Seasonal forecasts of Chesapeake Bay hypoxia

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Chesapeake Bay hypoxia forecasting model

Driver:

Jan-May average
Susquehanna TN load

➡️

Calibration target:

Mean July hypoxic volume (HV)
([DO] < 2 mg/L)

Model output:

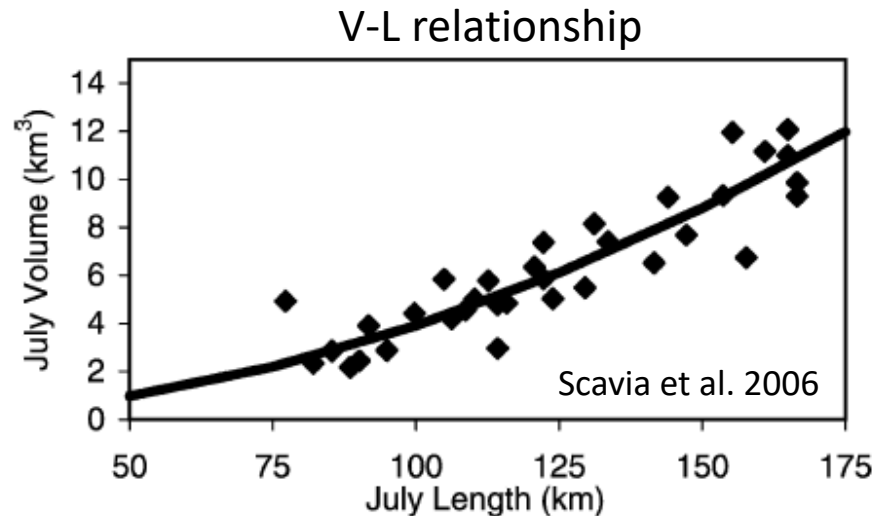Average subpycnocline
[DO] as a function of
distance from TN source

⬇️

Hypoxic length = sum
of all segments with
[DO] < 2 mg/L

➡️

V-L relationship

Scavia et al. 2006

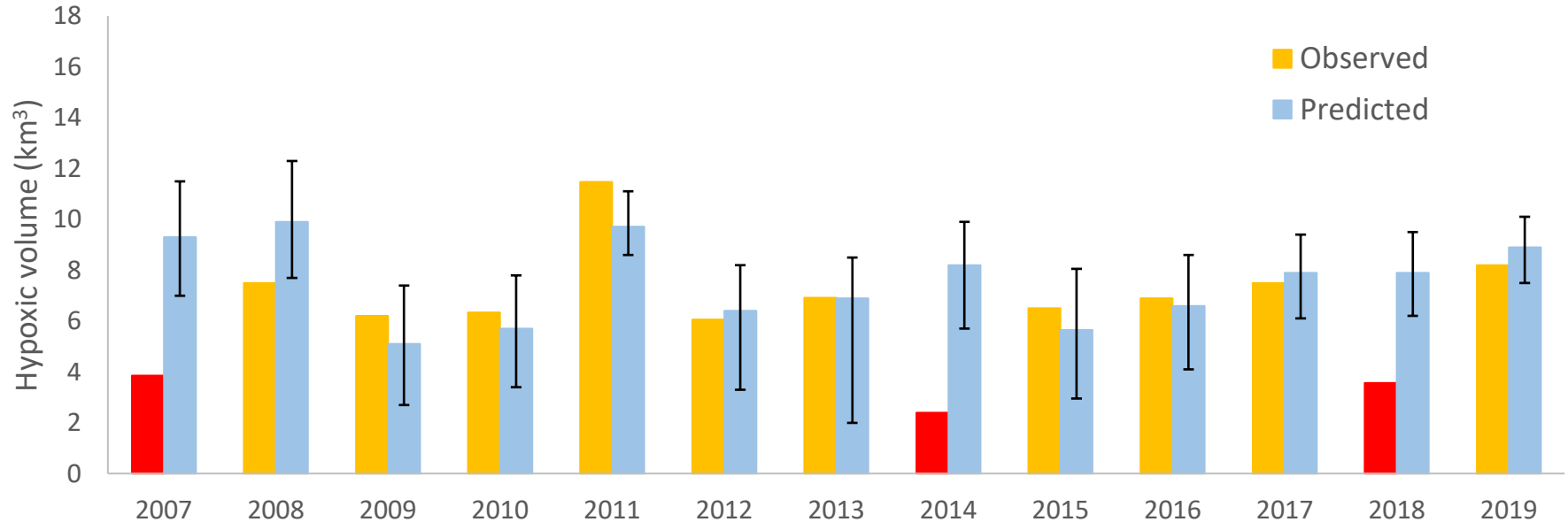July Volume (km³) vs July Length (km)

Hypoxic length → **hypoxic volume**
through empirical V-L relationship

Chesapeake Bay hypoxia forecasting model

Forecasting track record for Jul HV

Calibration exercises

1. HV metrics:
Average Summer (km^3), Total Annual (km^3 * days)

2. HV estimates
3 sets of interpolated estimates: **Murphy** et al., 2011, **Bever** et al.. 2013 and **Zhou** et al., 2014

3. Load sources:
Sus, Pot, Sus+Pot, Sus+Pot+PS, All 9 RIM rivers, All 9 RIM rivers + PS

4. Load time frames:
Oct-May (all possible combinations)
Oct-Jun (all possible combinations)

Updated model version

Driver:

Jan-May average
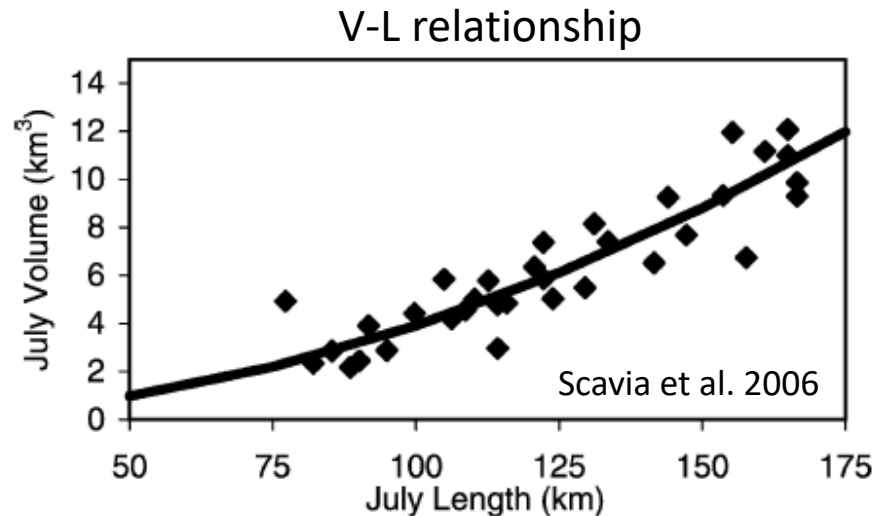~~**Susquehanna TN load**~~
**All 9 RIM rivers + PS
TN load**

➡️

Calibration target:

~~**Mean July hypoxic volume (HV)**~~
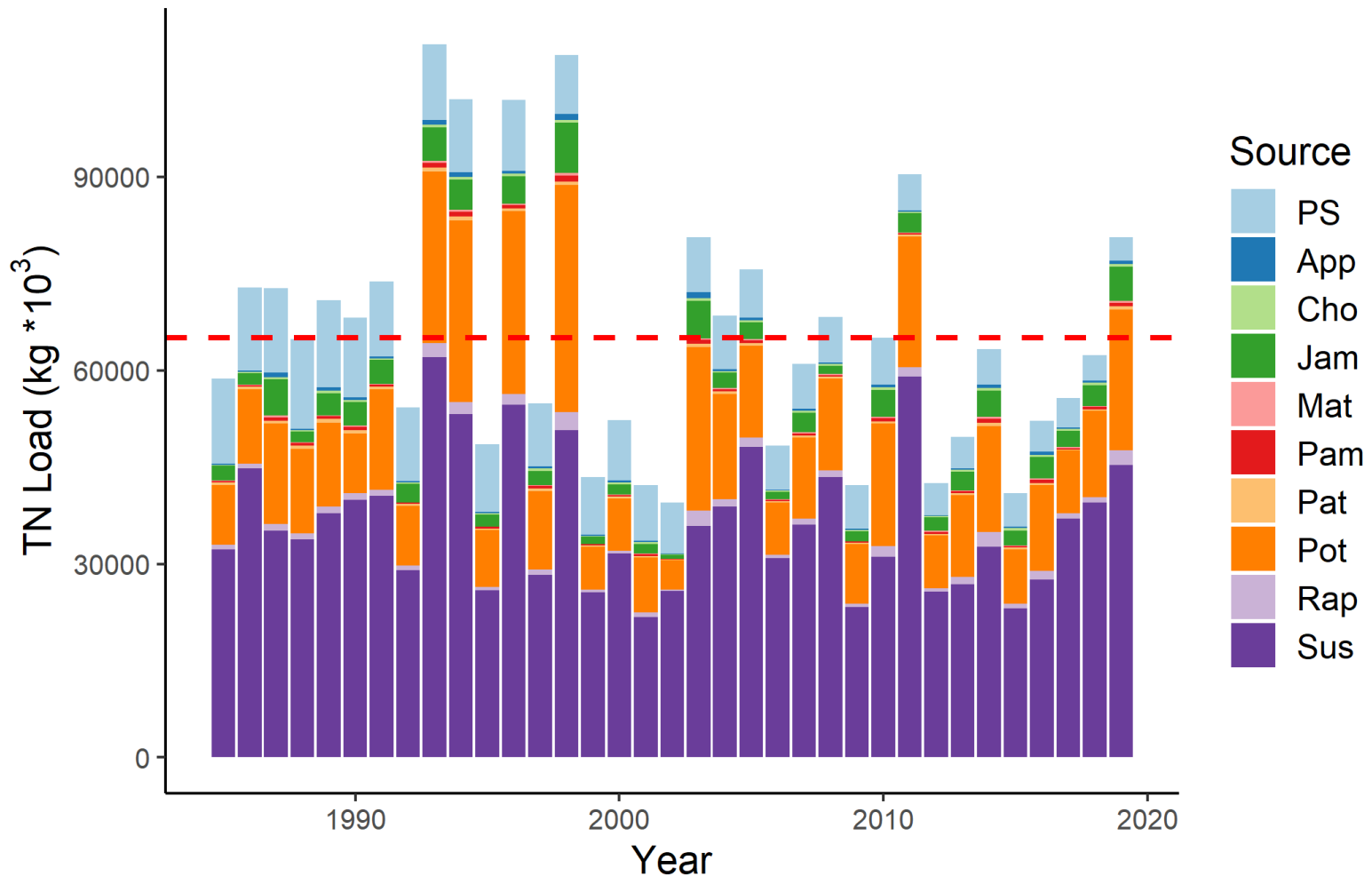**Total Annual HV**
([DO] < 2 mg/L)

⬇️

Model output:

Average subpycnocline
[DO] as a function of
distance from TN source

V-L relationship

Scavia et al. 2006

⬇️

Hypoxic length = sum
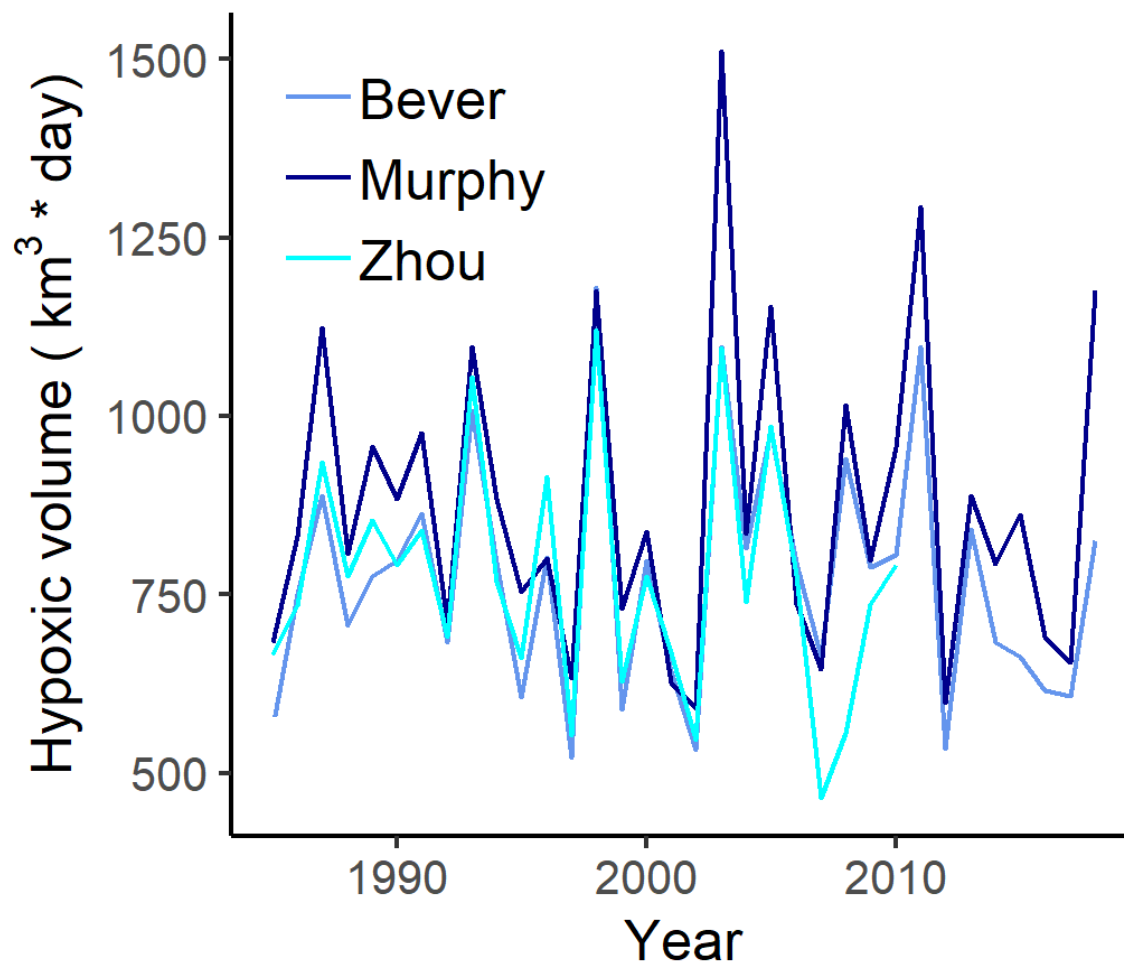of all segments with
[DO] < 2 mg/L

➡️

Hypoxic length → **hypoxic volume**
through empirical V-L relationship
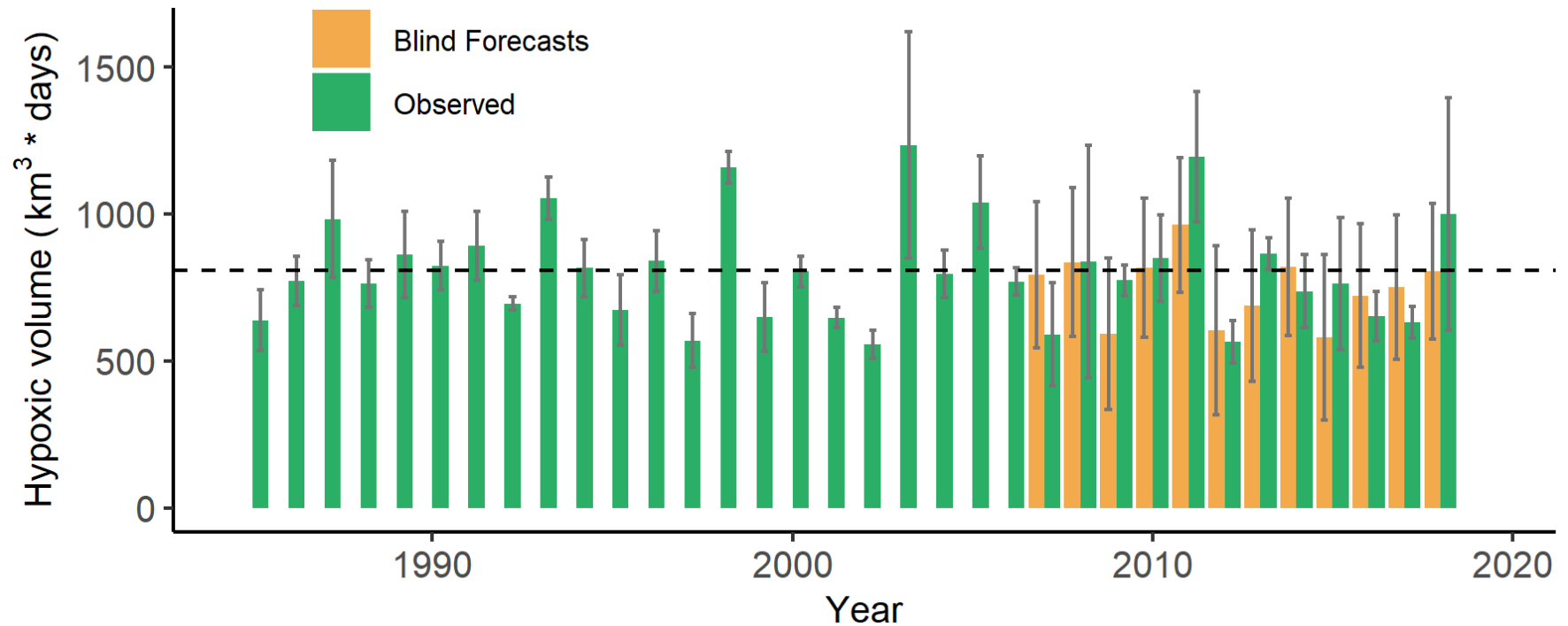
5

Jan-May TN Load by Source

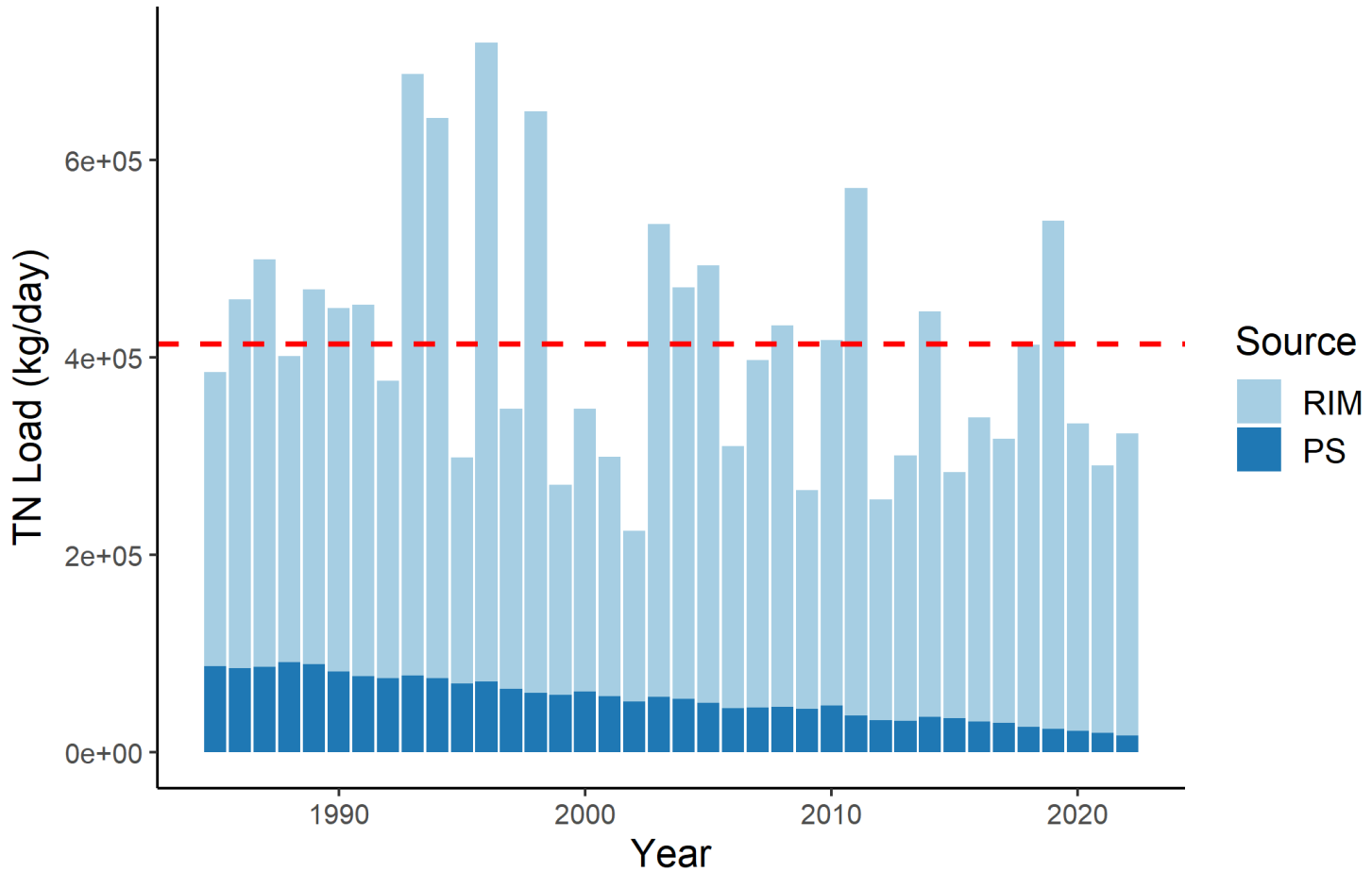PS = Point Sources discharging below non-tidal river monitoring stations
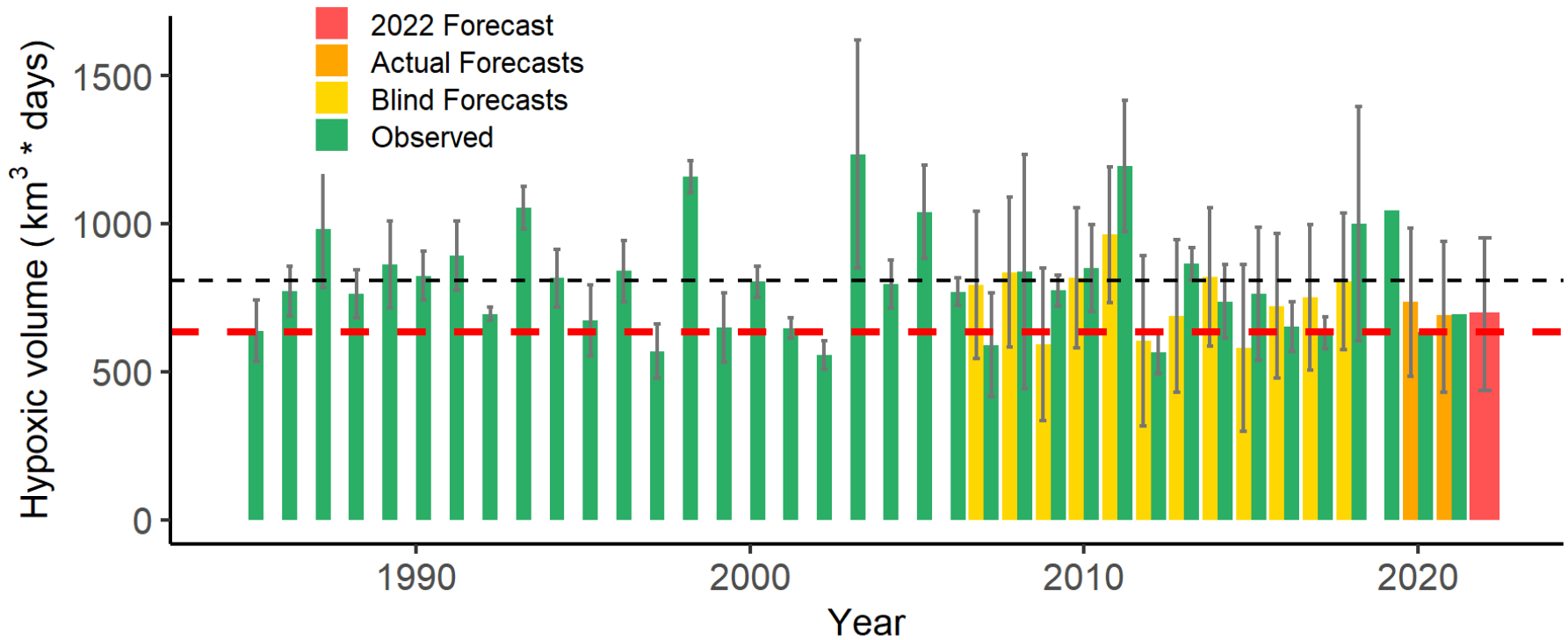
Total Annual HV by estimation method

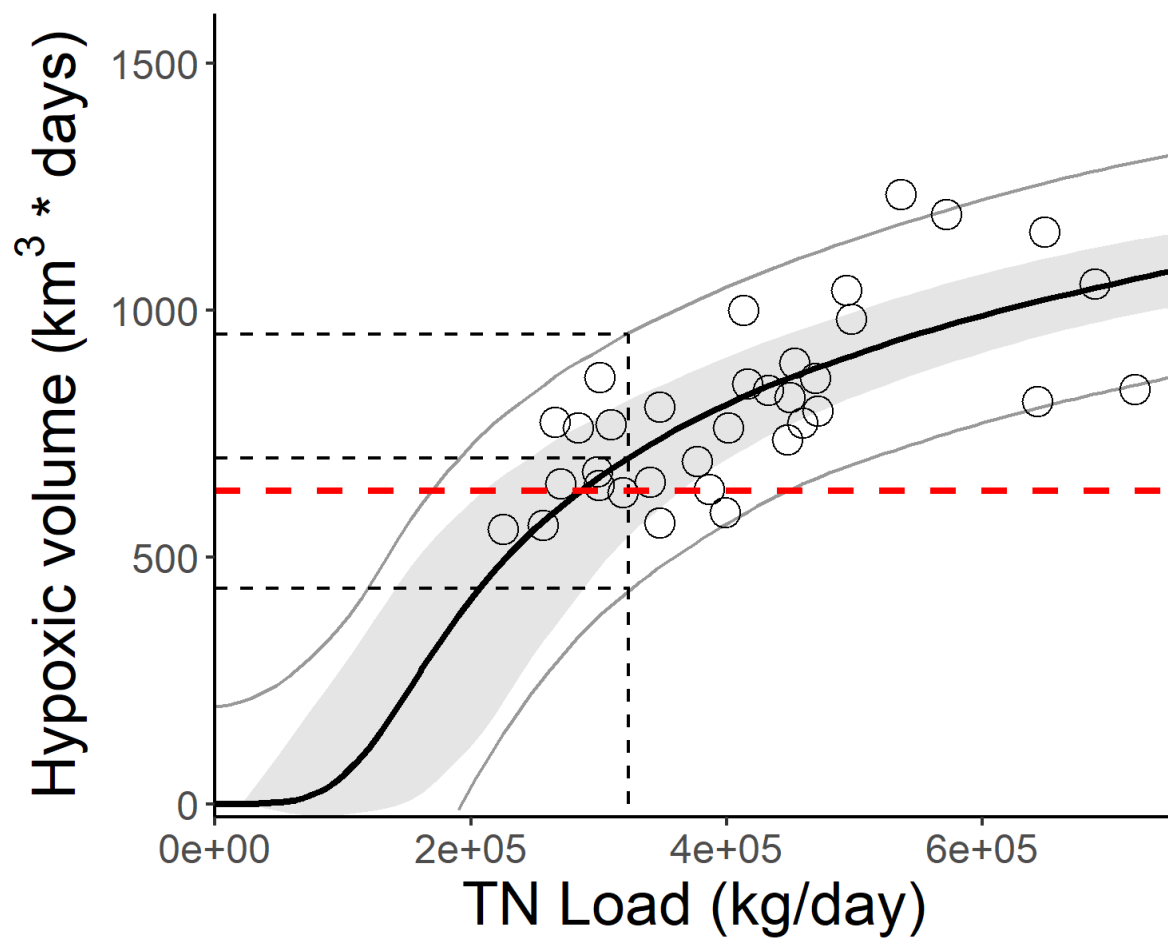# Creating a model track record – blind forecasts

2022 Jan-May TN load

2022 Forecast

2022 Forecast

CBP Press Release

Media Contact
Rachel Felver
Director of Communications
(410) 267-5740

Chesapeake Bay Program
Science. Restoration. Partnership.

Chesapeake Bay "dead zone" predicted to be 13% lower than average
Low oxygen conditions also expected to start later in the season

Media Release | 06-28-22

Annapolis, MD—Researchers from the Chesapeake Bay Program, the University of Maryland Center for Environmental Science, University of Michigan and U.S. Geological Survey announced today that they are predicting this summer's dead zone to be smaller than the long-term average taken between 1985 and 2021. This is due to the below average amount of water entering the Bay from the watershed's tributaries this past spring, as well as decreased nutrient and sediment pollution from jurisdictions within the watershed.

End-of-summer assessment (2021)

Media Contact
Rachel Felver
Director of Communications
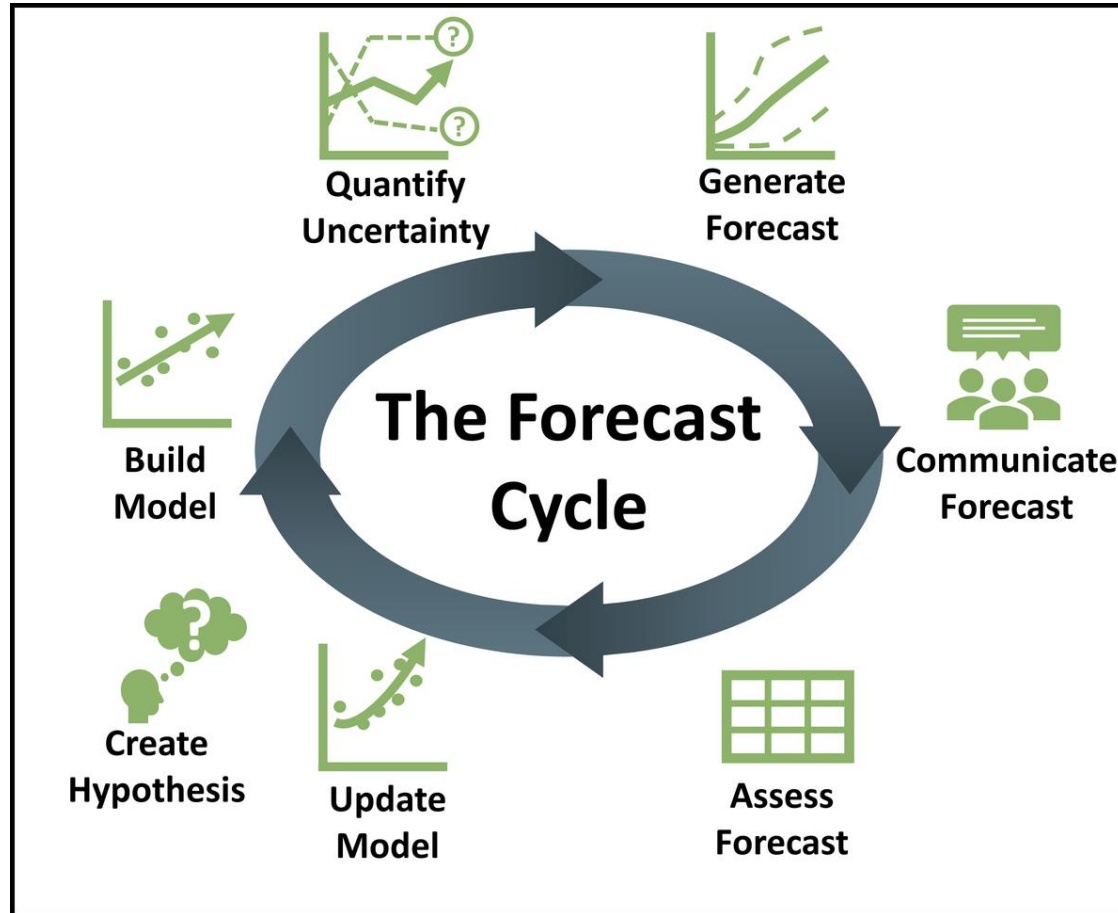rfelver@chesapeakebay.net
(443) 892-0205

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Changing weather patterns mix up the size, duration of annual dead zone

A lengthier, but average dead zone was recorded in 2021

Annapolis, MD – Today, Chesapeake Bay Program partners released information on the state of the 2021 Chesapeake Bay "dead zone". While last year's dead zone was the second smallest observed since 1985, this year's assessment paints a more complex picture of the Bay's health.

Ecological forecasting best practices

Forecasting resources

USGS – Streamflow and load data

Eyes on the Bay – MD Tidal Water Quality Data

VECOS – Virginia Estuarine and Coastal Observing System

University of Michigan Forecast Page – Forecast results

VIMS – Chesapeake Bay Environmental Forecast System

Thank You!

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