# “Where are the fish?”

## FISH MOVEMENTS IN A CHANGING CHESAPEAKE BAY

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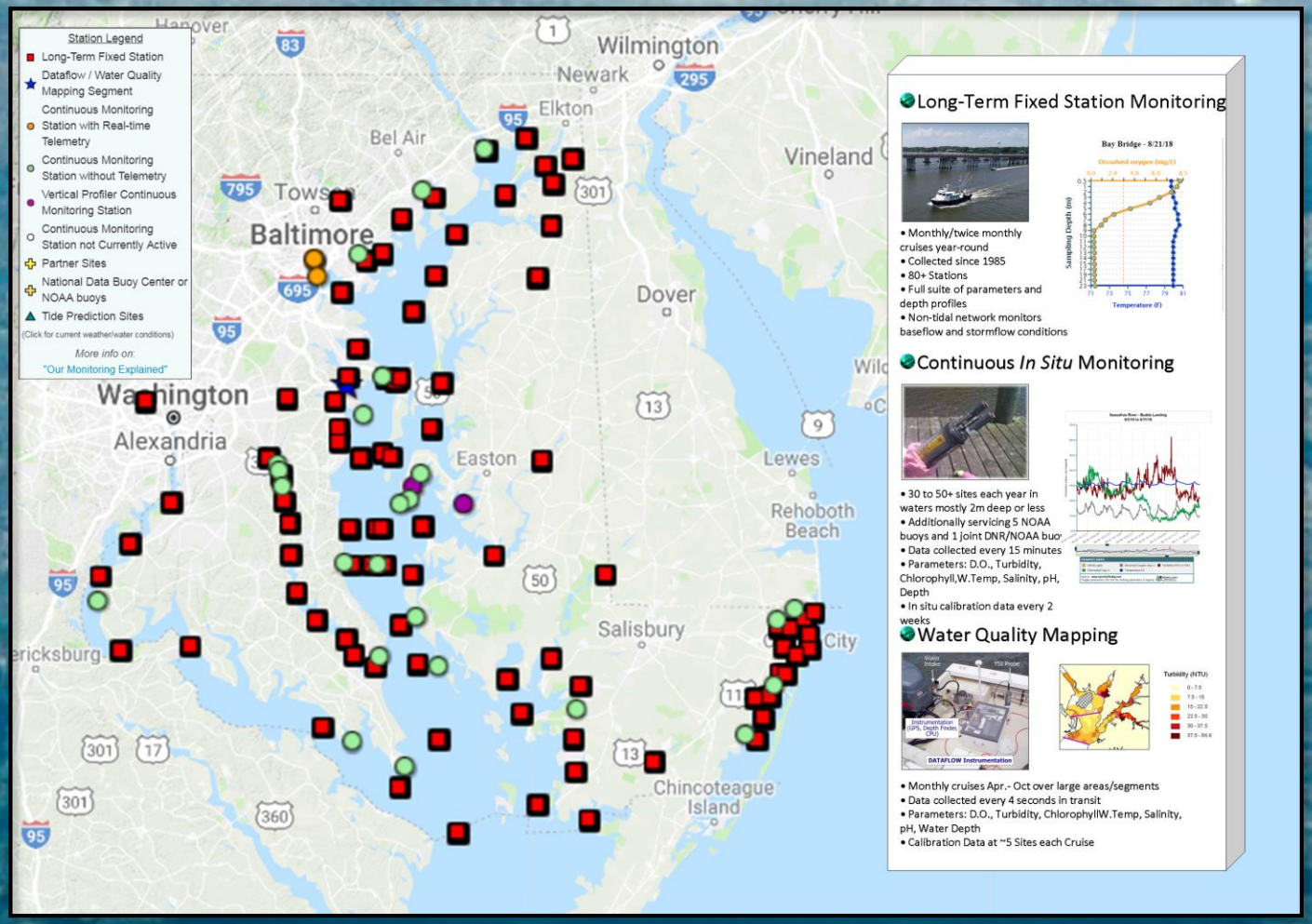
MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

# Maryland's Tidal Water Quality Monitoring

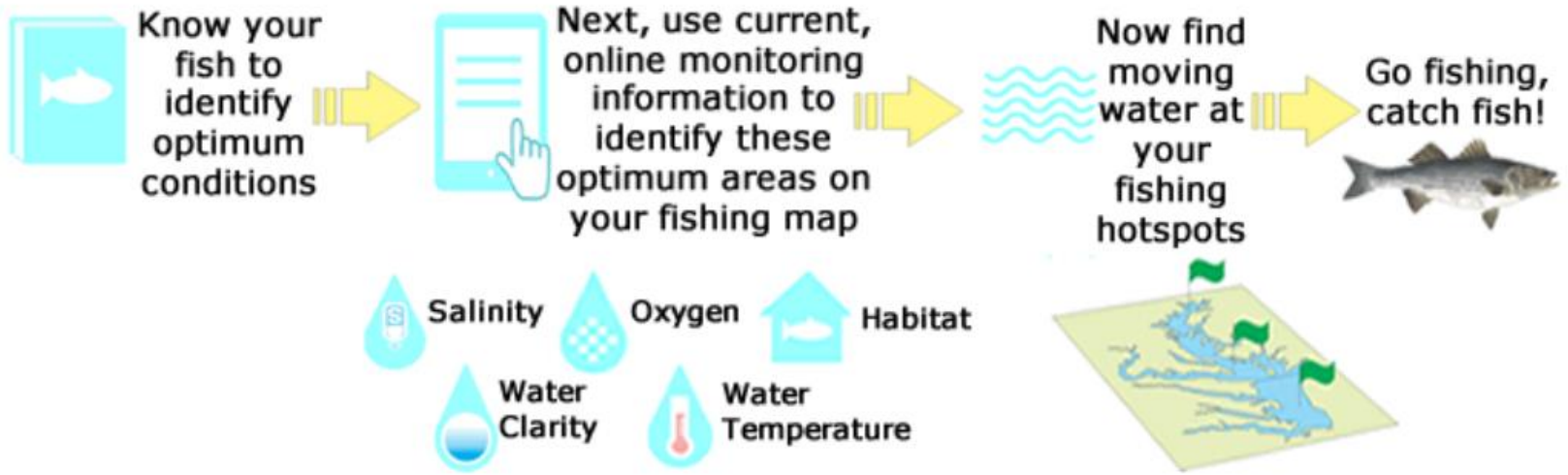



- Tracking progress of Bay restoration activities
- Assessing Bay conditions for fish, crabs and oysters
- Better understanding of changing Bay conditions

# Click Before You Cast

## USING ONLINE FISHING RESOURCES TO CATCH MORE FISH

**Follow these steps to find where fish are likely to be present on your next fishing trip:**




**"The more people we can get out there to fish, the better this world will be, if they're not there, they won't care."**

**- Lefty Kreh**

# Understand Your Fish

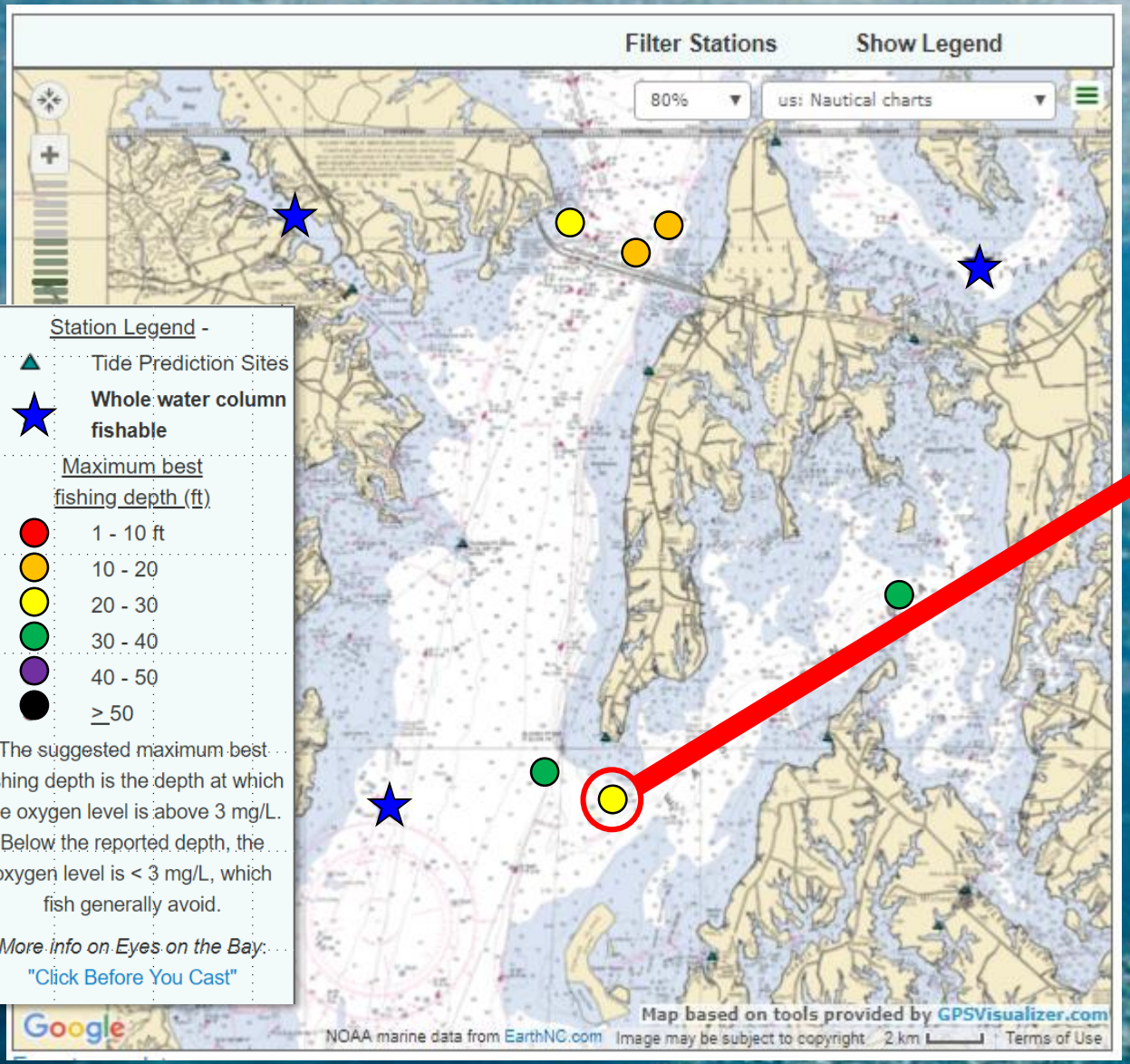
## Striped Bass Preferred Conditons

- **Oxygen** - Avoid area with oxygen levels <3mg/l
- **Temperature**
  - Avoid areas>84F
  - Reduced activity levels <50F
  - Preferred water temperatures 68F -72F
  - Optimal spawning temperatures 60F-64F
- **Salinity**
  - Spawning areas 0 to 2ppt
  - Adult areas 0 to 35 ppt

## Striped Bass Calendar Movements

| Month | Typical Water Temperatures | Typical Oxygen Conditions | Striped Bass Activity |
|---|---|---|---|
| January | **Mainbay**<br>• Surface – Mid 30's to mid 40's<br>• Bottom – Mid 30's to mid 40's<br>**Rivers**<br>• Low 30's to upper 40's | Oxygen adequate at all depths for low oxygen tolerant Bay fish (>3 mg/l), crabs and oysters (>~2 mg/l). | • Resident and juvenile striped bass are present in deeper waters which are warmer and provide more stable temperatures.<br>• Typically choose deep areas protected from heavy current such as bridge pilings, points, and holes. Also present at warm water discharge locations. |
| February | **Mainbay**<br>• Surface – Low/Mid 30's to low 40's<br>• Bottom – Low/Mid 30's to low 40's<br>**Rivers**<br>• 30's to mid 40's | Oxygen adequate at all depths for low oxygen tolerant Bay fish (>3 mg/l), crabs and oysters (>~2 mg/l). | • Resident and juvenile striped bass are present in deeper waters which are warmer and provide more stable temperatures.<br>• Typically choose deep areas protected from heavy current such as bridge pilings, points, and holes. Also present at warm water discharge locations. |

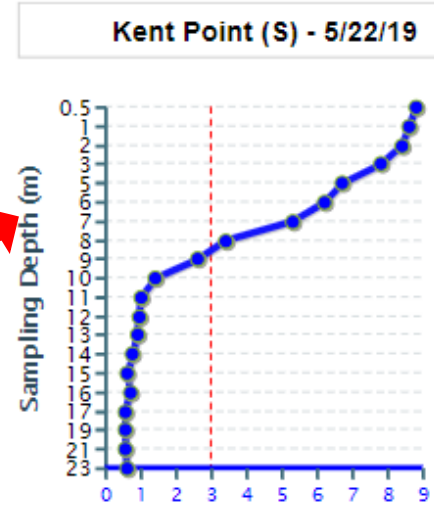
# Don’t Fish Below This Depth

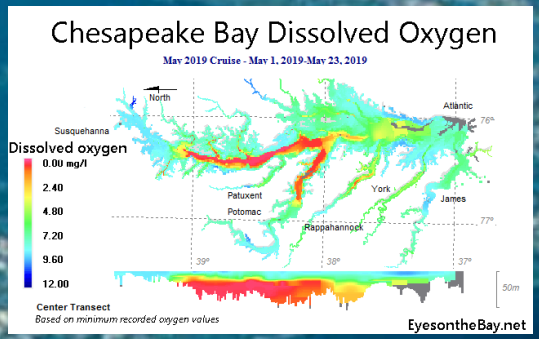



**Kent Point (S) (CB41E)**
**Limit fishing depth to: 26 ft**

**Most Recent Sampling Date:** 5/22/19
**Max Station Depth:** 75 ft

**Maximum Fishing Depth:** 26 ft
Below 26 ft, dissolved oxygen was below 3 mg/L which fish will avoid.
**Site Coordinates:**
Lat: 38.8167 / Long: -76.3717



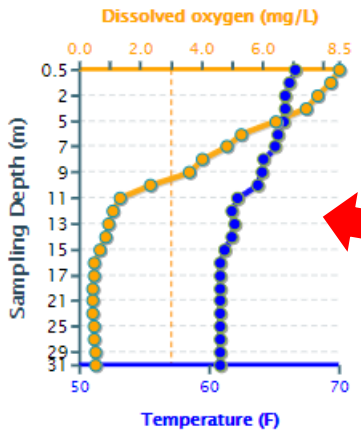
# Water Temperature By Depth

**Kent Point (SW) (CB41C)**
**Max Fishing Depth: 30 ft**
**Surface water warmer than at max fishing depth**
**Station Depth:** 102ft /**Max Fishing Depth:** 30ft

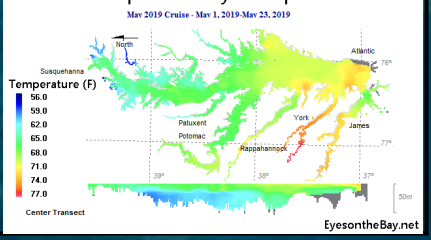
**Surface water temp**: 66.6°F
**Temp. at Max Fishing Depth**: 64.0°F
Surface water is warmer than the water at the max fishing depth. If surface water temperature is above the preferred temperature for your target fish, fish deeper, but above 30 ft. Use the chart below to help inform your best fishing depth.

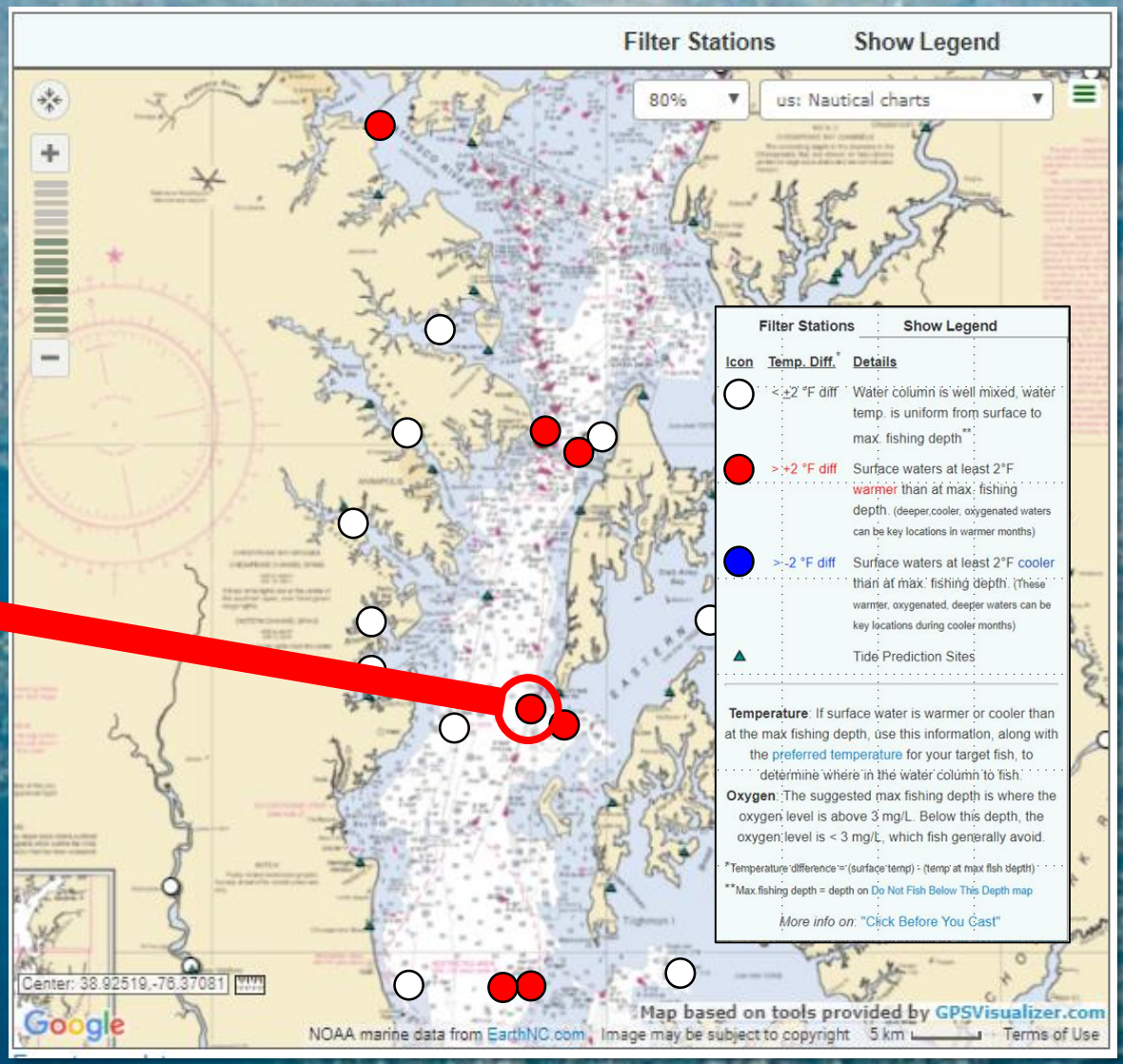
**Oxygen Availability Notes:**
Below 30 ft, dissolved oxygen was below 3 mg/L which fish will avoid.

**Kent Point (SW) - 5/22/19**

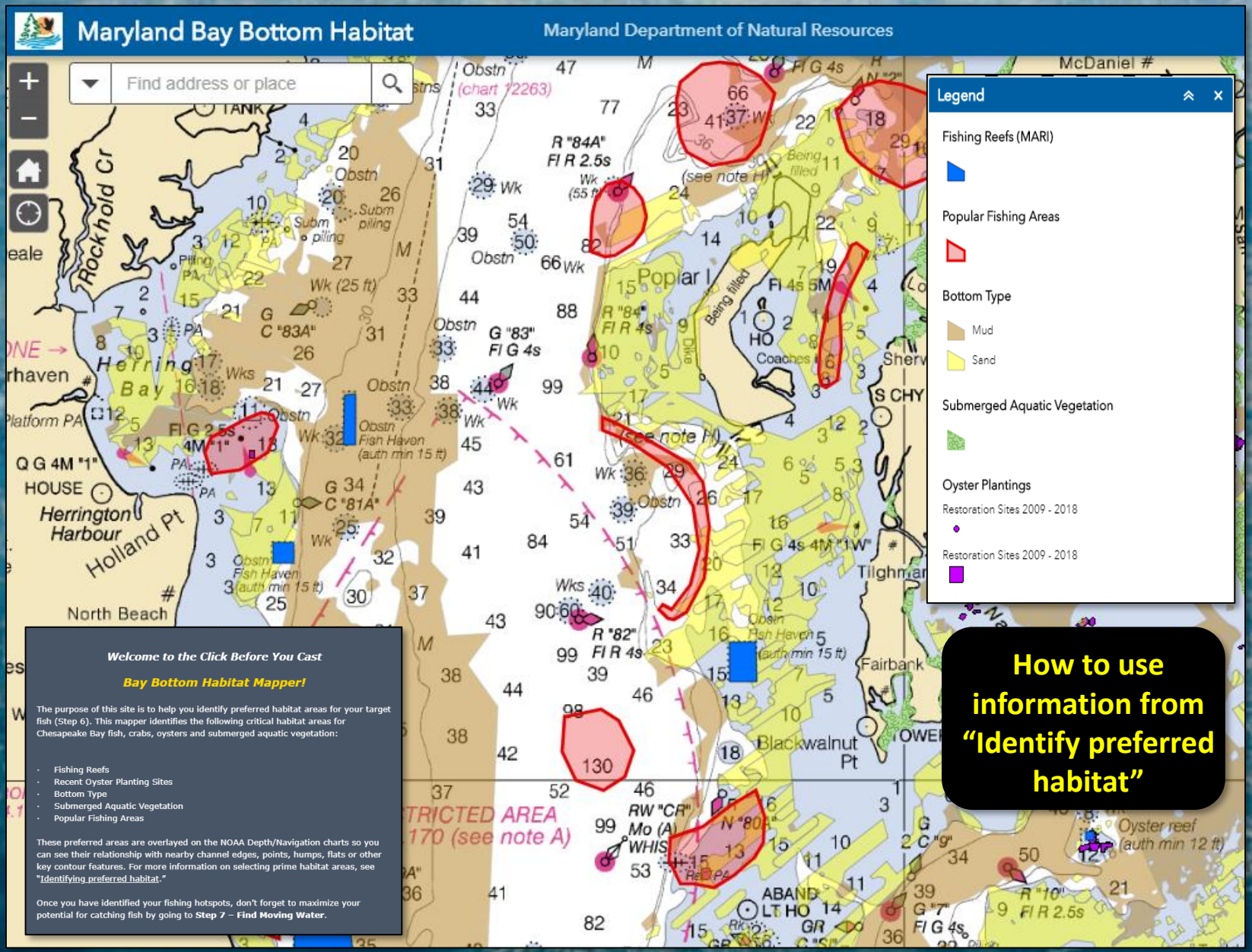



Chesapeake Bay Temperature



# Bay Bottom Habitat Mapper



# Click Before You Cast Summary

- Forecasts updated weekly April through December
- Part of Maryland Fishing Report since 2017
- Weekly review of bay conditions/fish movements with DNR fisheries experts in touch with commercial and recreational fishermen
- **As expected, fish movement is highly related to short and long term changing bay conditions**

# Reviewing Maryland Fishing Reports

- Covering 2002 through 2019, (~April through December)
- Same author
- Includes (striped bass, bluefish, white/yellow perch, spot, croaker, weakfish, speckled trout, black/red drum, Spanish mackerel, cobia, shad, channel/blue/flathead catfish)
- **Great record of fish movement to match with changing Bay conditions**
- **Seeing possible shifts in location of summer striped bass schools and regional changes in weakfish, spot, and croaker**

# “Why are Striped Bass leaving the Lower Potomac early?”

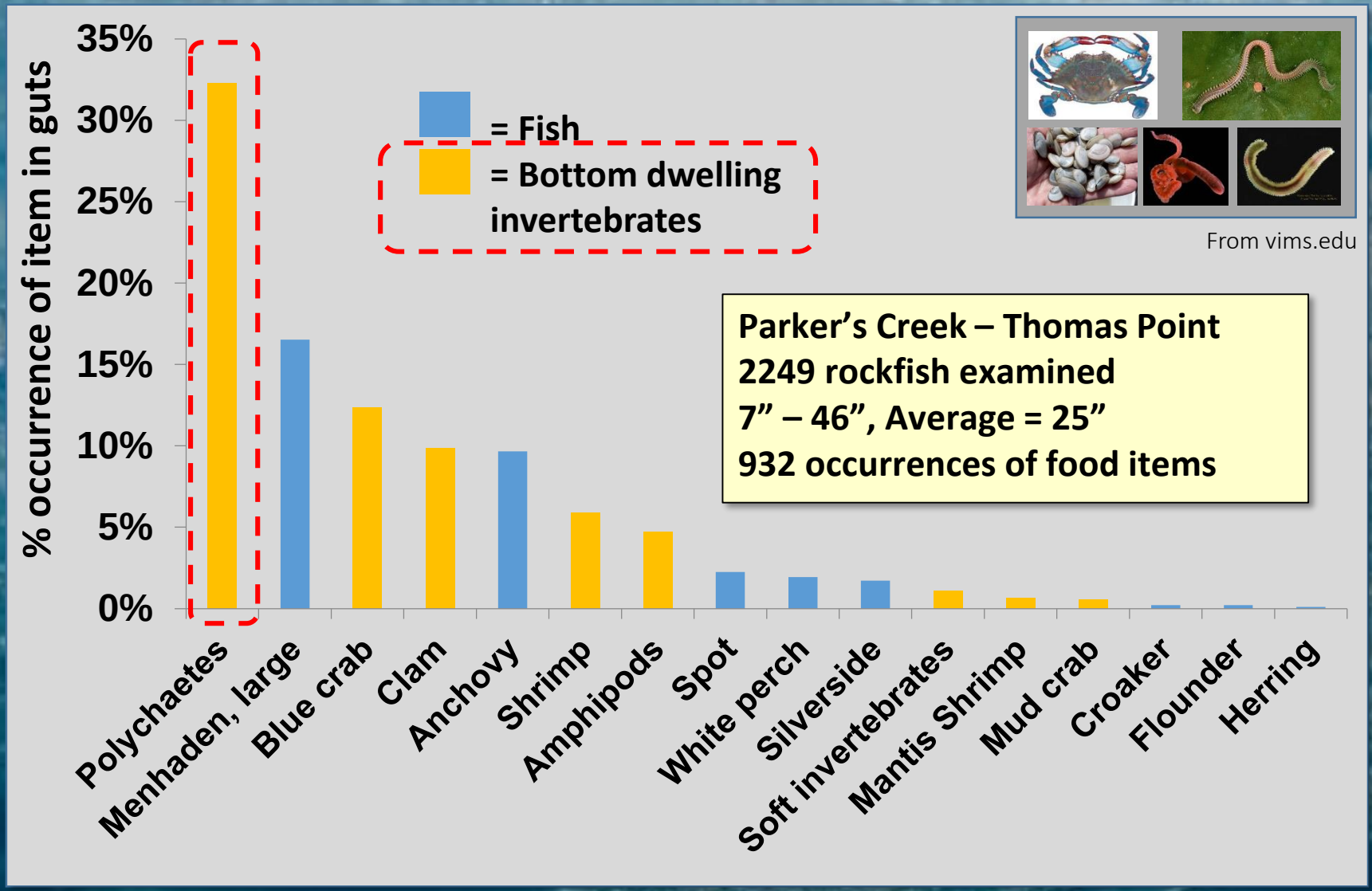
Patuxent

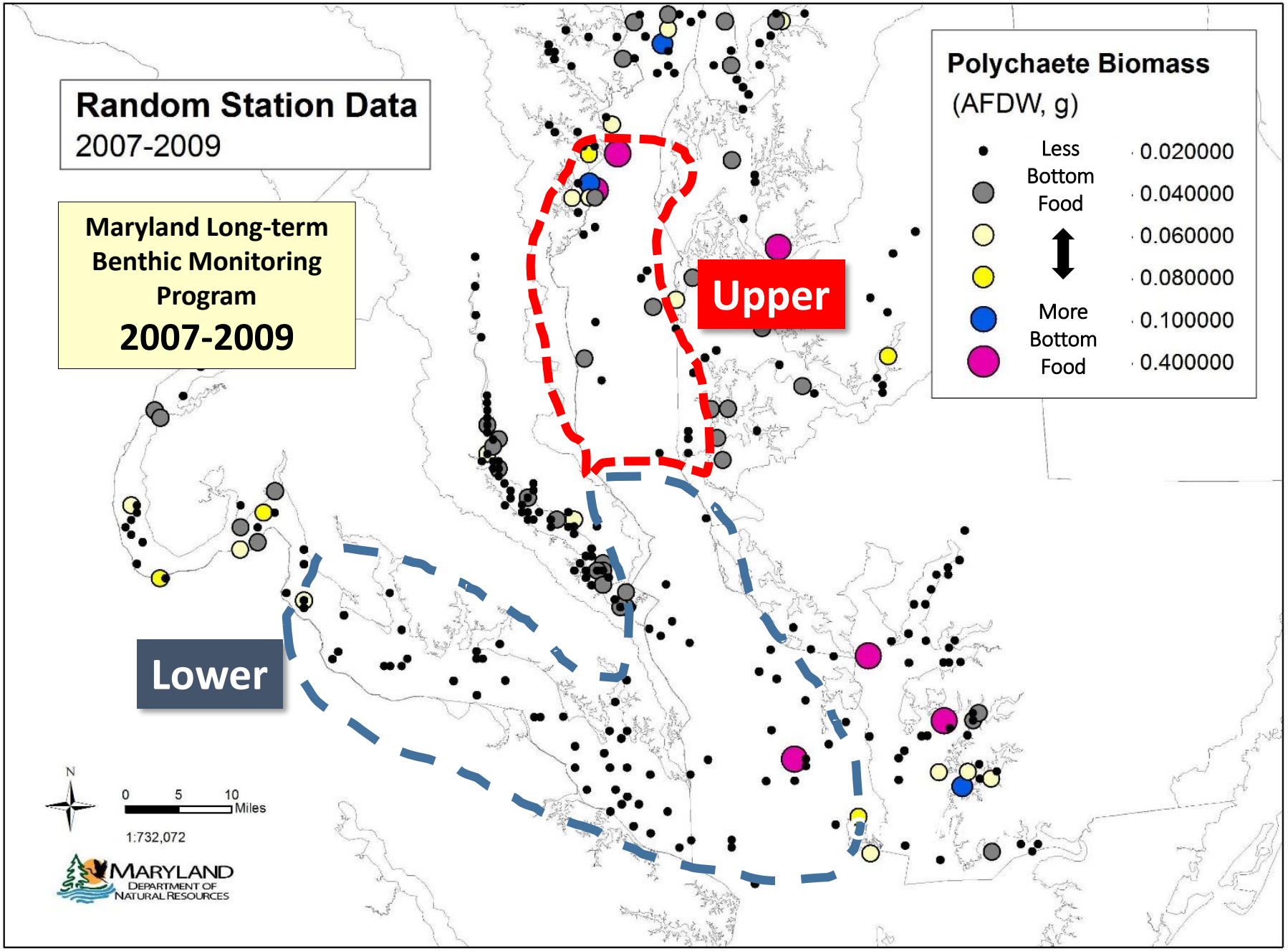
Potomac

# Information Used

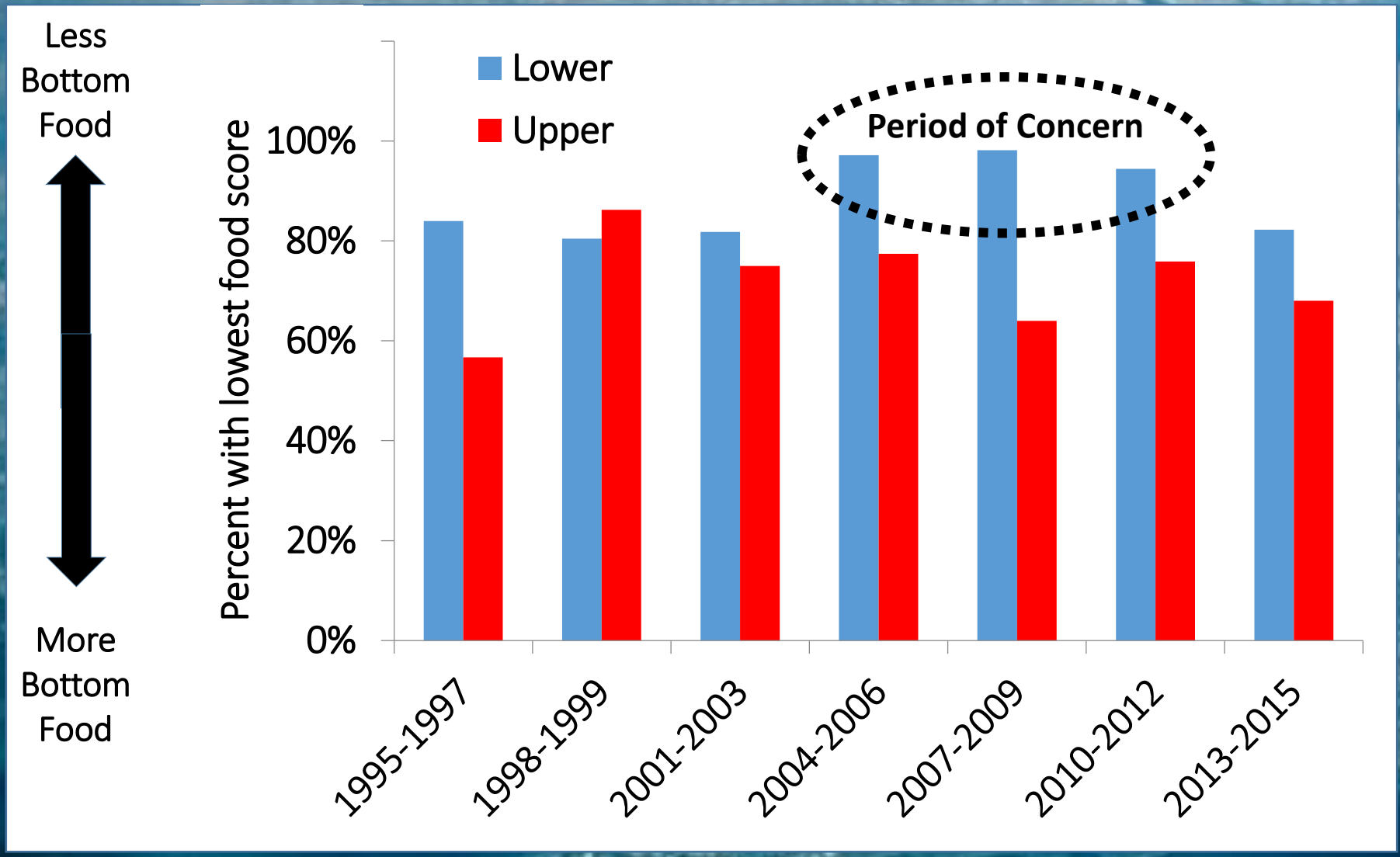
- General shifts  over time in locations of legal fish
- Catch data
- Distribution of tagging returns
- Forage
- Benthic community
- Rockfish nutrition/conditions over time
- Water quality conditions
- Fishing reports

# Occurrence of Striped Bass Diet Items During May-June, 2007-2012

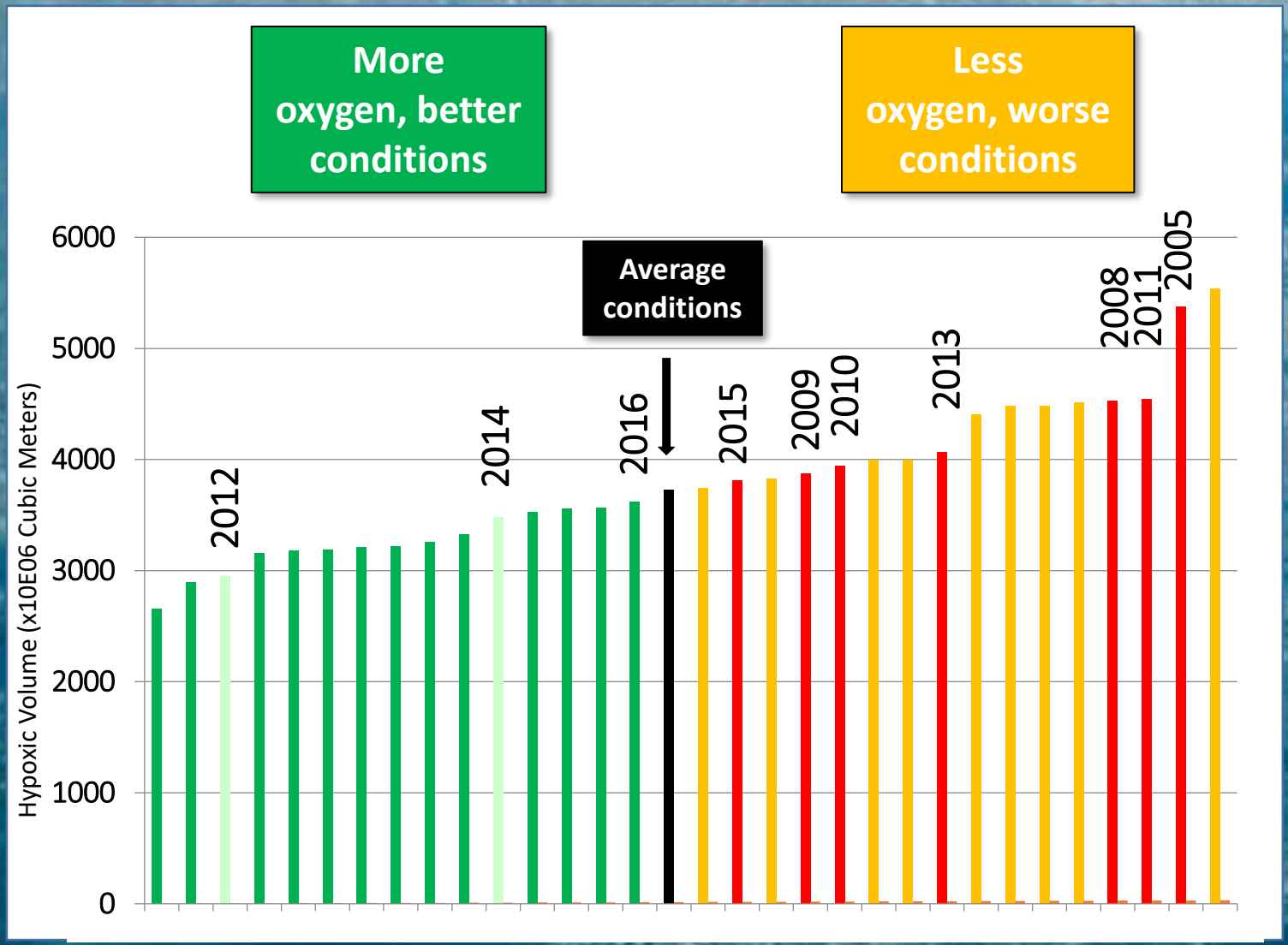



Random Station Data
2007-2009
Maryland Long-term Benthic Monitoring Program
2007-2009
Upper
Lower
Polychaete Biomass
(AFDW, g)
Less Bottom Food
More Bottom Food
0.020000
0.040000
0.060000
0.080000
0.100000
0.400000
N
0 5 10 Miles
1:732,072
MARYLAND DEPARTMENT OF NATURAL RESOURCES

# Percent of Bottom Samples Without Polychaetes (May worms)



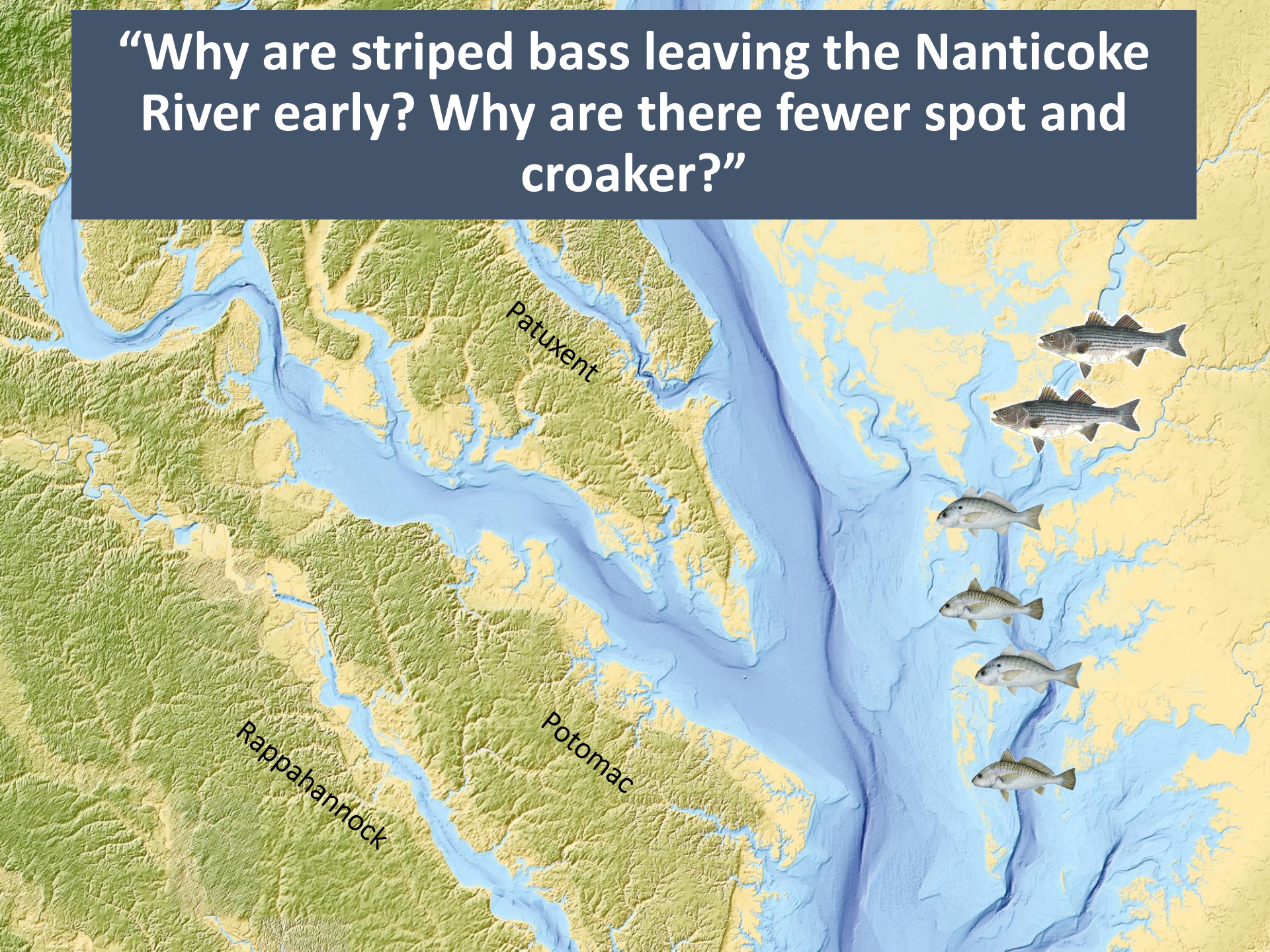
# Ranked Volume of Low Oxygen Conditions in the Chesapeake Bay Mainstem (1985-2015)



# Potomac Assessment Conclusions

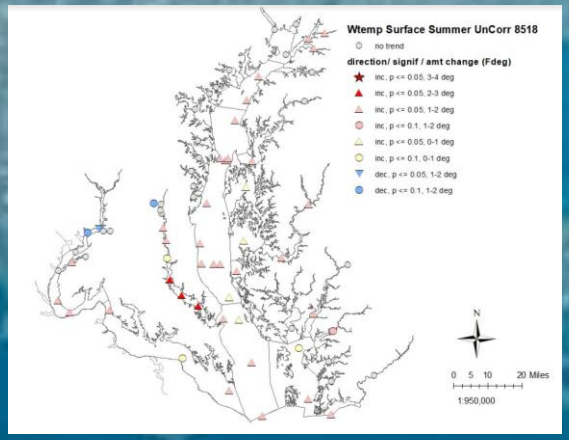
- **Information available does not offer a clear explanation**
  - Tagging data does not support a distributional shift
  - Resident rockfish may have been at low abundance in some years
  - **Habitat conditions in the deeper waters of the lower Potomac/lower Bay became poorer and fish may not have been able to use habitat they once did**
  - **Less bottom-dwelling forage in lower Potomac/lower Bay a possibility**

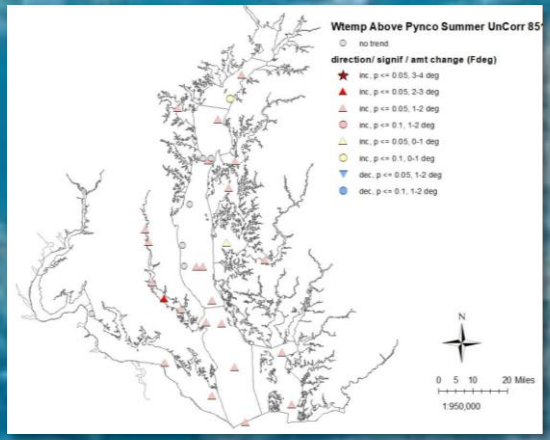
# “Why are striped bass leaving the Nanticoke River early? Why are there fewer spot and croaker?”

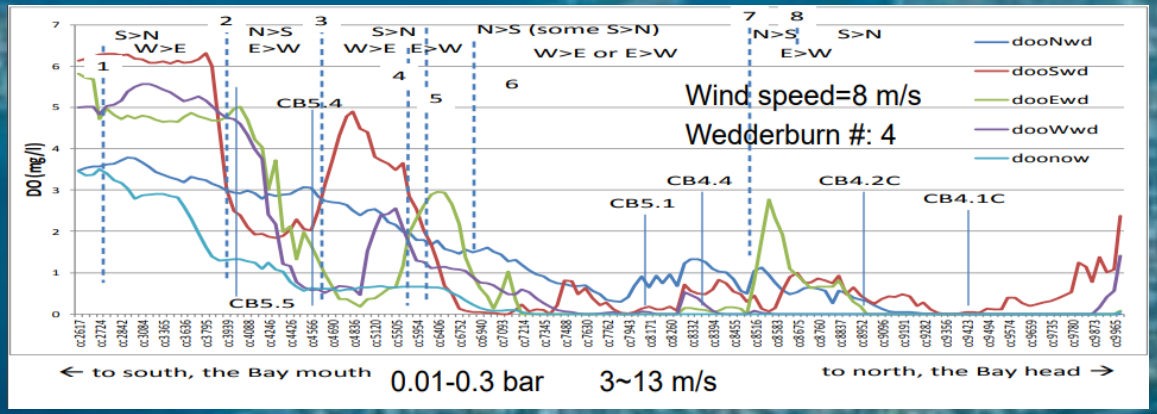


# Looking at System Changes – Trends and Frequency of Episodes

- **Climate variability** – impacts to flow and wind patterns impact hypoxia
- **Climate change** – increasing water temperature S and AP layers




Ping Wang and Harry Wang

# Next Steps

- Identify shifting fish patterns from fishing reports
- Work with fisheries experts and watermen to verify/identify current/other shifts
- After removing harvest related changes, determine likely cause(s) of shifts
  - Nutrient reduction related
  - Climate related
  - Other

# Thank You!

*Special thanks to **Jim Uphoff, Margaret McGinty & Renee Karrh** (MD-DNR) for their analysis and technical support and **Roberto Llanso** (Versar) for collecting and analyzing the Maryland long-term benthic monitoring data.*