Tidal Water Quality Trends

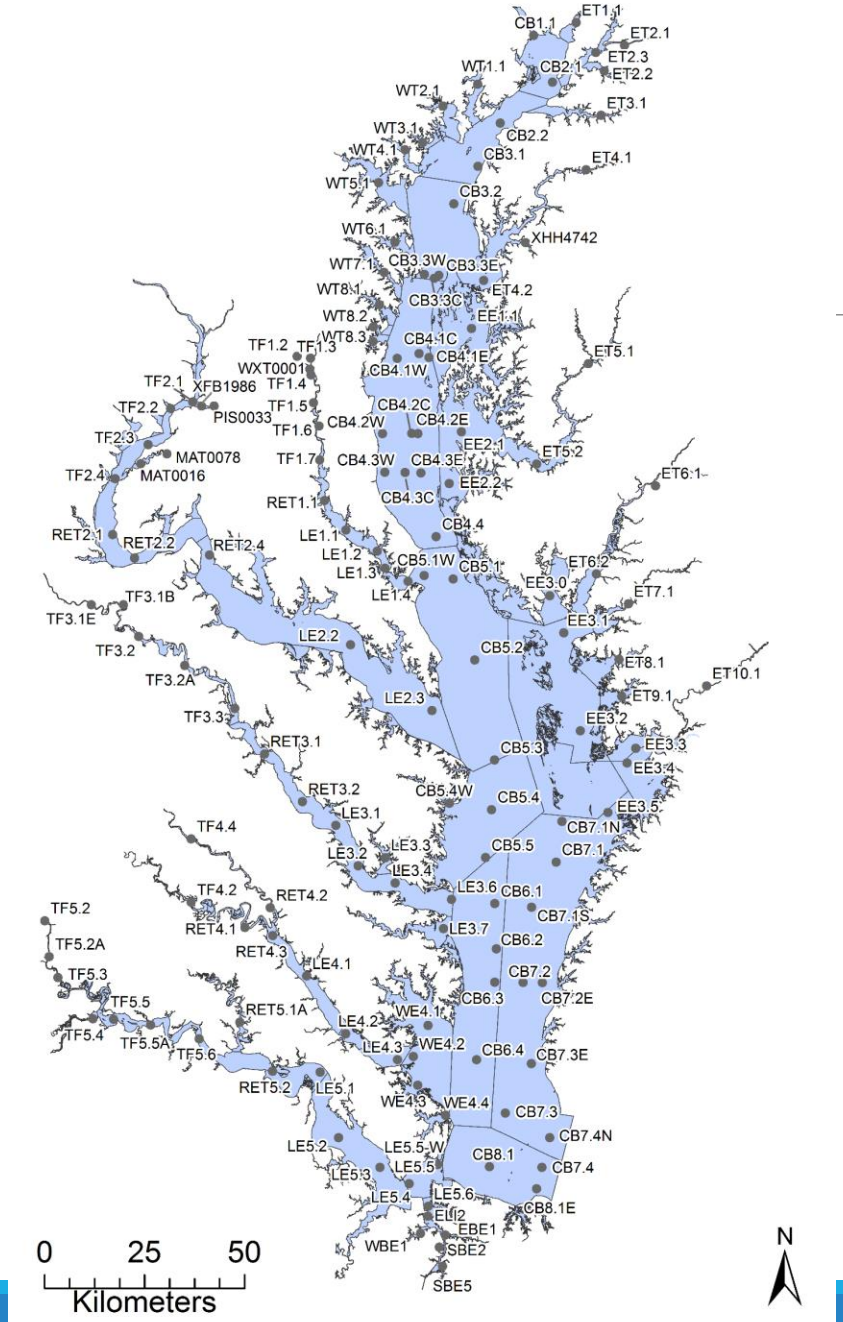
Rebecca Murphy
University of Maryland Center for Environmental Science,
Chesapeake Bay Program Office

*2020 trends run by **Renee Karrh** (MDDNR) and **Mike Lane** (ODU)*
Coordinated through ITAT

STAR meeting

Aug. 25, 2022

Chesapeake Bay Program
Science. Restoration. Partnership.



Extensive long-term coordinated tidal water quality monitoring

- MDDNR, VADEQ, DC and others have been sampling at 150+ stations since the 1980s 1-2 times/month
- Nutrients, chlorophyll-*a*, dissolved oxygen, Secchi depth, salinity, temperature, and others

Matt Rath/Chesapeake Bay Program

Annual tidal trend results

- Multiple parameters at every station:
  - Nutrients: Total Nitrogen, Dissolved Inorganic Nitrogen, Total Phosphorus, Orthophosphate
  - Secchi Depth, Chlorophyll-*a*, Dissolved Oxygen, Total Suspended Solids
  - Temperature, Salinity
- Capture the spatial and temporal dynamics:
  - Surface & bottom
  - True conditions & flow-adjusted
- Post-process analysis possible for time periods and seasons:
  - Long-term (ideally 1985-present)
  - Short-term (last 10 years)
  - Spring & summer chlorophyll-*a*, summer bottom DO

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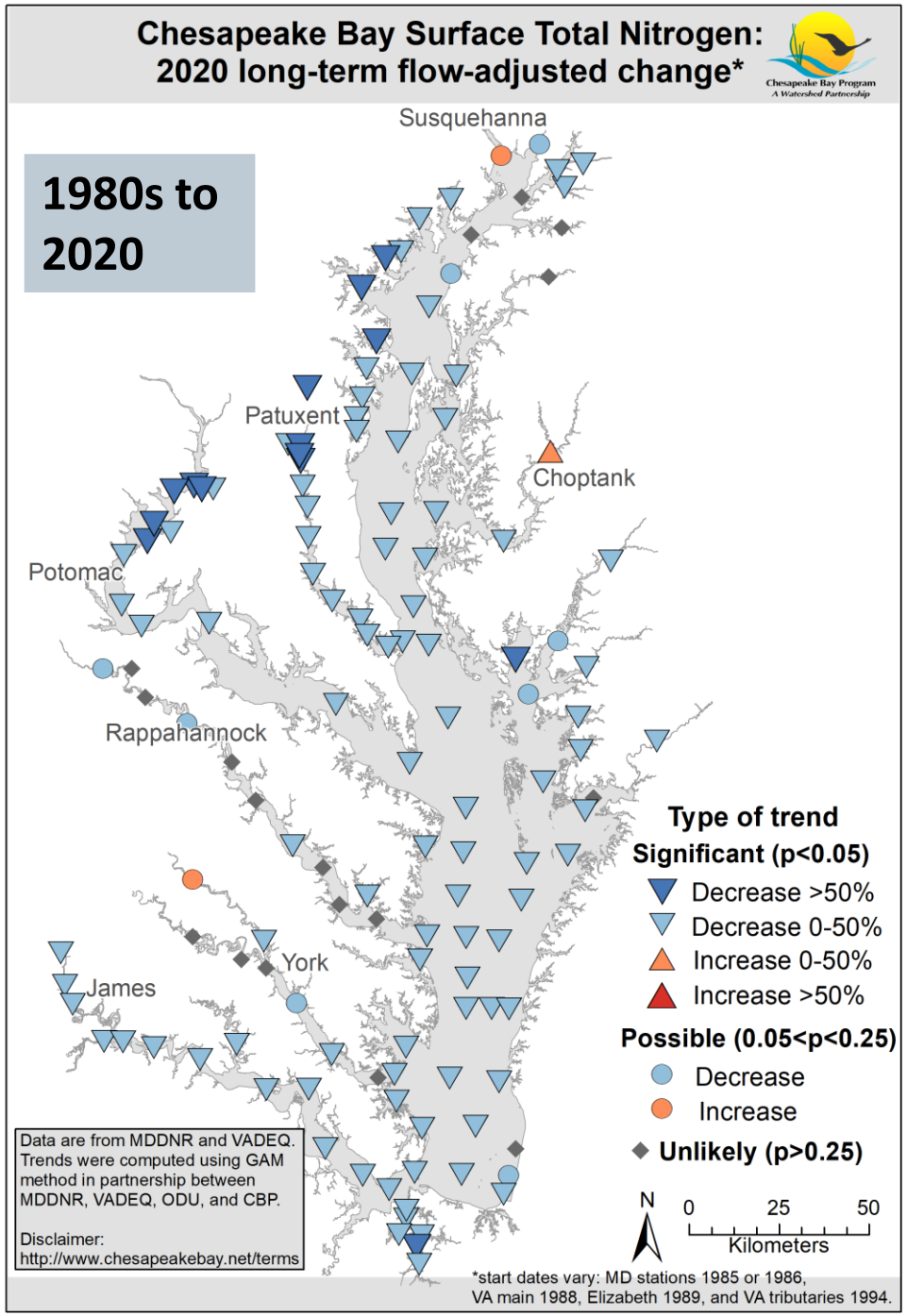
TN


Chesapeake Bay Surface Total Nitrogen:
2020 long-term flow-adjusted change*
Chesapeake Bay Program
A Watershed Partnership
1980s to 2020
Susquehanna
Patuxent
Choptank
Potomac
Rappahannock
York
James
Type of trend
Significant (p<0.05)
Decrease >50%
Decrease 0-50%
Increase 0-50%
Increase >50%
Possible (0.05<p<0.25)
Decrease
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Unlikely (p>0.25)
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25
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Kilometers
Data are from MDDNR and VADEQ. Trends were computed using GAM method in partnership between MDDNR, VADEQ, ODU, and CBP.
Disclaimer:
http://www.chesapeakebay.net/terms
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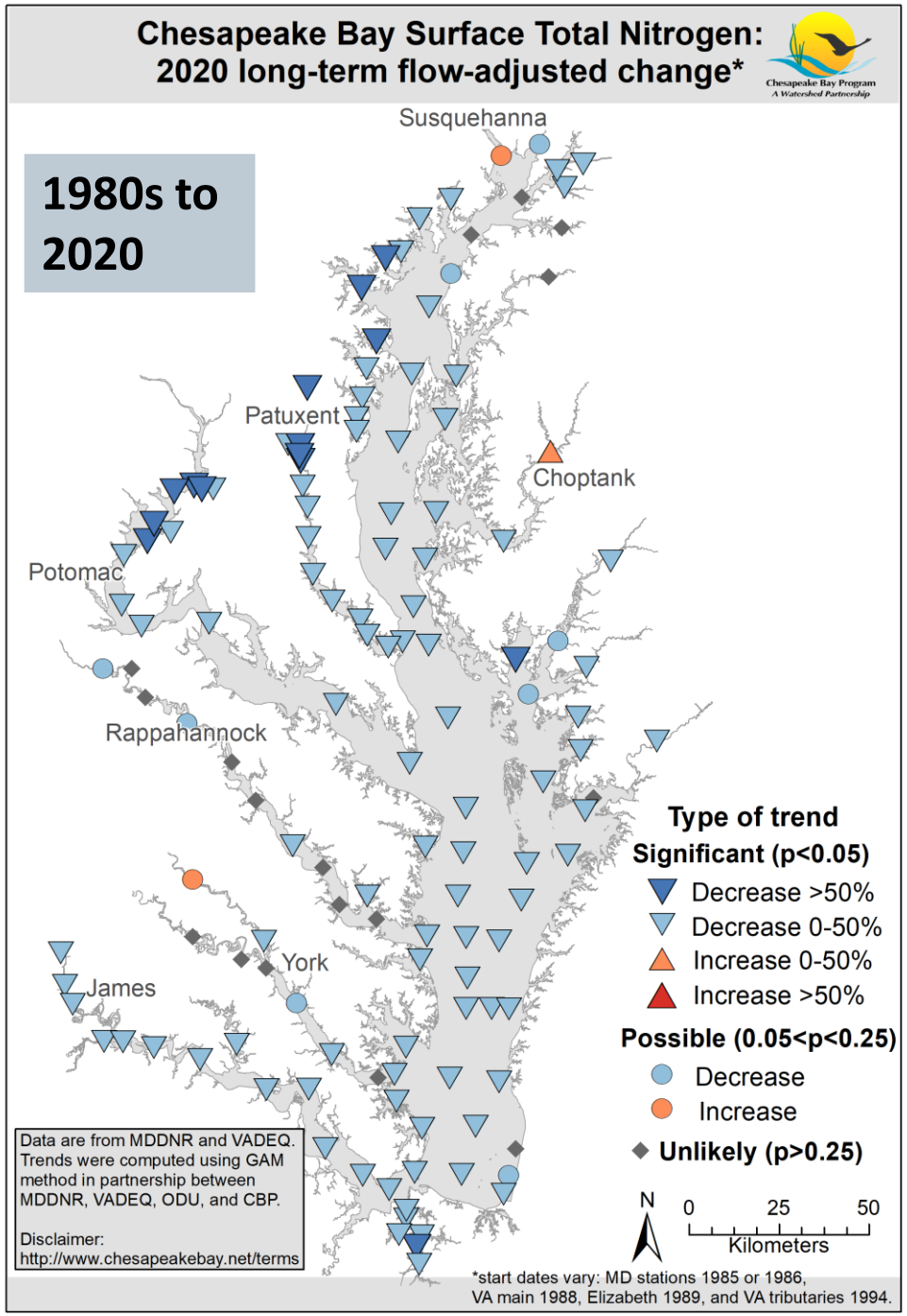
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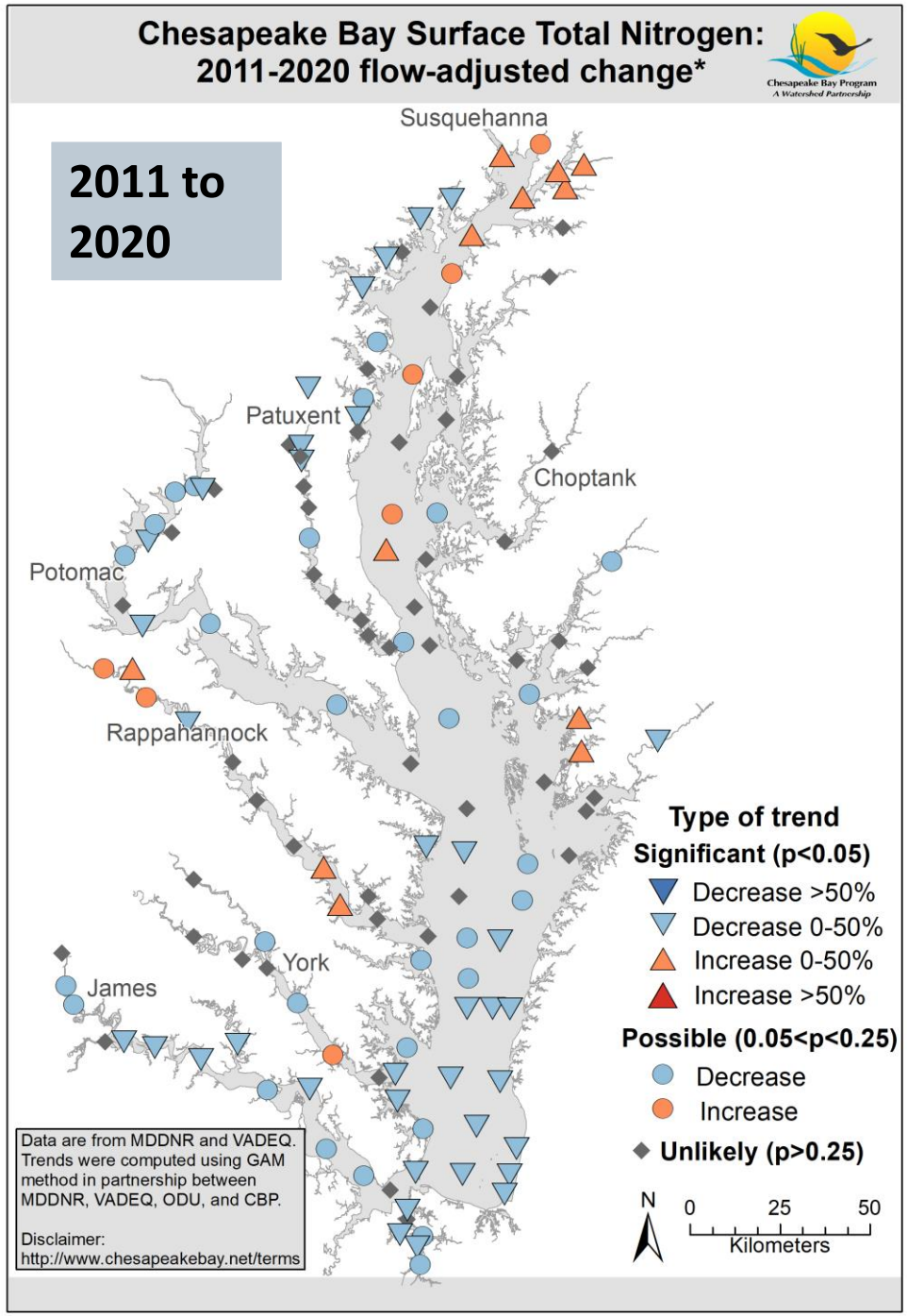
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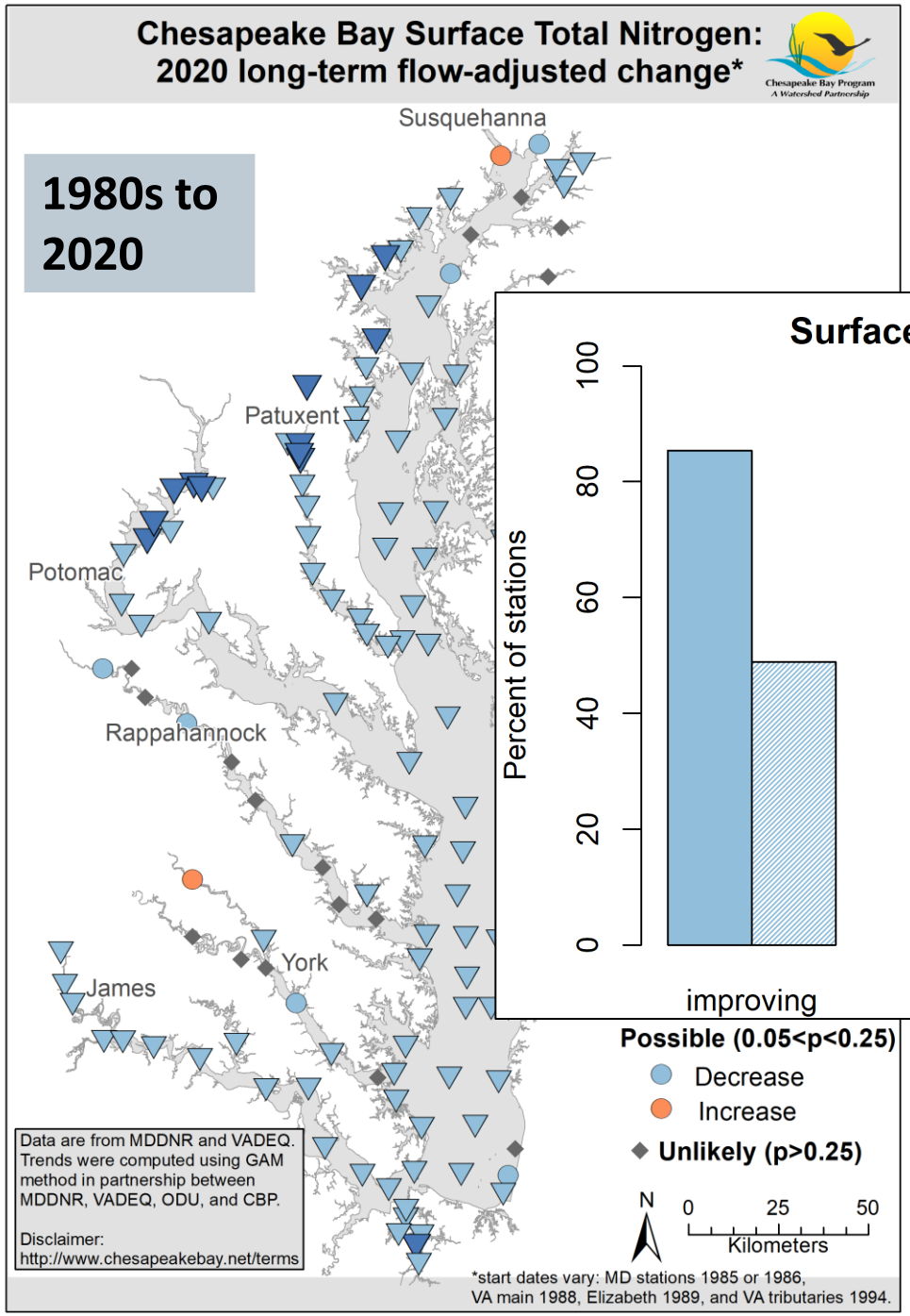
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short-term
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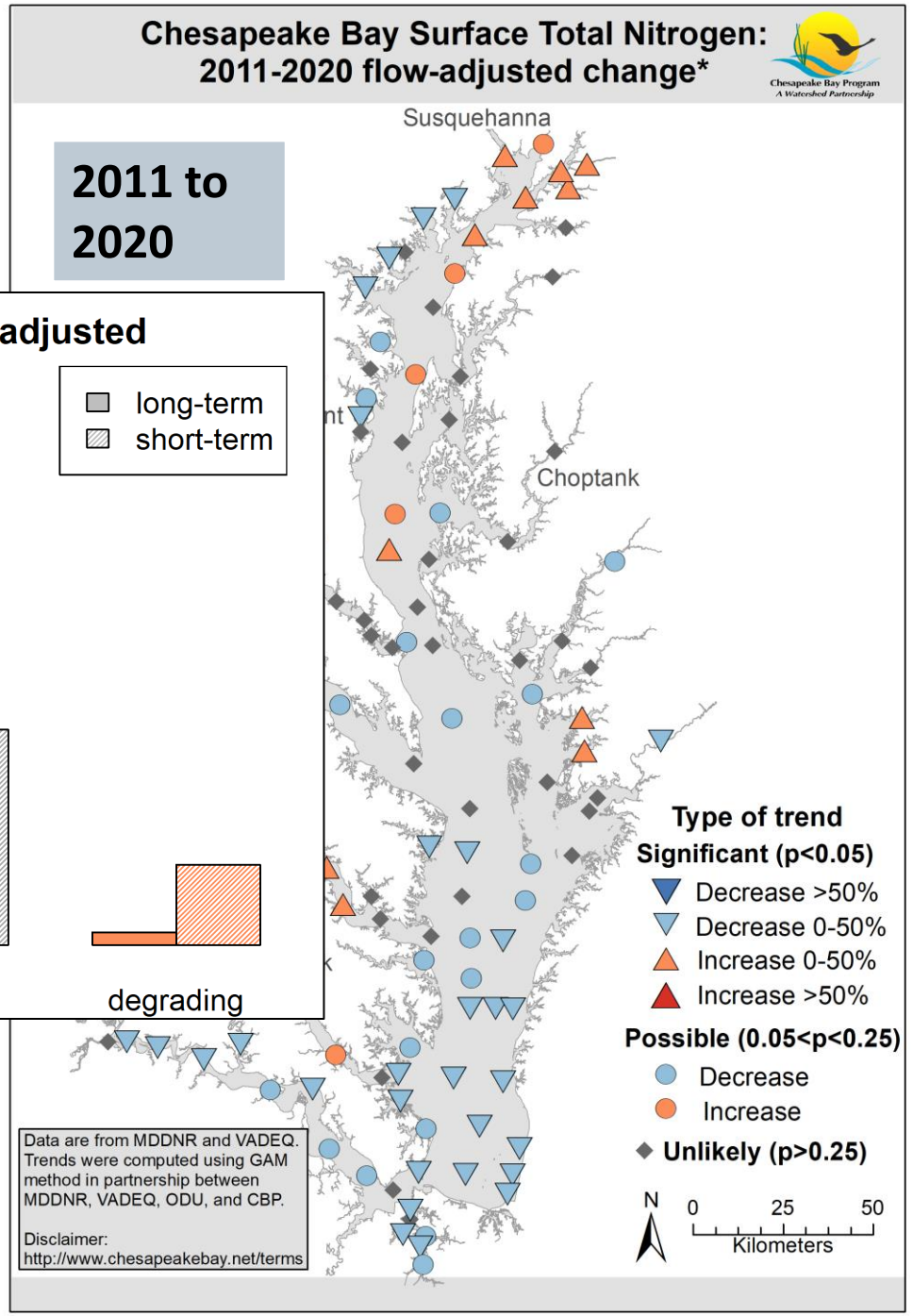
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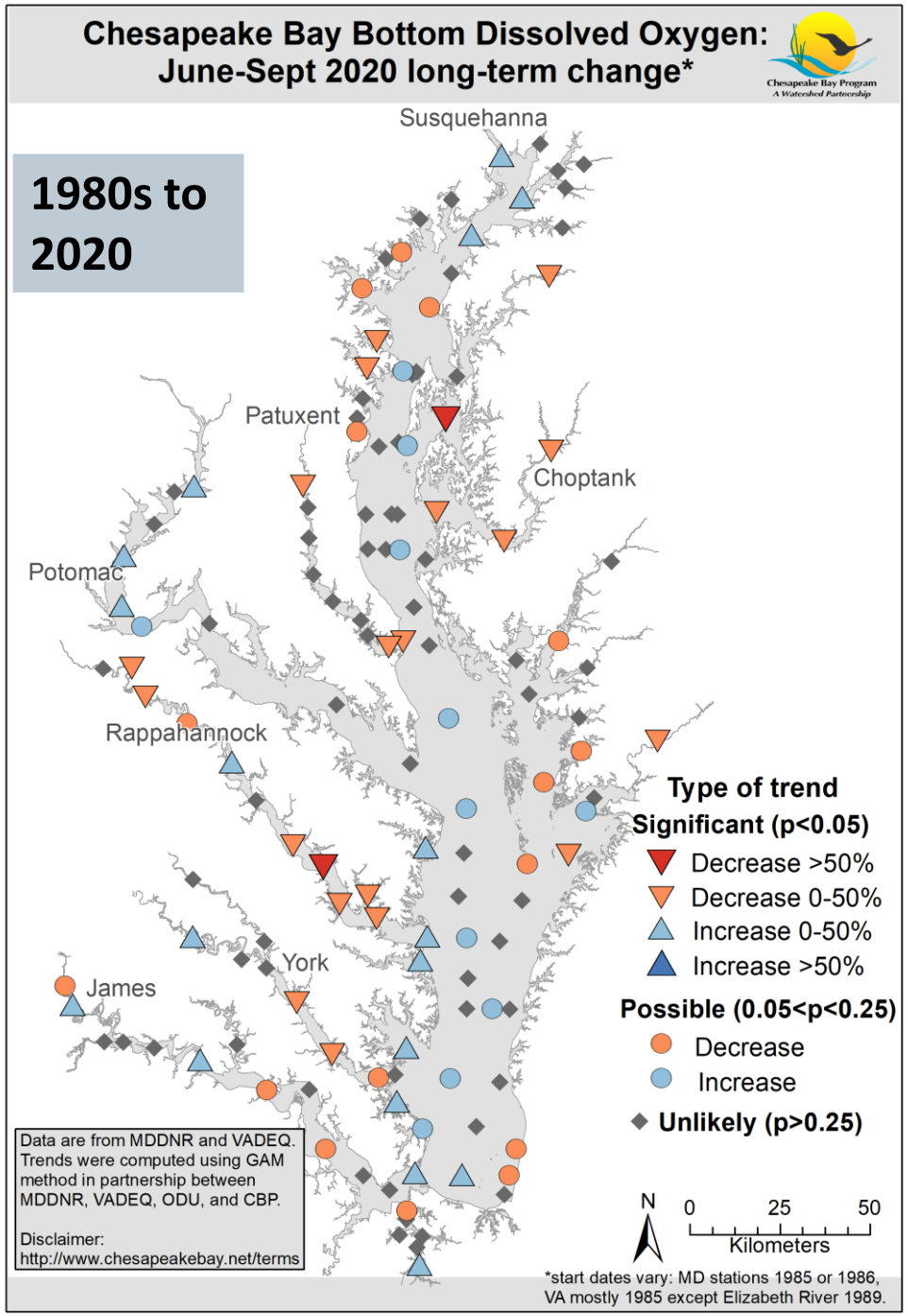
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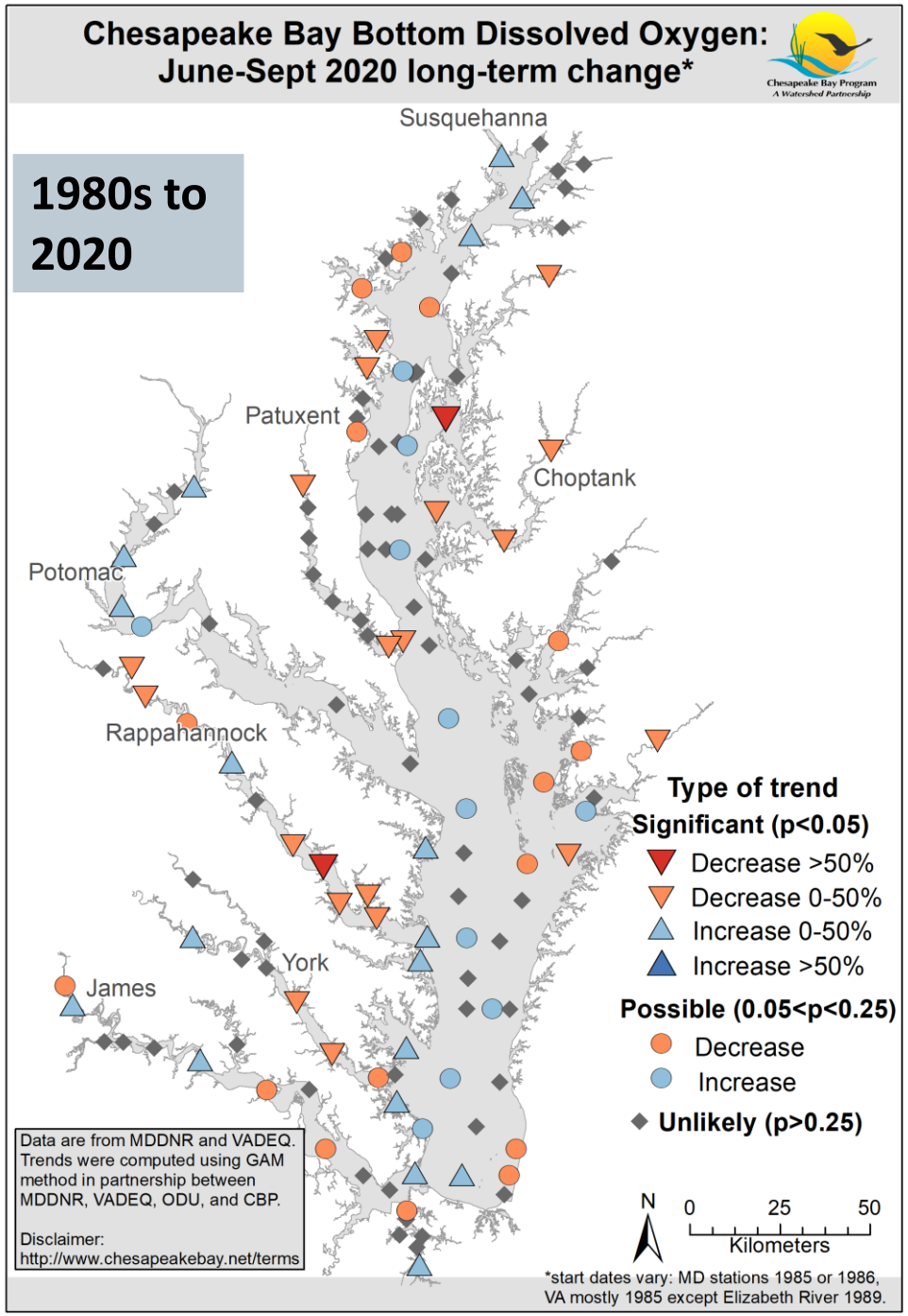
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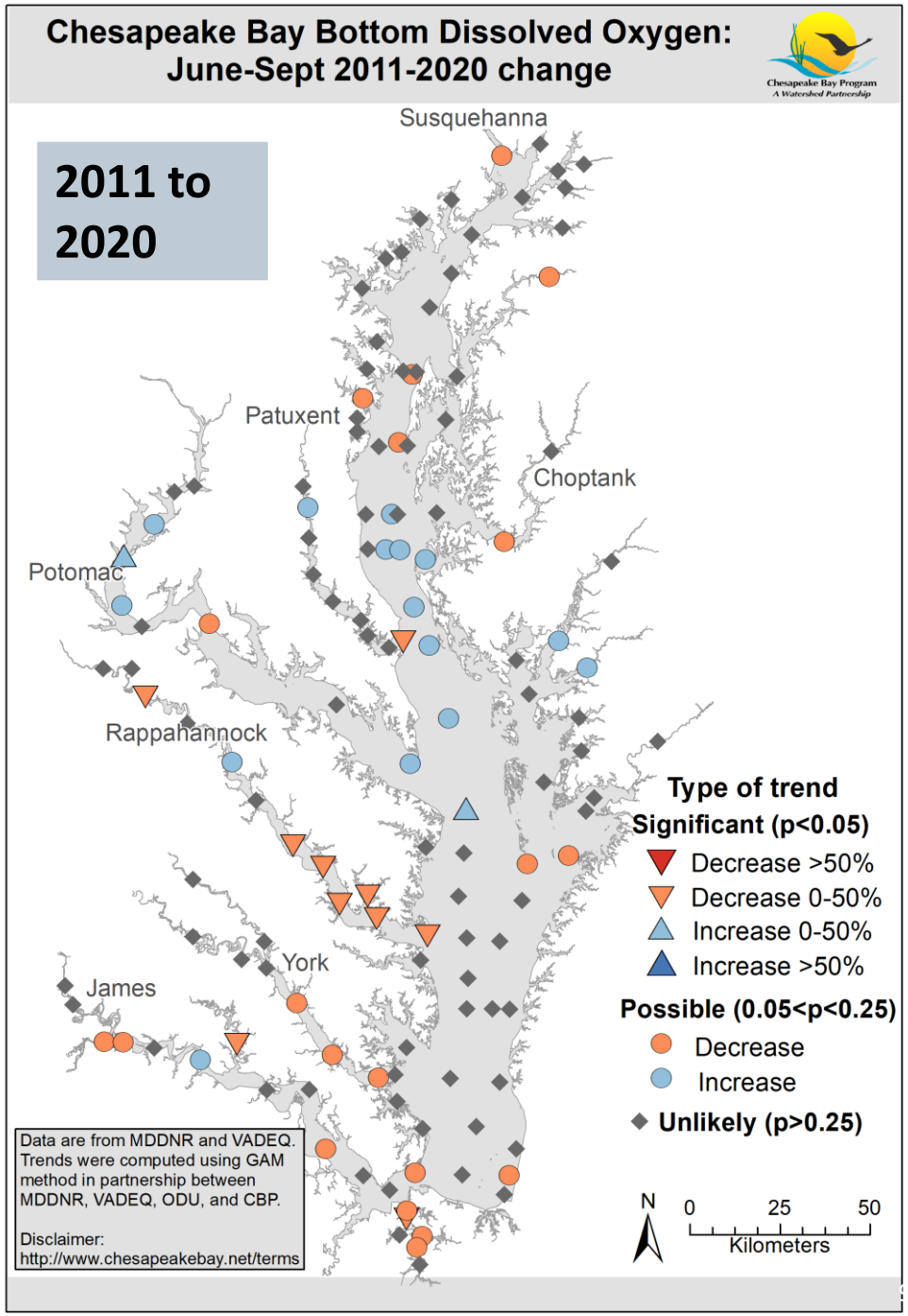
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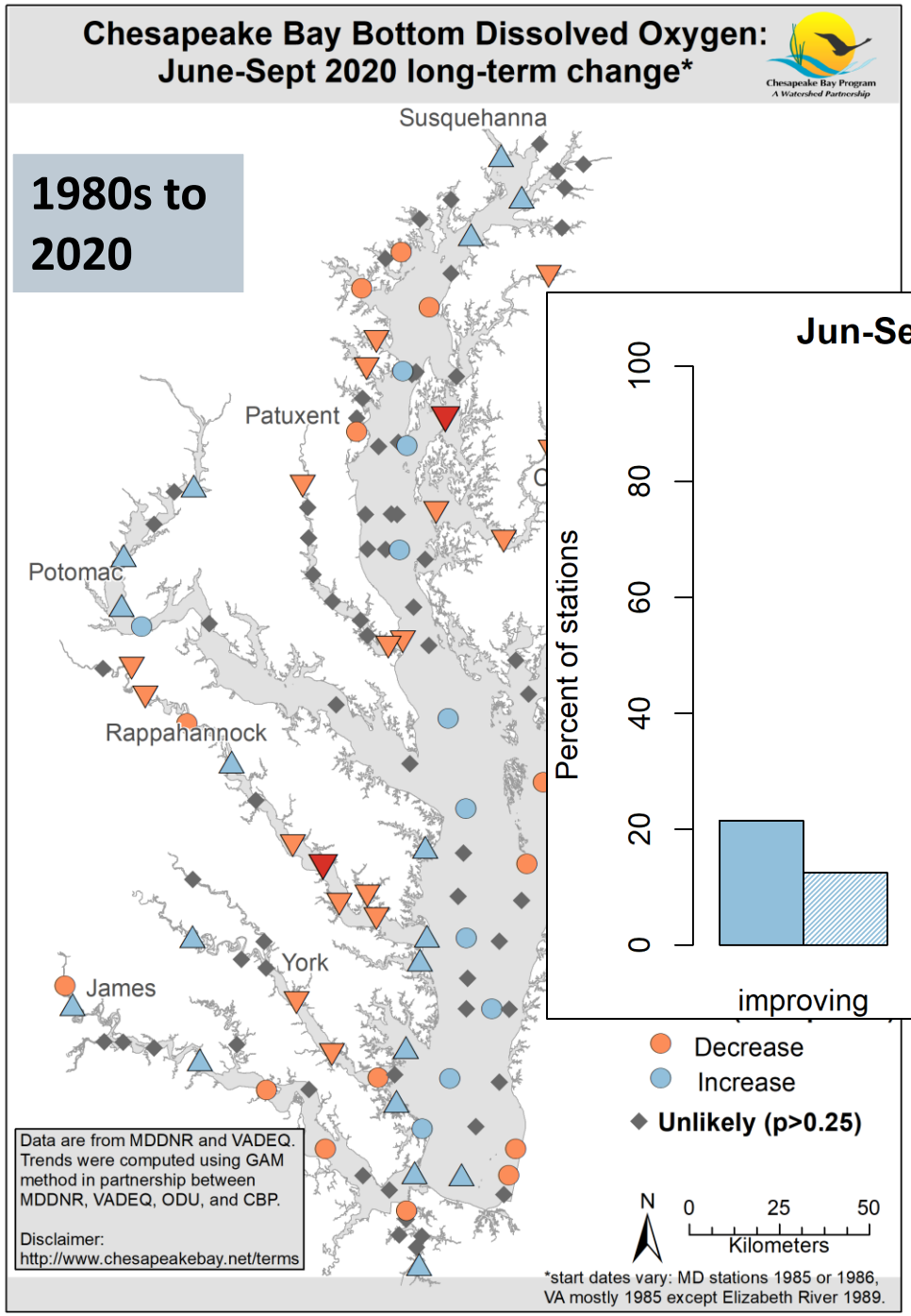
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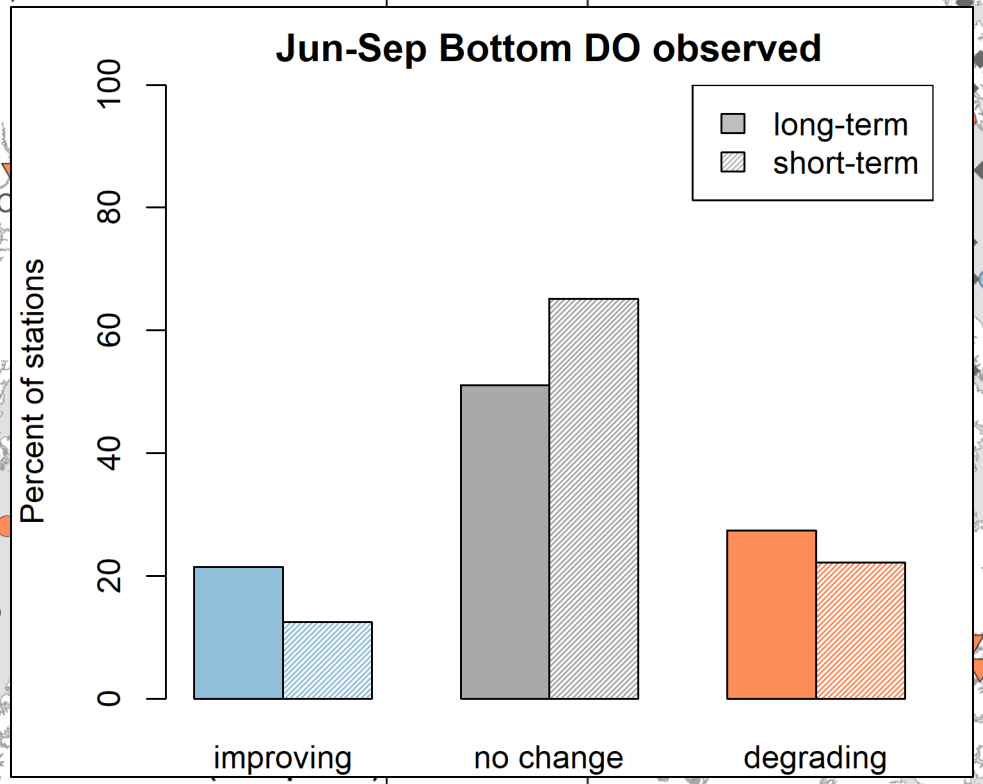
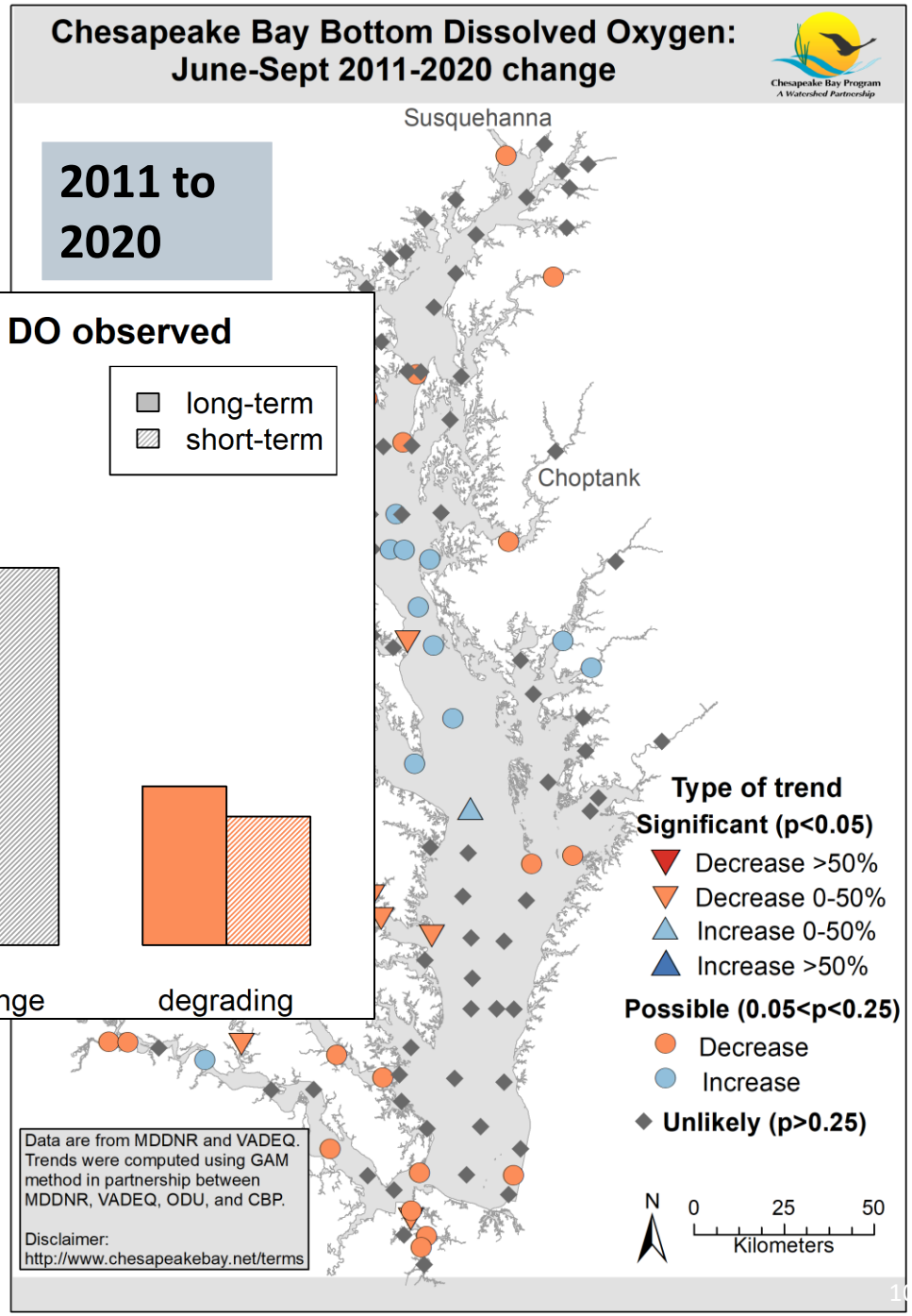

Jun-Sep Bottom DO observed
long-term
short-term
Percent of stations
0
20
40
60
80
100
improving
no change
degrading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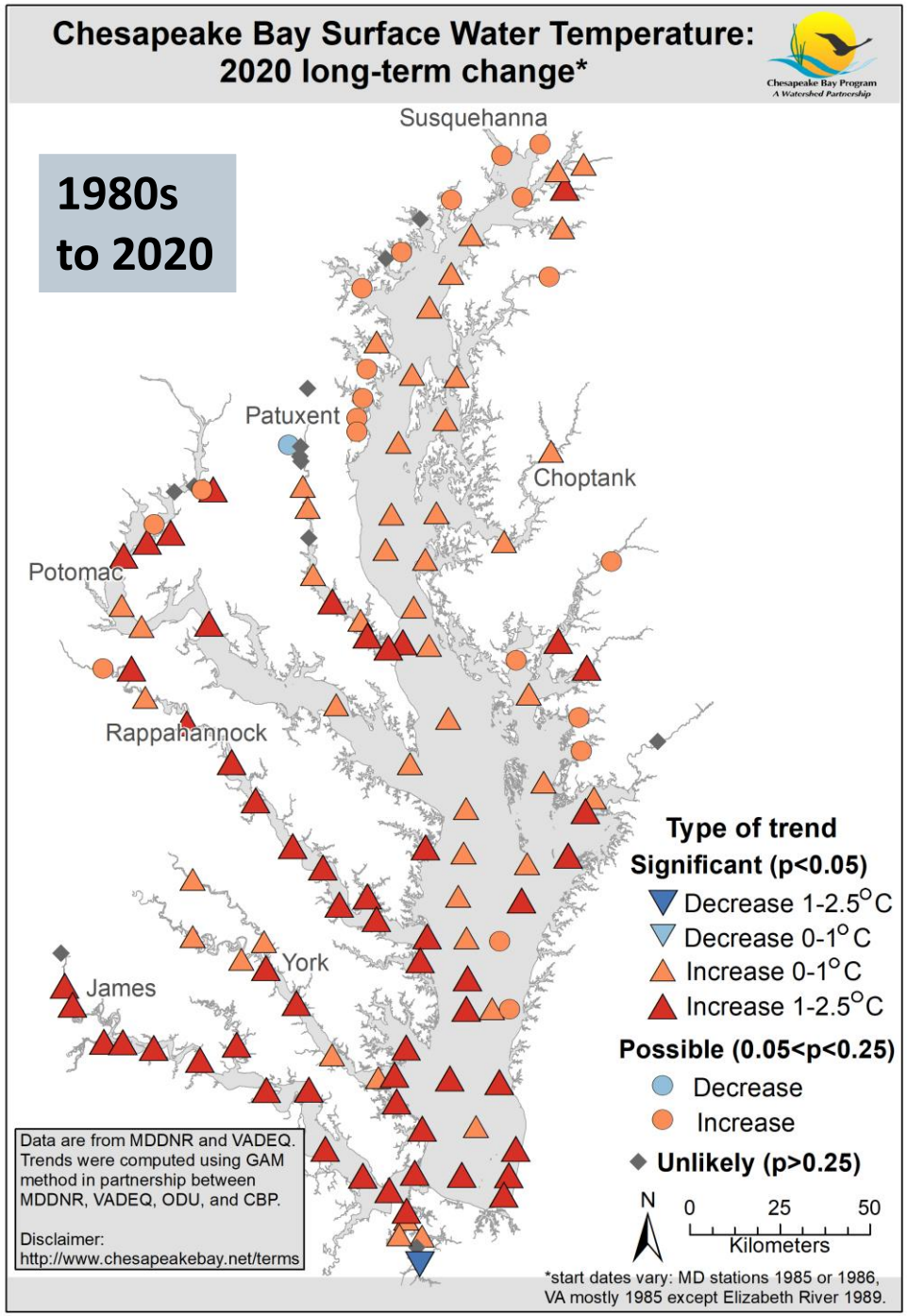
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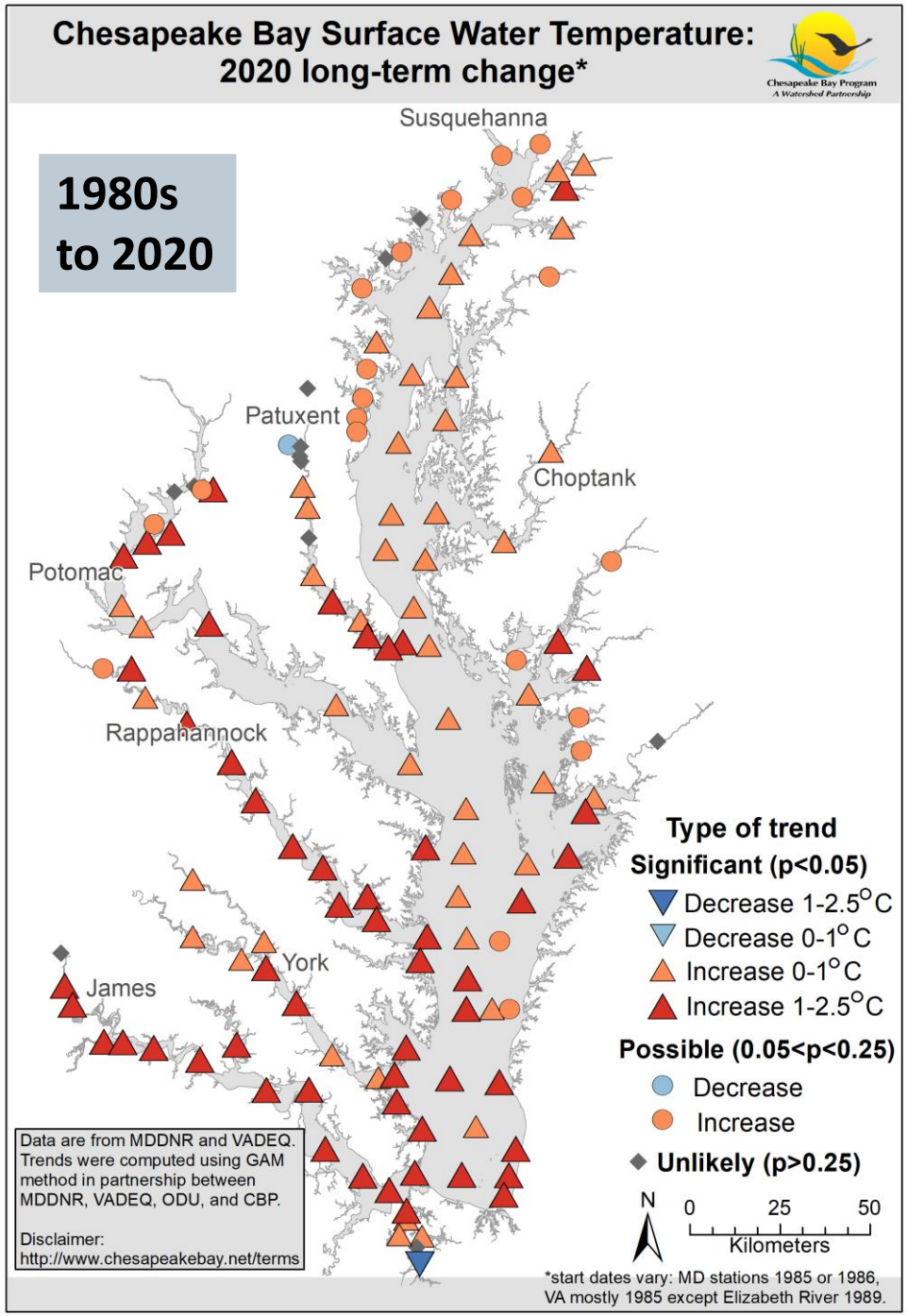
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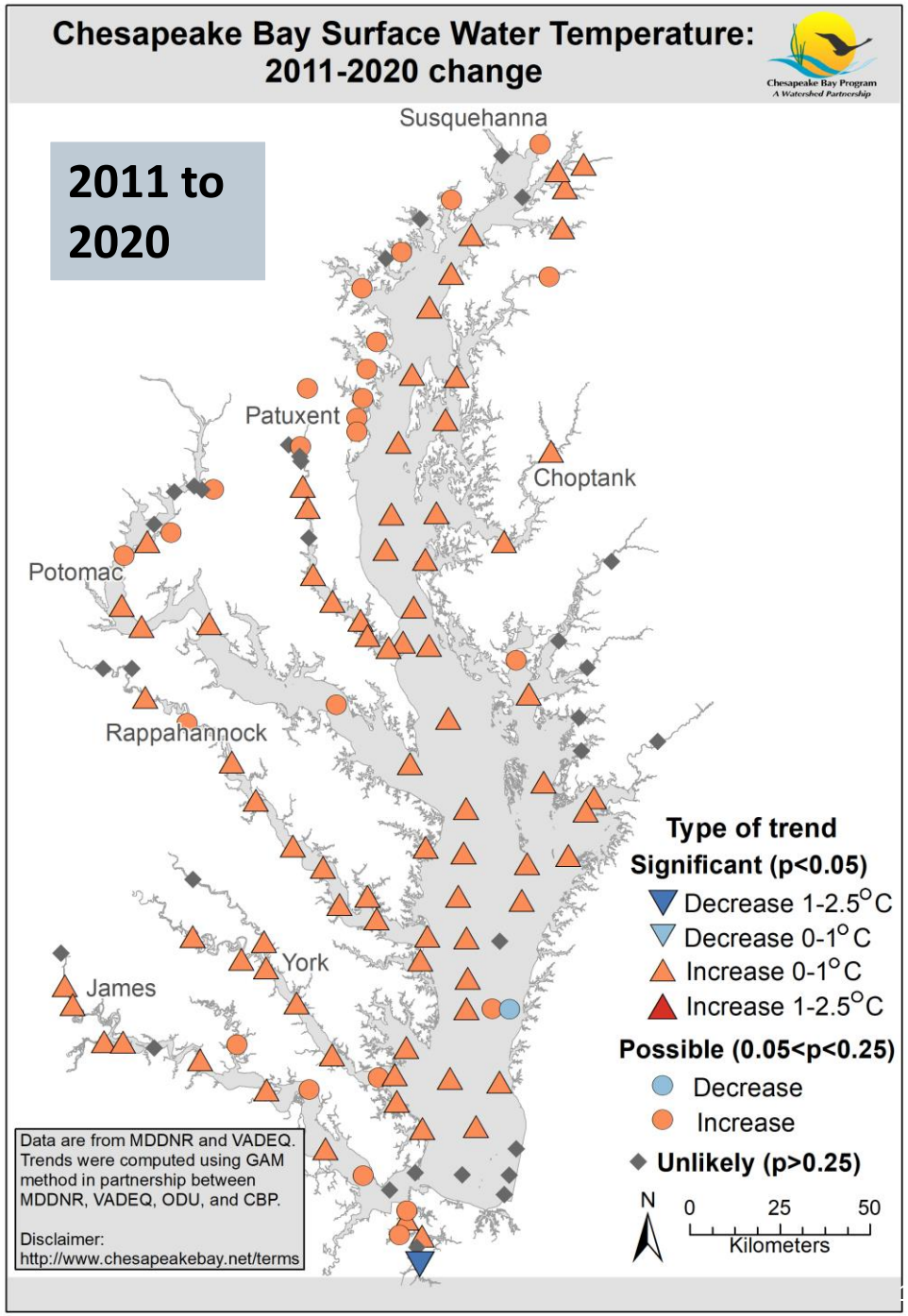
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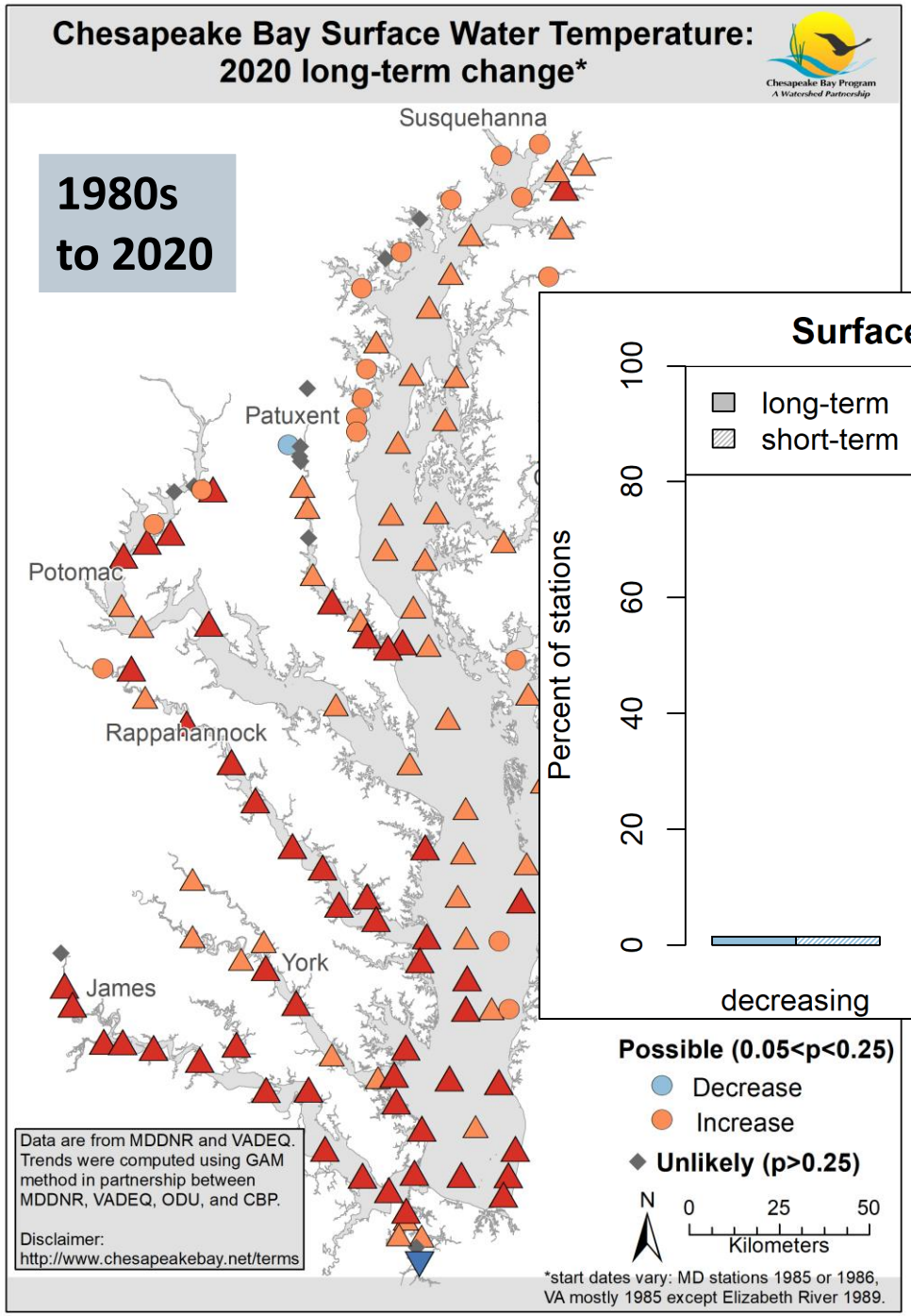
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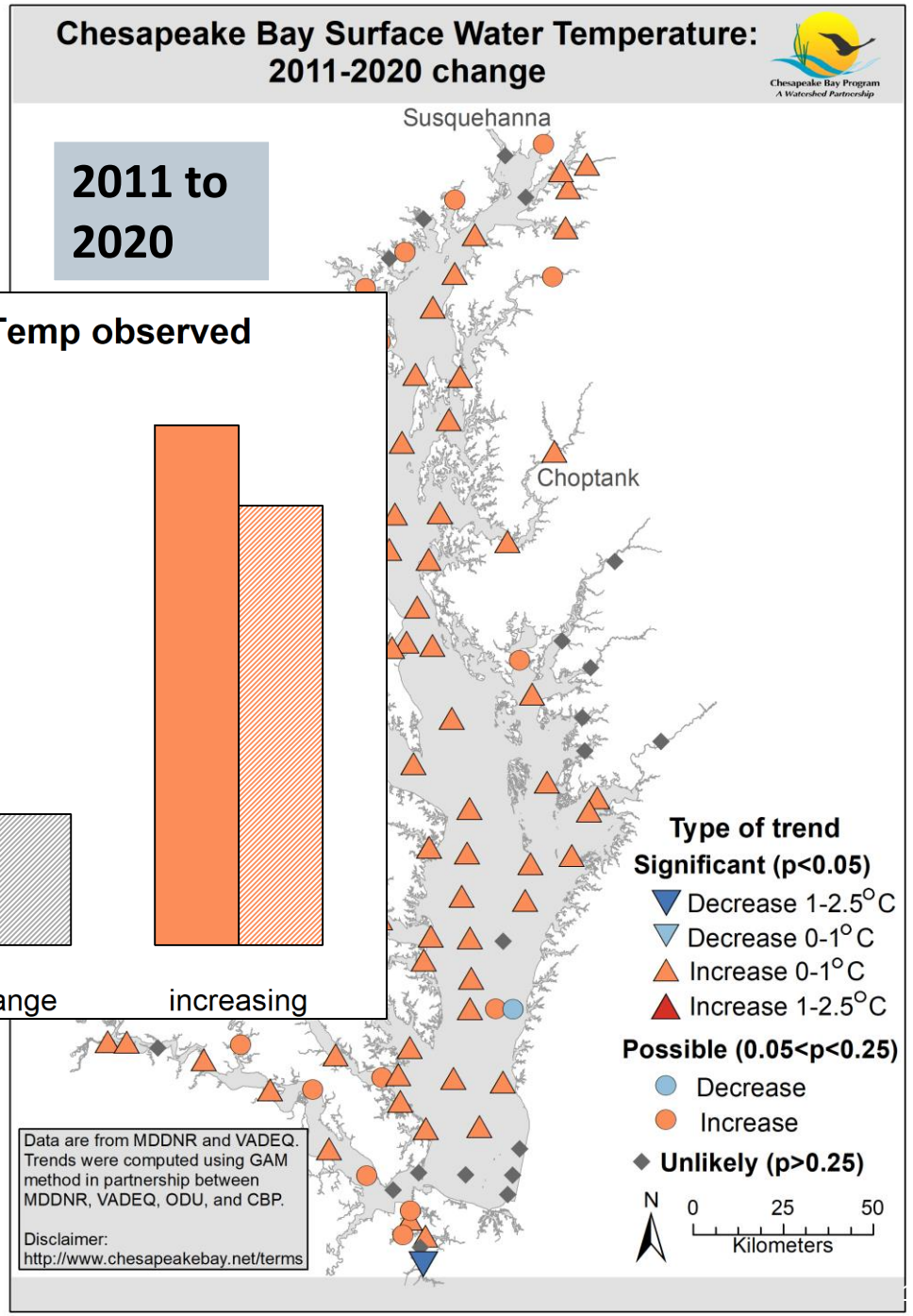
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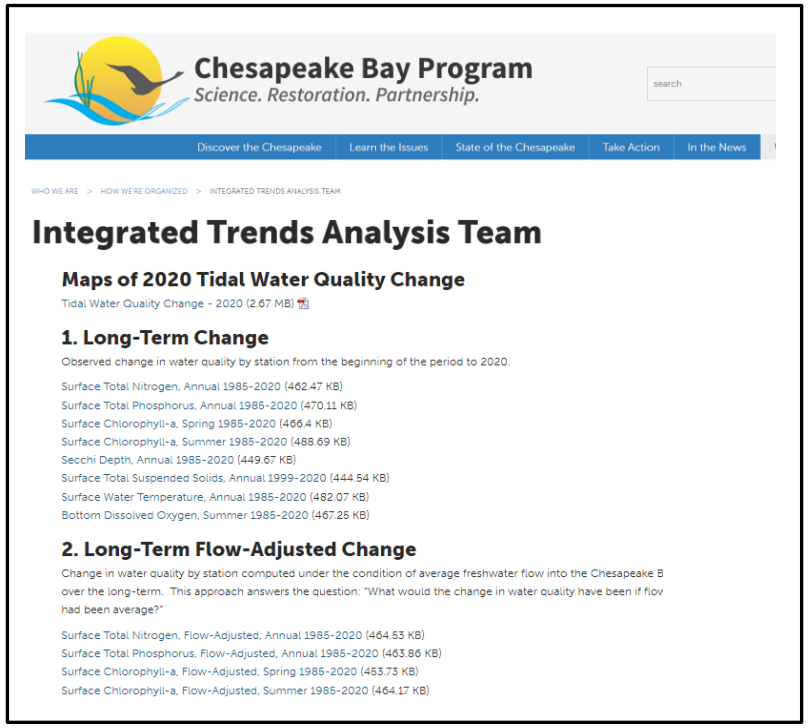
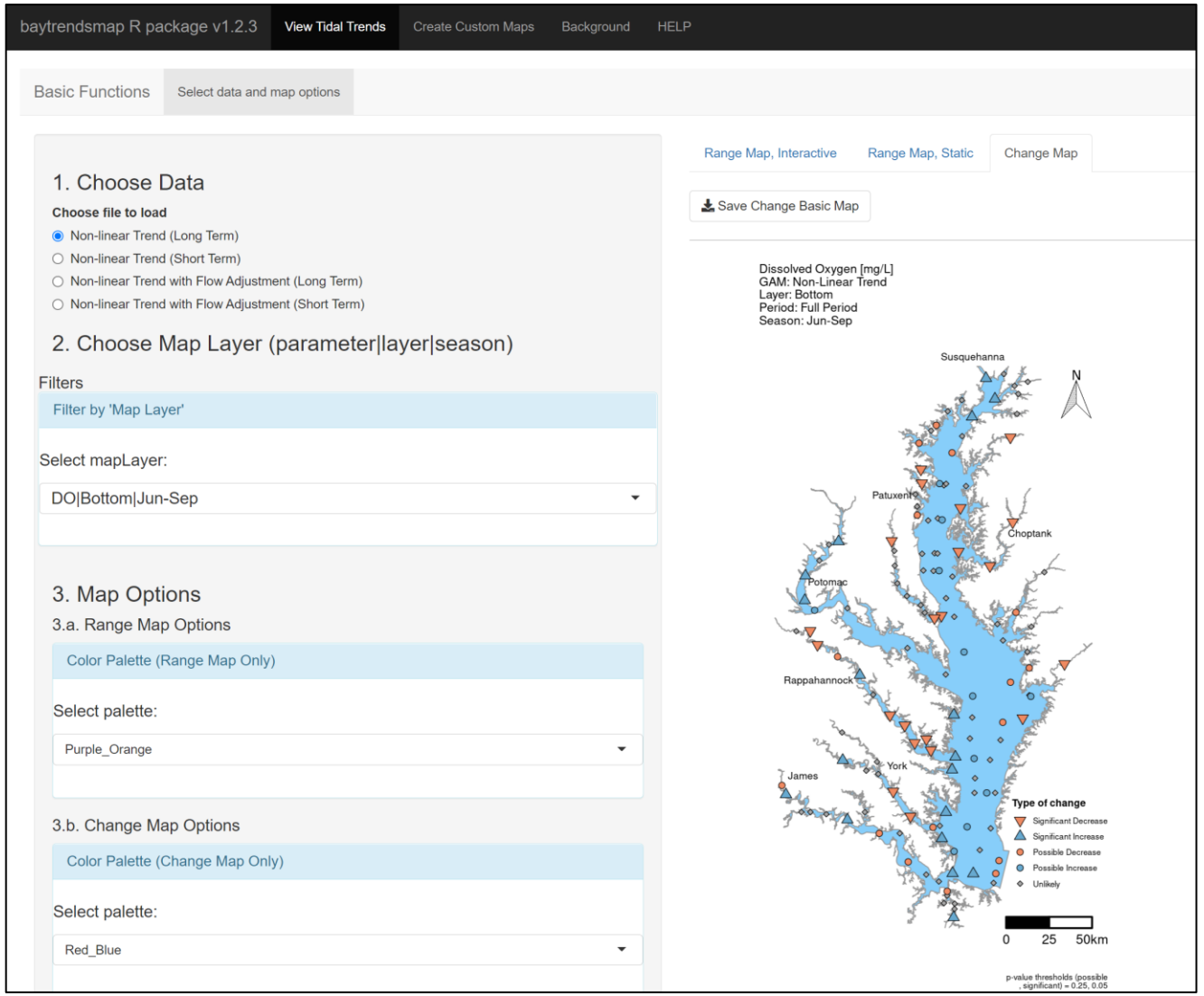
Accessing the results

ITAT webpage:
Static maps and summary document



https://www.chesapeakebay.net/who/group/integrated_trends_analysis_team

baytrendsmap app: Web tool to map the trends, current concentrations, and zoom in on regions



https://baytrends.chesapeakebay.net/baytrendsmap/

Accessing the results

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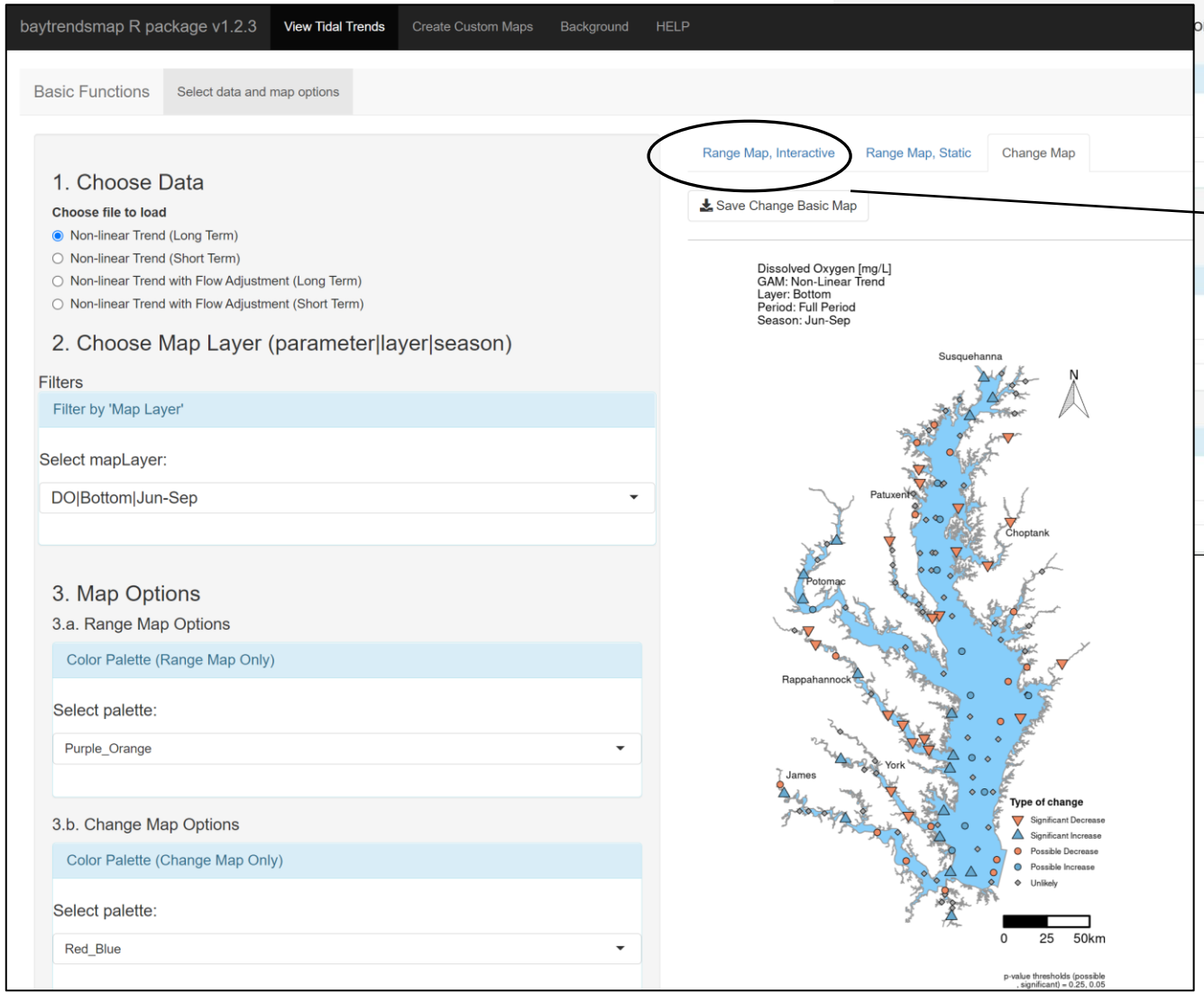

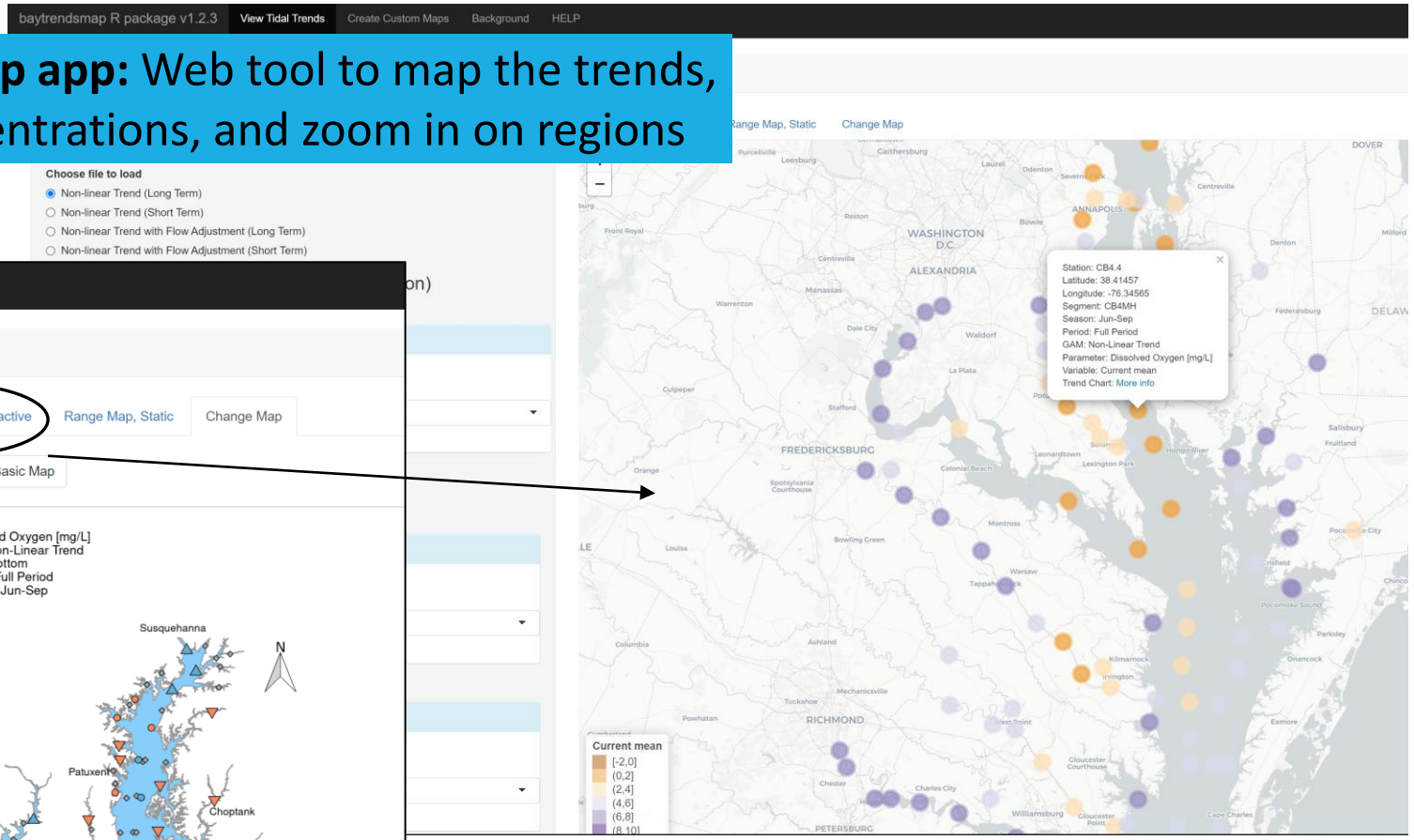

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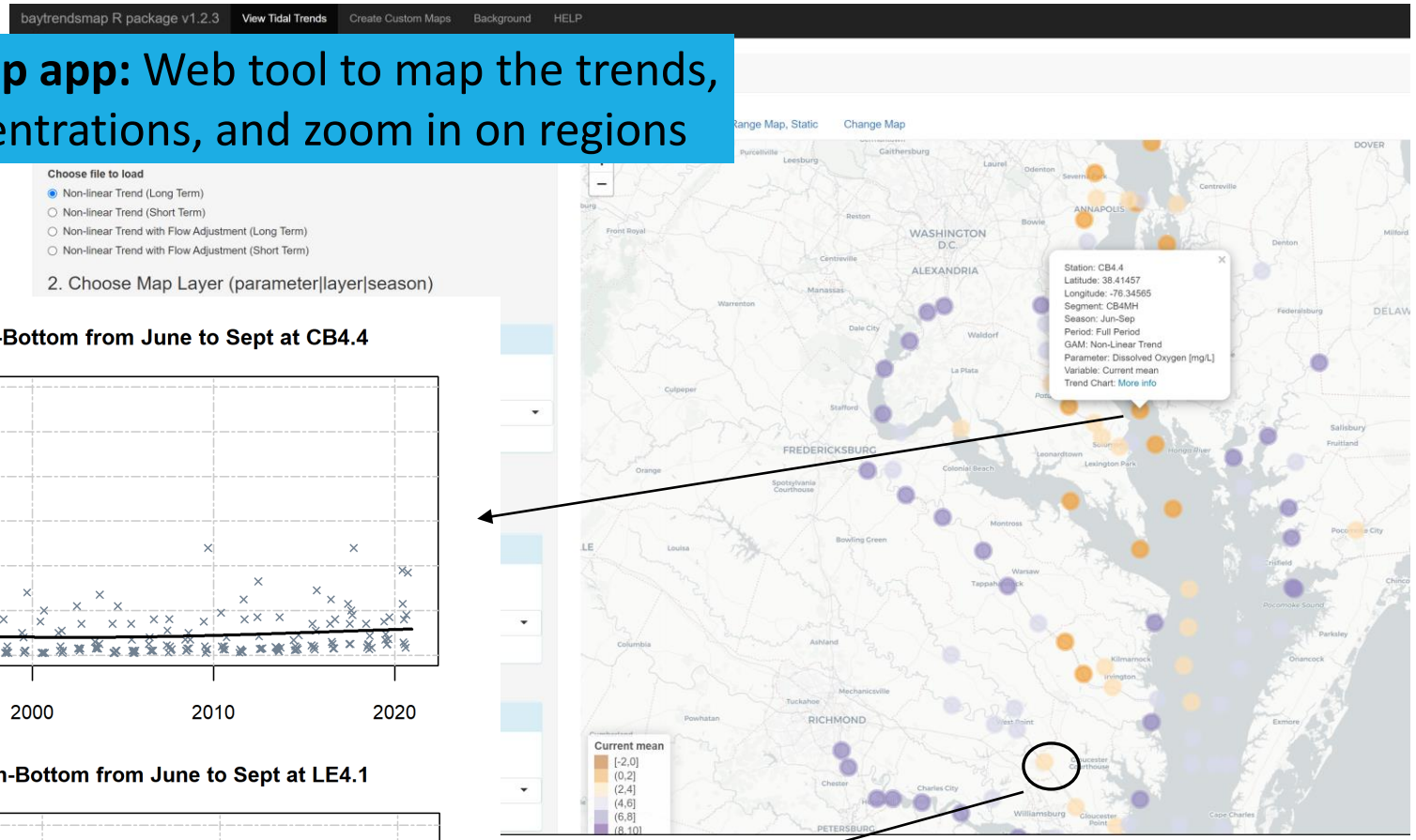

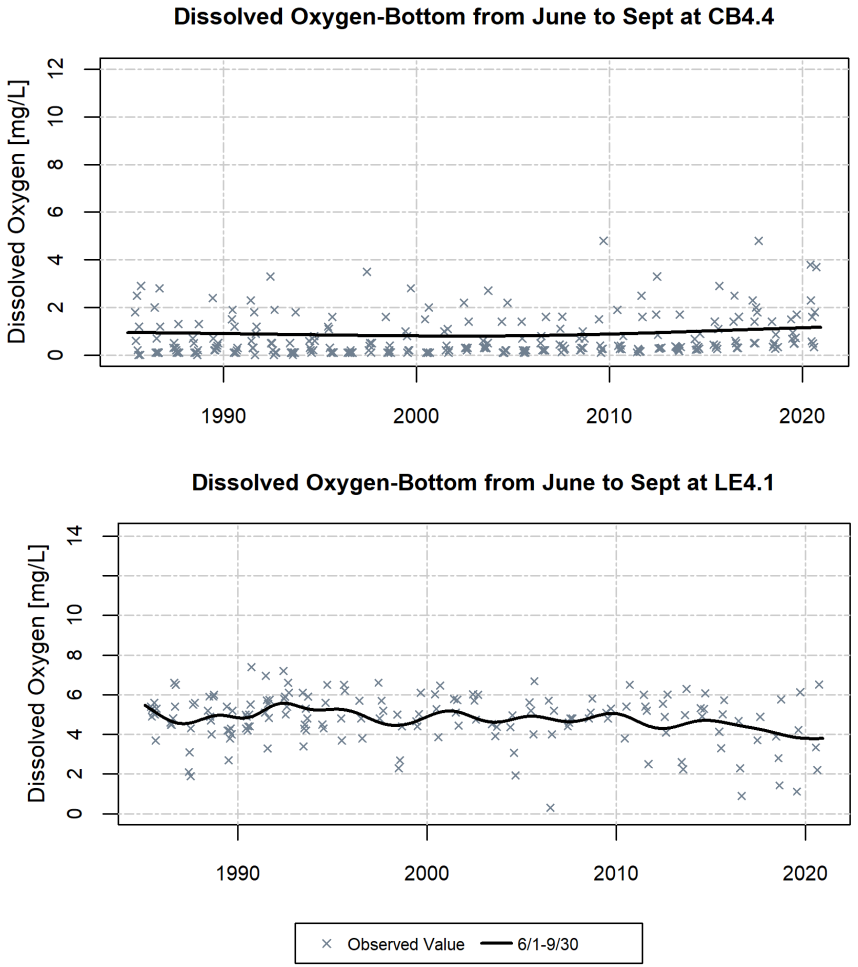

https://baytrends.chesapeakebay.net/baytrendsmap/

Next steps and Team

- 2021 Tidal Trends will be released by November
  - Very likely to be included this year: 18 Washington DC stations in Potomac and Anacostia for some parameters
- Update tributary summaries with the new trends (next presentation)

Tidal Trends collaborators:

- CBP office: Breck Sullivan (USGS), Vanessa Van Note (EPA), Rebecca Murphy (UMCES, rmurphy@chesapeakebay.net)
- States & DC: Renee Karrh (MDDNR), Mike Lane (ODU), Cindy Johnson (VADEQ), Efeturi Oghenekaro, Blessing Edje and George Onyullo (DOEE), Mukhtar Ibrahim and Karl Berger (COG)
- Consultants: Elgin Perry (independent), Jon Harcum and Erik Leppo (Tetra Tech)