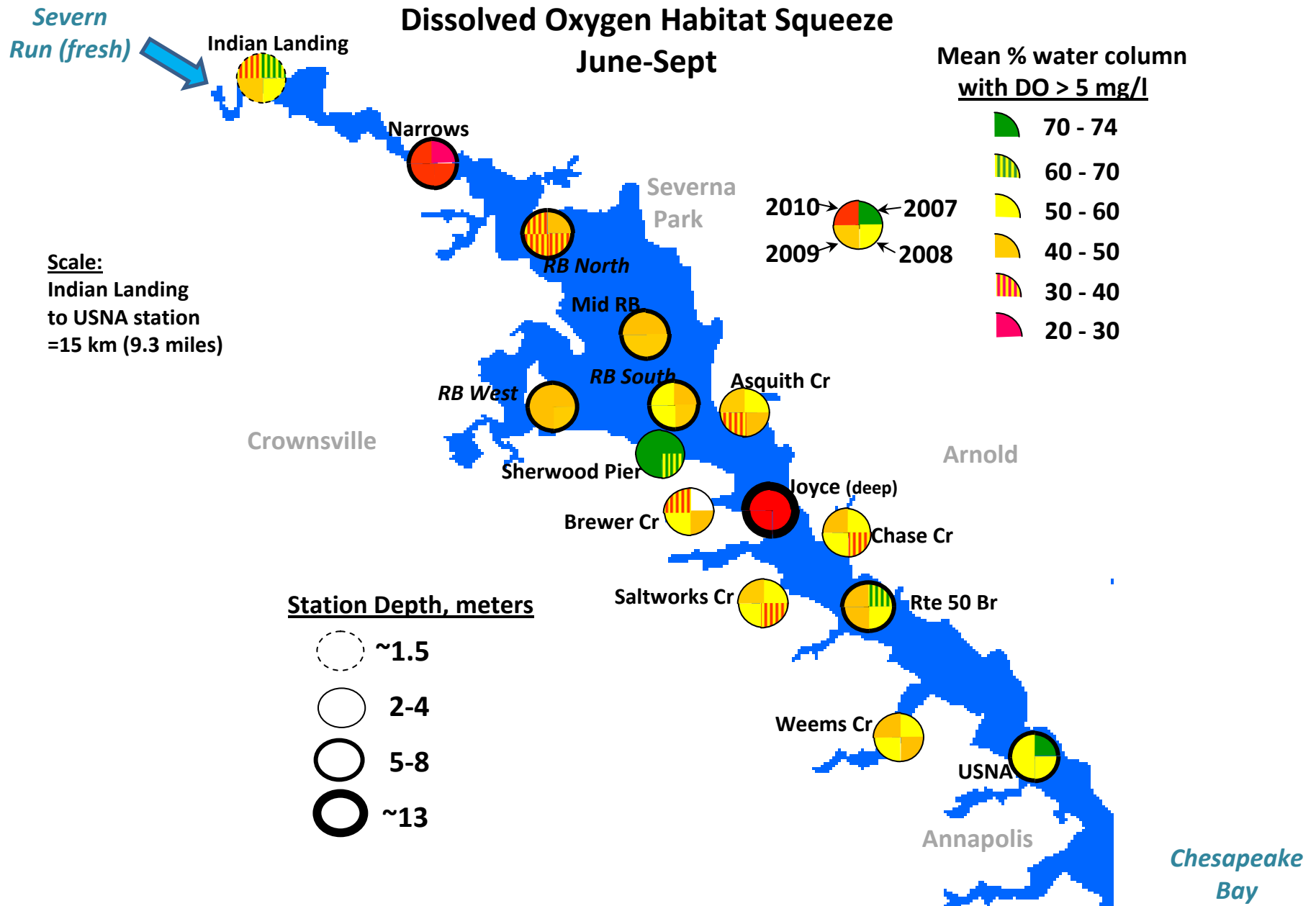
Understanding oxygen problems in water bodies requires depth profiles



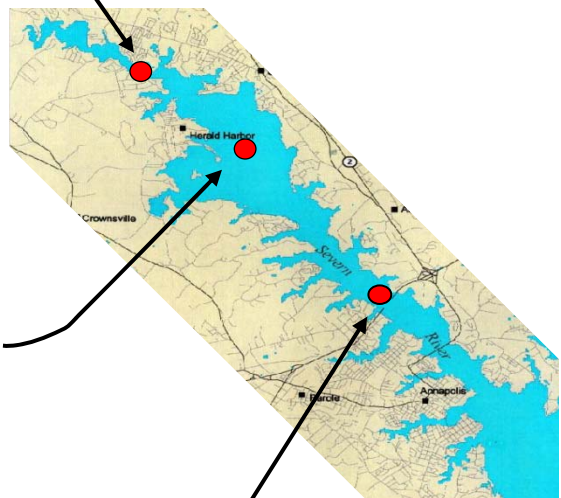
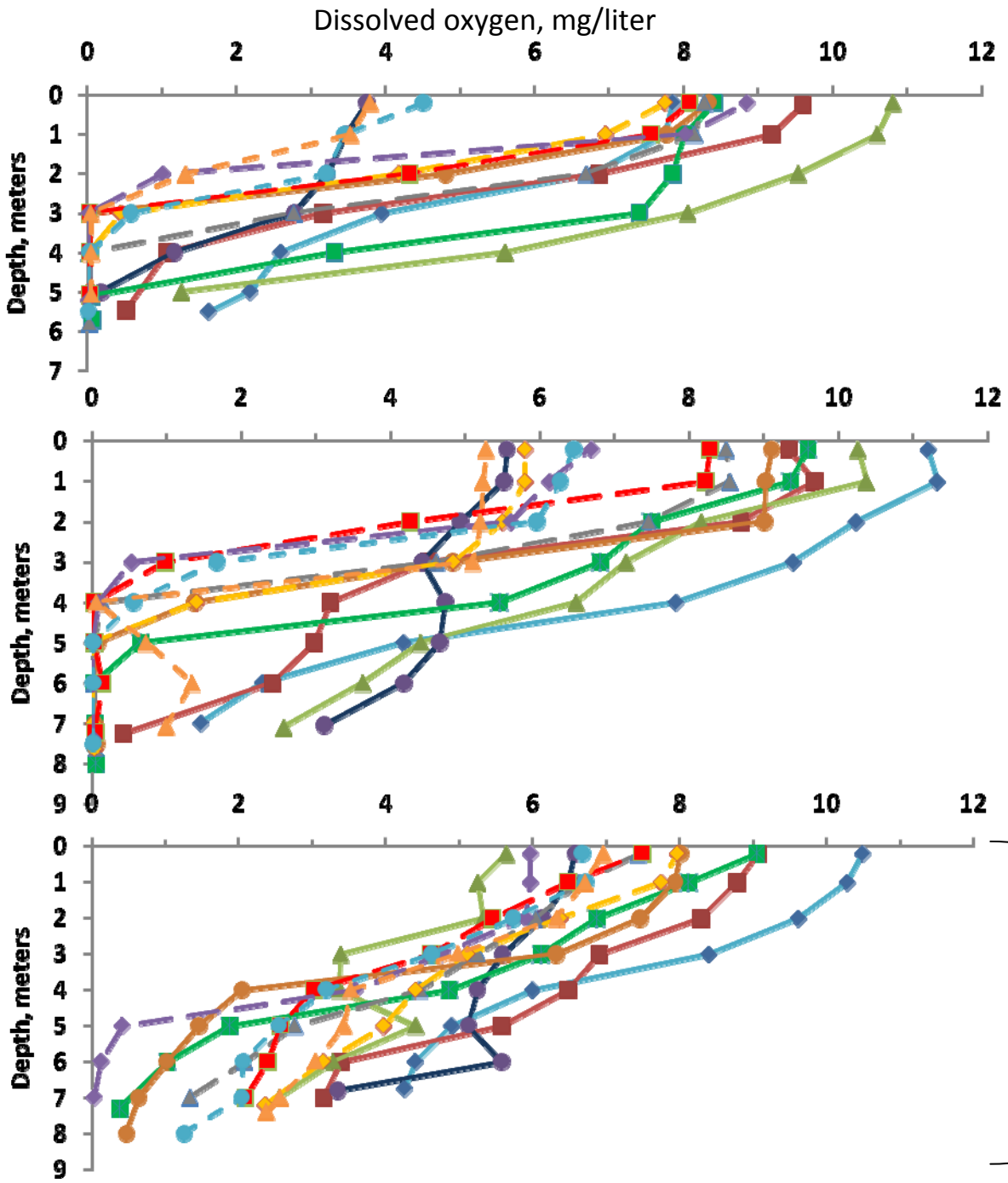
Over half the water column



2007-2010 Severn Monitoring: Water Column Dissolved Oxygen

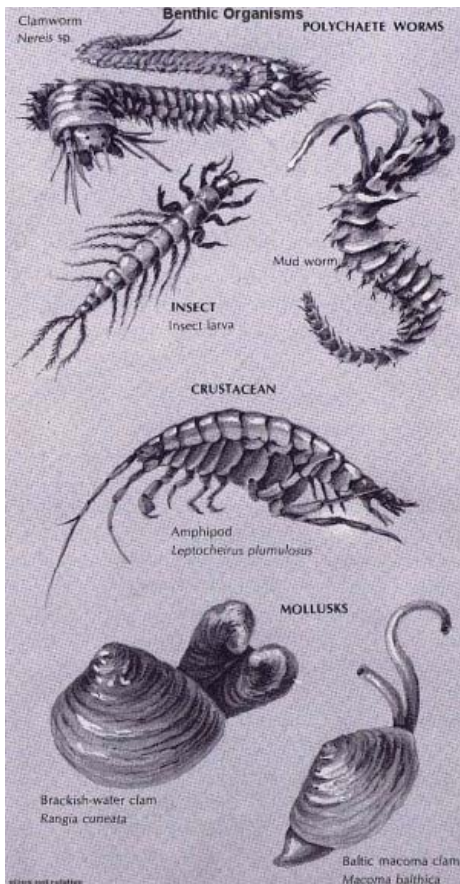


Severn DO profiles look different in and above Round Bay

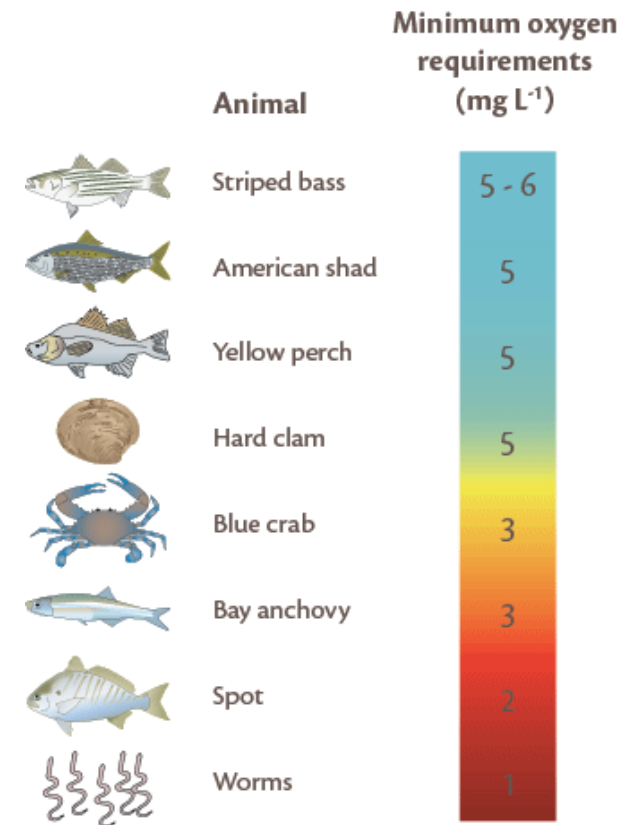


- 2011
- ◆— 25-May
 - 1-Jun
 - ▲— 8-Jun
 - 15-Jun
 - 22-Jun
 - 29-Jun
 - ▲— 6-Jul
 - ◆— 13-Jul
 - 20-Jul
 - 27-Jul
 - 3-Aug
 - ▲— 10-Aug

Benthic organisms are an important component of estuarine food chains

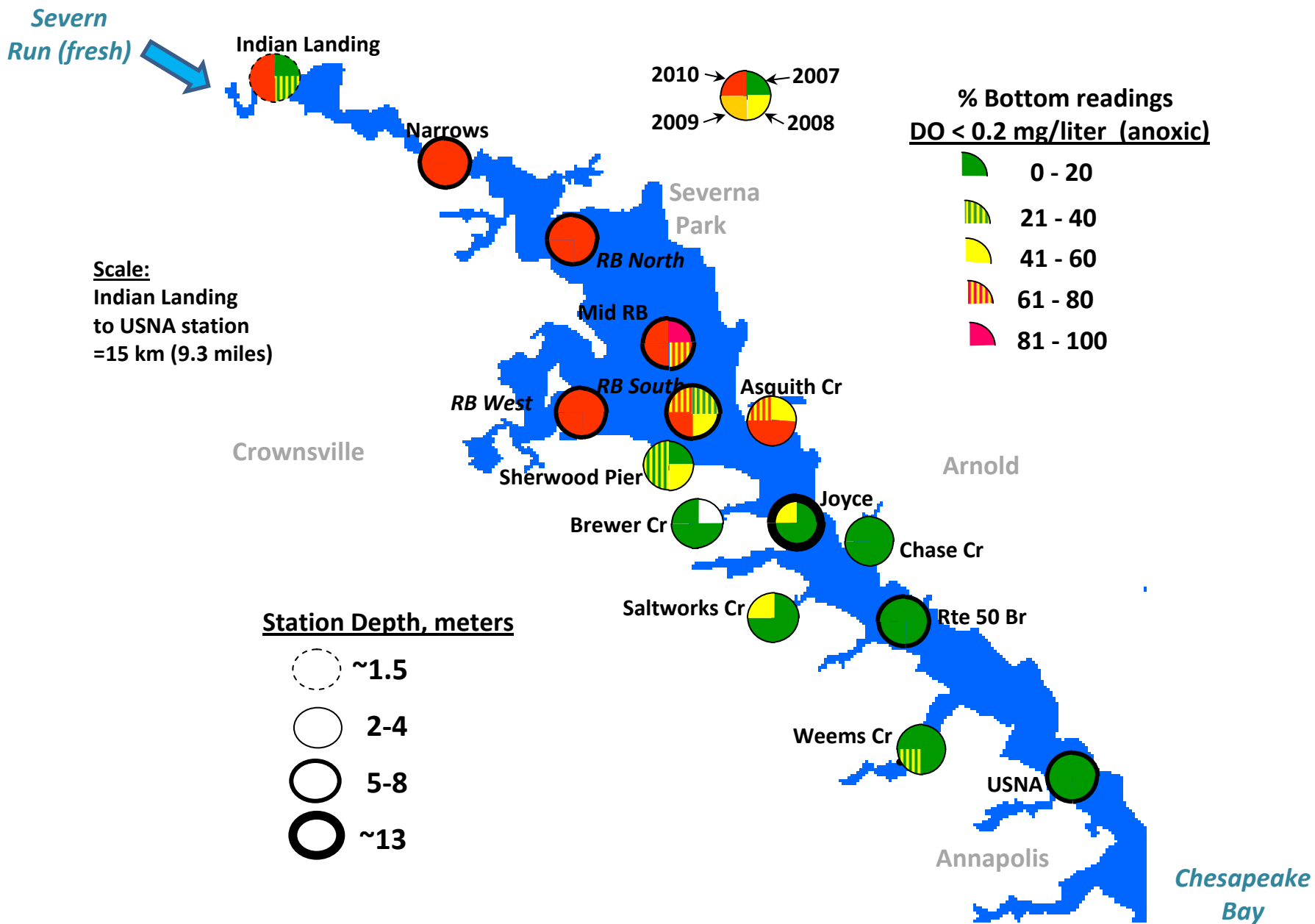


Most benthic organisms are adapted to life at low DO levels, but become stressed at DO levels less than 1 mg/liter, and die at anoxic levels (<0.2 mg/liter oxygen)



Minimum dissolved oxygen requirements for key organisms in Chesapeake Bay

2007-2010 Severn Monitoring: July-August Bottom Anoxia



2010 CBP bottom dissolved oxygen map: Severn region magnified

Understanding this map

Dissolved oxygen was measured at approximately 144 stations, up to 6 times between June and September, using a water quality probe positioned just above the bottom. Average dissolved oxygen levels at each station were calculated and levels between stations estimated using spatial interpolation software.

Dissolved oxygen (mg per Liter)

Average- June to September



○ Monitoring station

Severn Riverkeeper Monitoring Program Issues

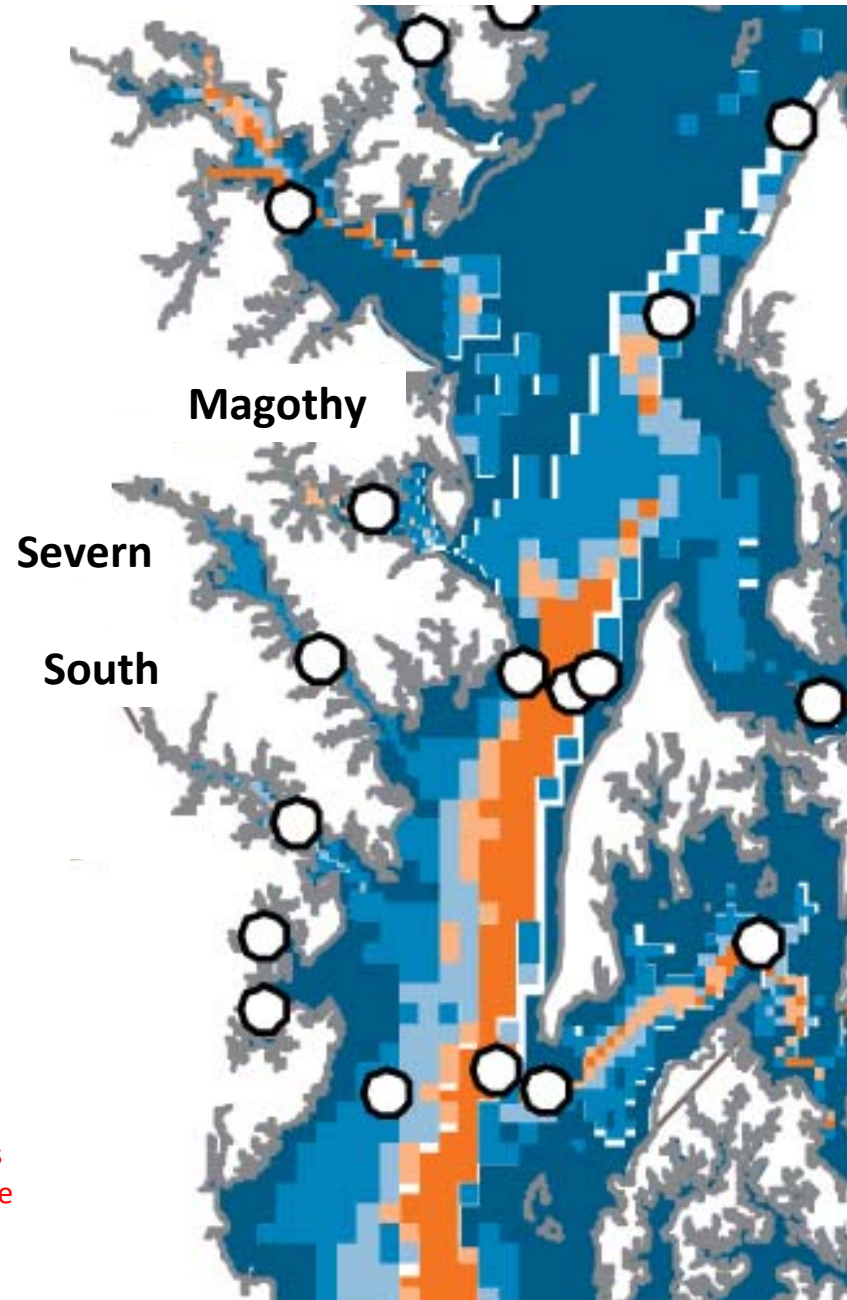
1. Bottom DO in the Severn above the monitoring station is shown as 3-5 mg/liter, while SRK monitoring showed a mean of 0.37, i.e., 10x lower.

2. Bottom DO in the South is shown as 2-3 mg/liter, i.e., worse than the Severn, while Riverkeeper data shows South has better bottom DO than the Severn.

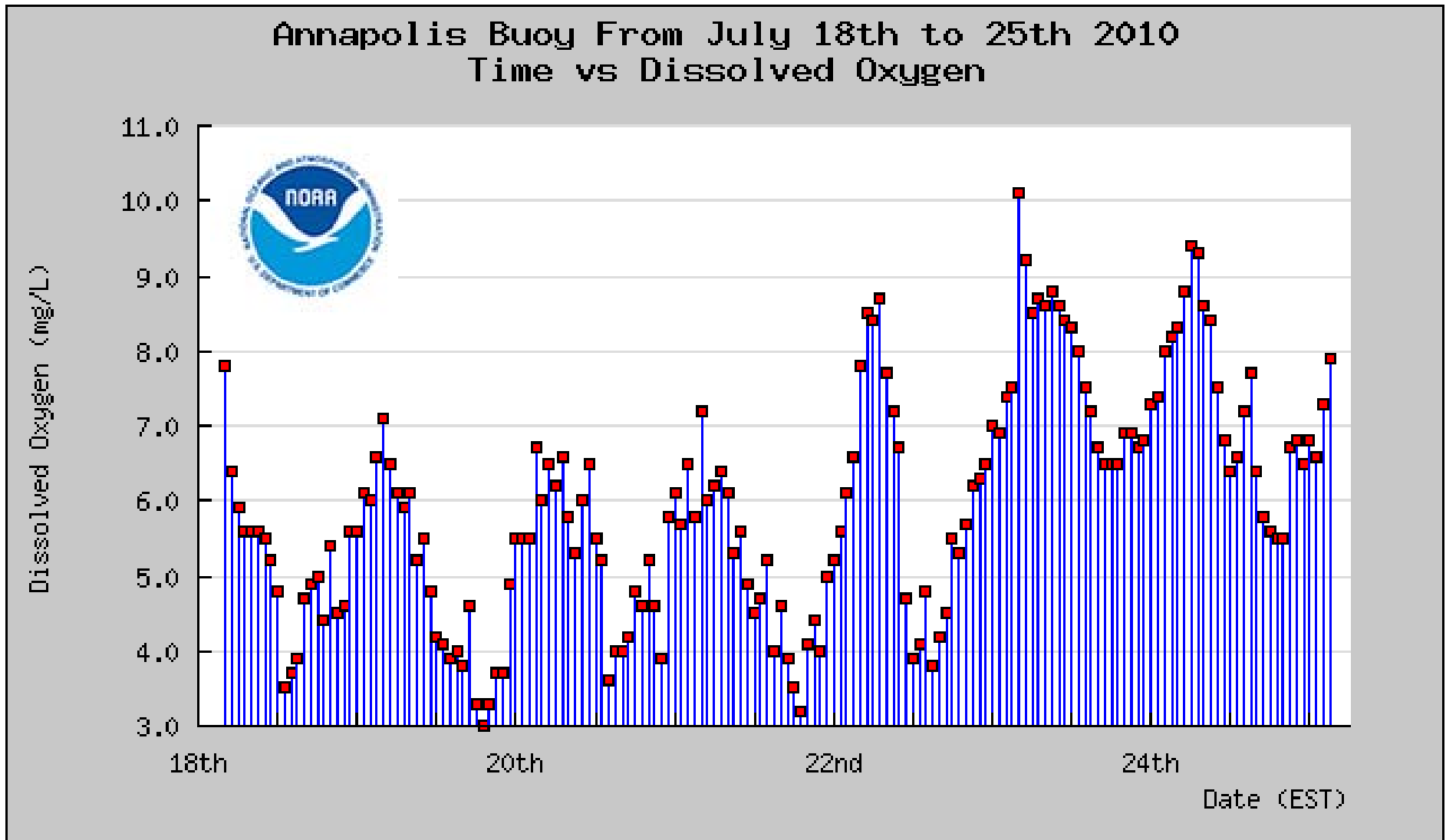
3. “Interpolations” are estimates between data points, whereas “extrapolations” are estimates beyond the data points.

Speculation:

The “interpolation” program assumes water is layered and extrapolates beyond the CBP stations based on bottom depth, thus accounting for the 10-fold Severn bottom DO error shown in this map.



Near surface DO measurements show diurnal cycling due to photosynthesis by phytoplankton





DDT wiped out osprey populations, but banning it led to recovery



Thank you, SRK

- Nate Frankoff and Aaron Canale
- CBF
- Schools U of MD, Naval Academy
- Government
- Incoming – bay, stormwater, Severn Run, septic
- Sanctuaries
- Habitat (islands)