

Atmospheric Deposition Loads of Nitrogen to the Chesapeake Watershed and Tidal Waters

Kyle Hinson, Gopal Bhatt, Jesse Bash, Gary Shenk, Lewis Linker

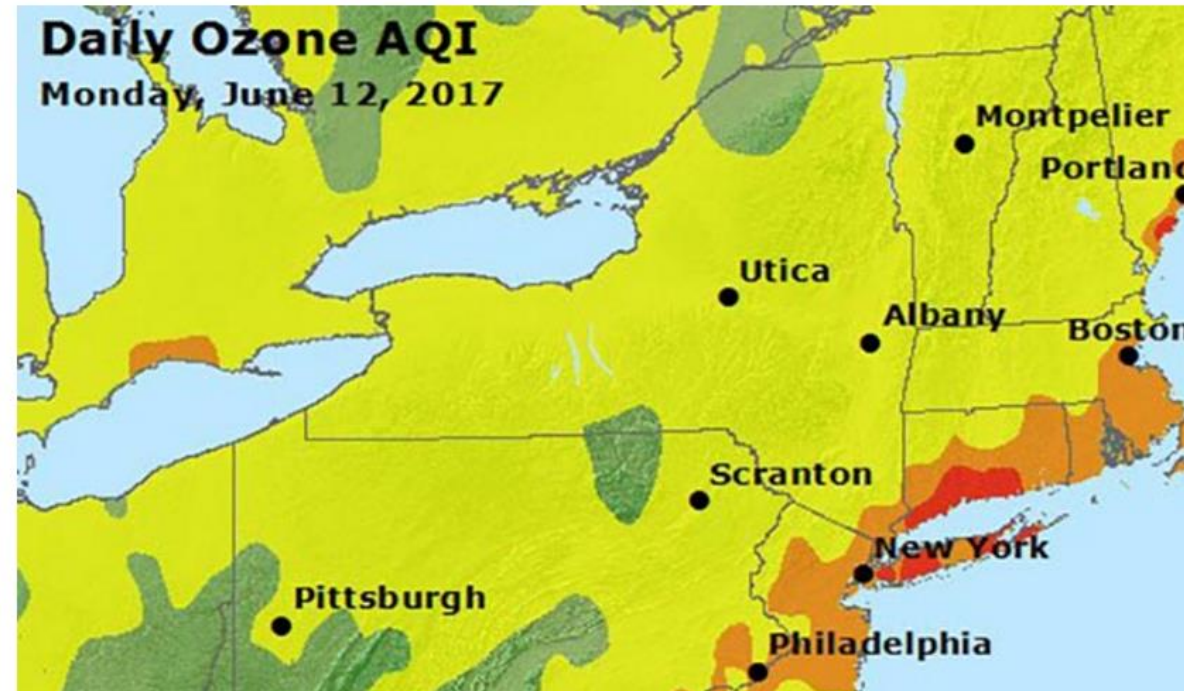
June 14, 2017

Outline

- Watershed Deposition: Methods and Results
- Bay Deposition: Methods and Results

Category 6

Breaking news + deep dives on weather, climate, & air quality

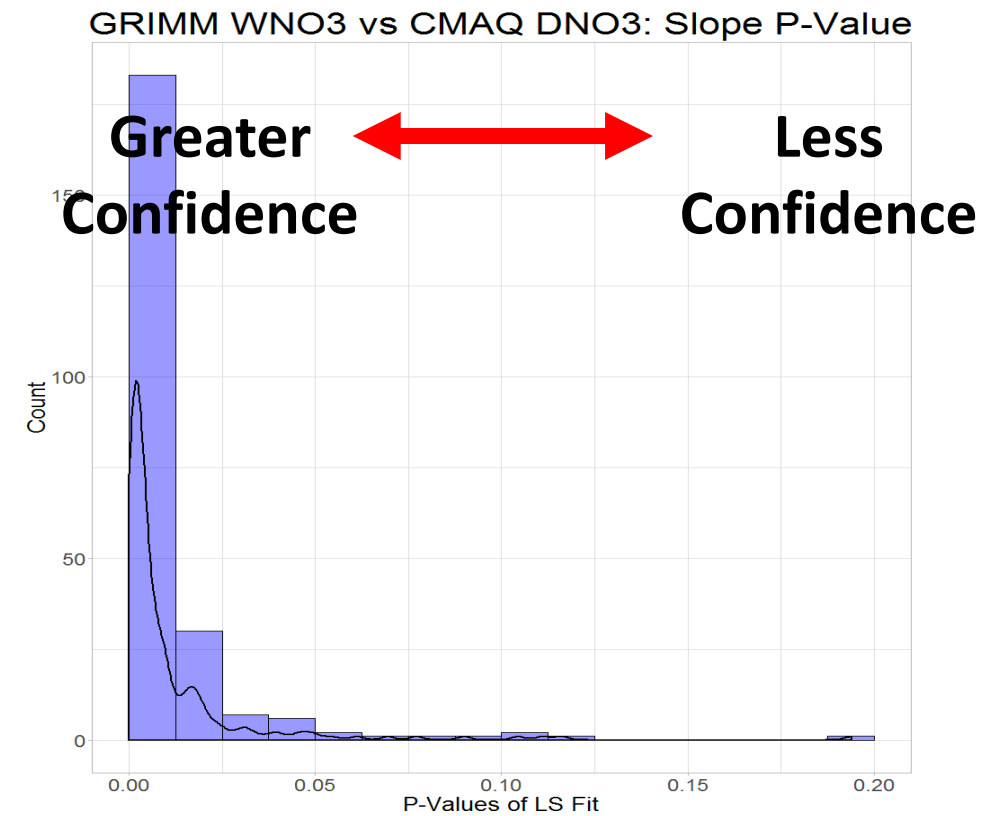
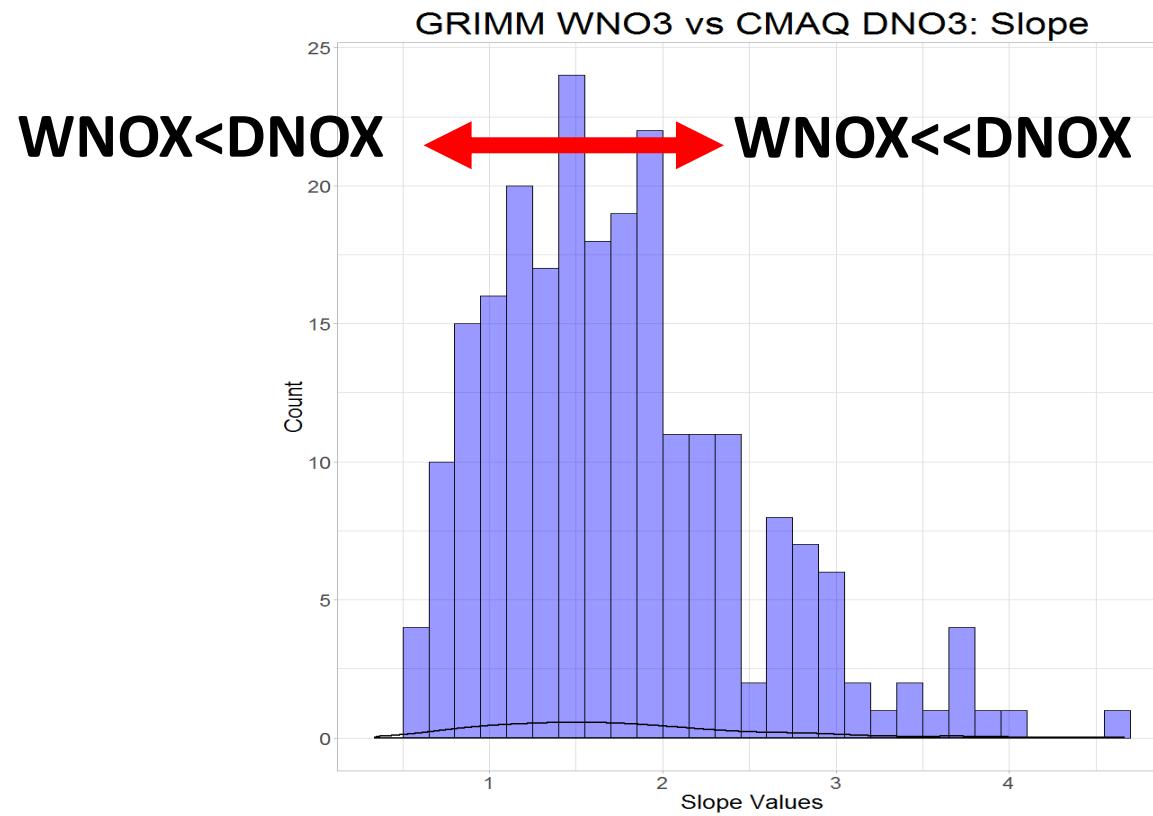


Record Heat Brings First Serious Air Pollution Episode of 2017 to Northeast, Midwest

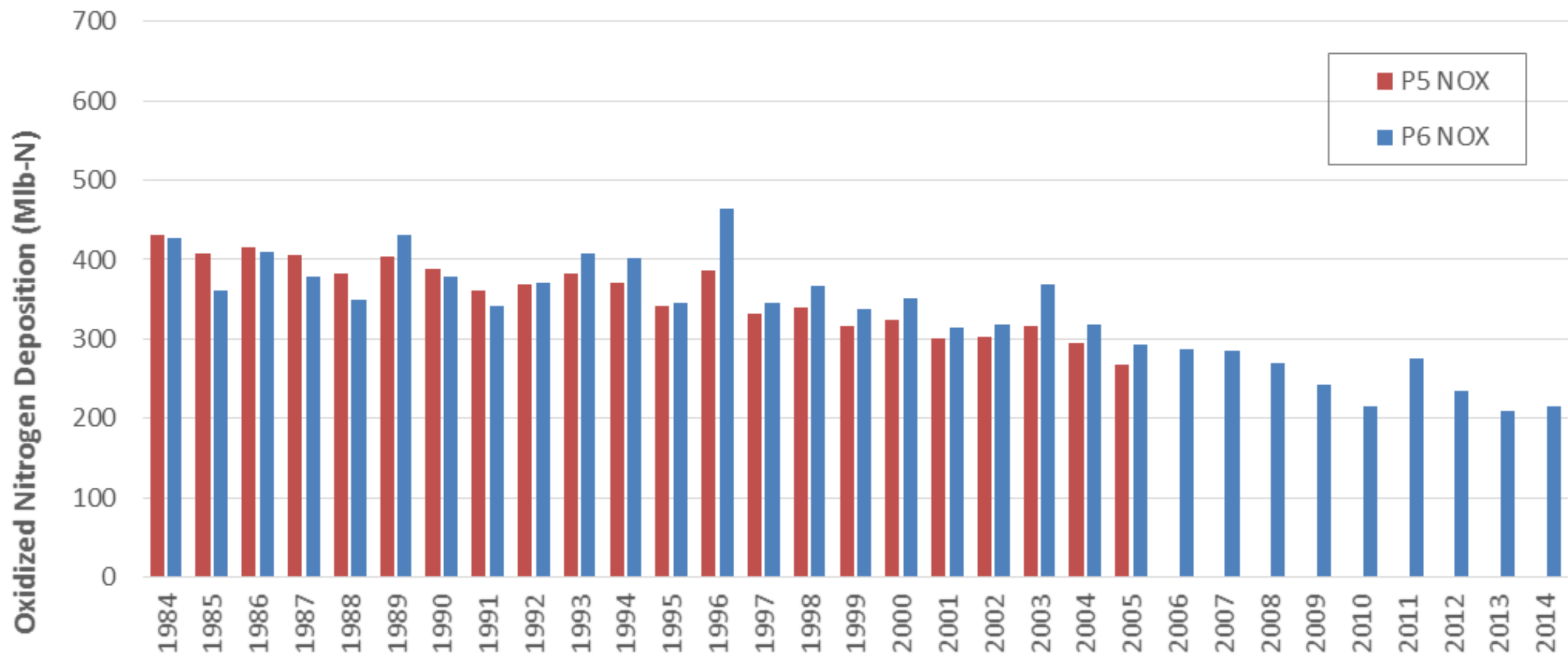
Dr. Jeff Masters - June 13, 2017, 3:47 PM

Watershed Deposition

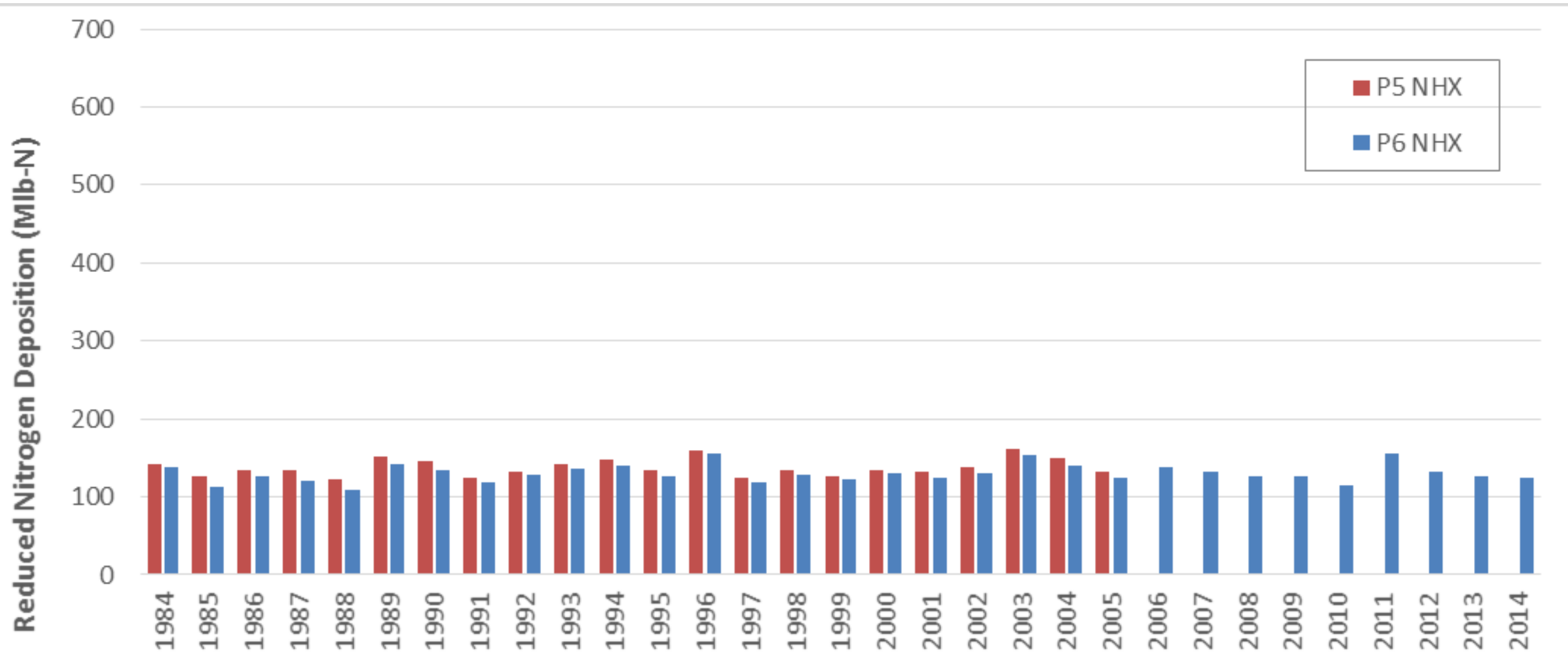
- A dry NOX dataset was developed by utilizing the relationship between CMAQ dry NOX and a time series of wet NOX provided by Jeff Grimm
- Dry NHX was held constant throughout the watershed



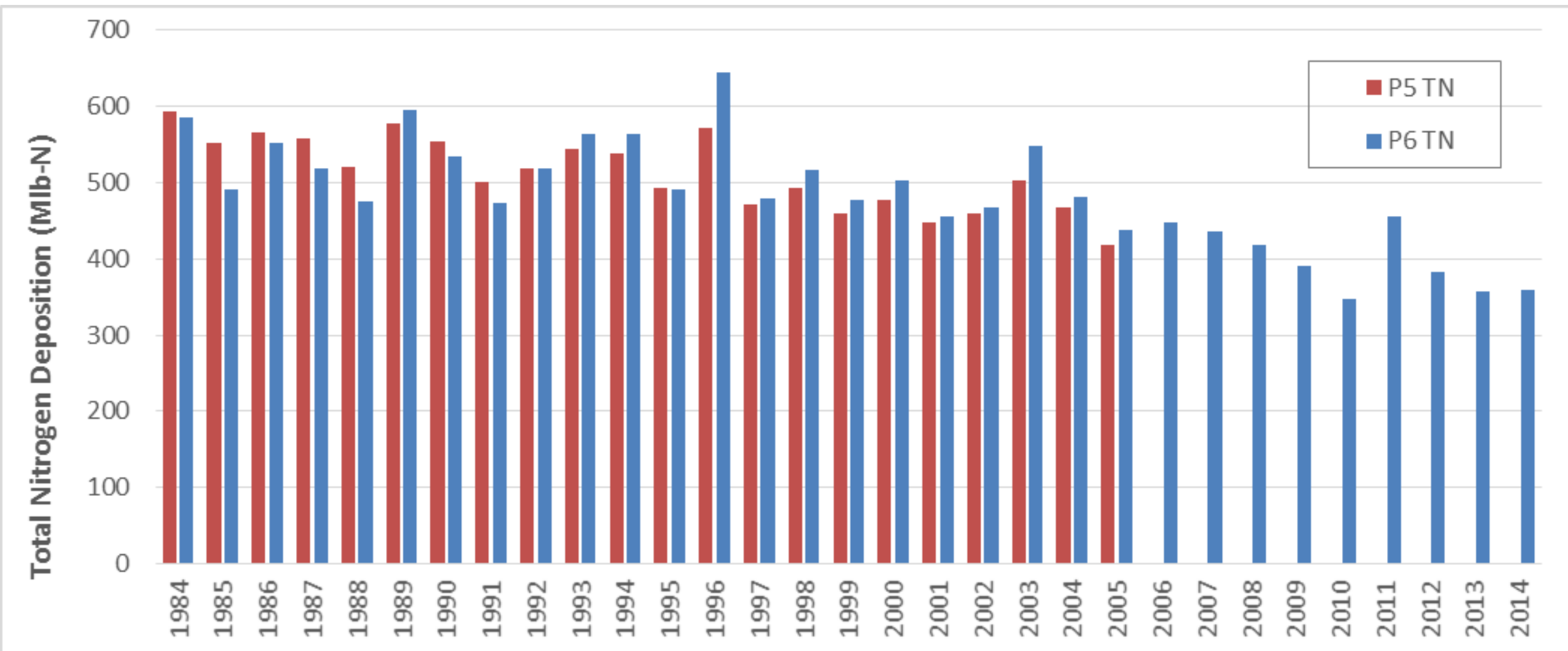
NOX Deposition Datasets



NHX Deposition Datasets

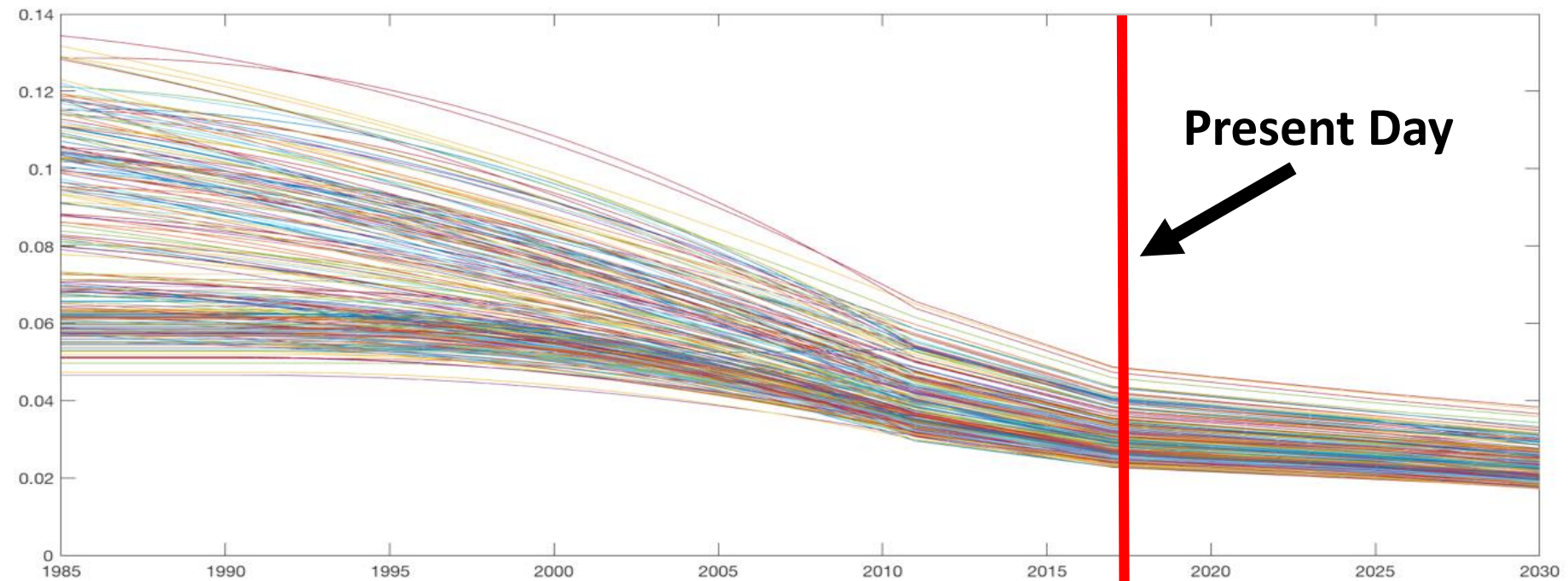


TN Deposition Datasets

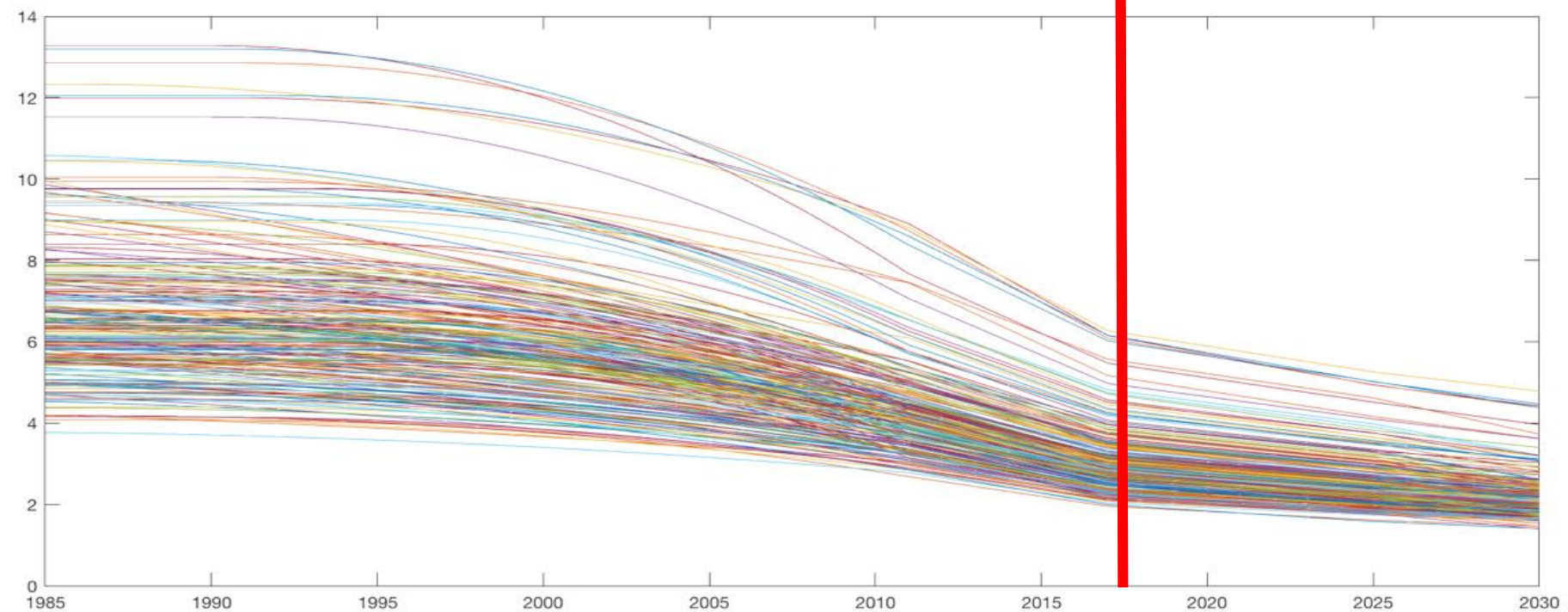


Trends of Watershed Dry Deposition

Wet NOX

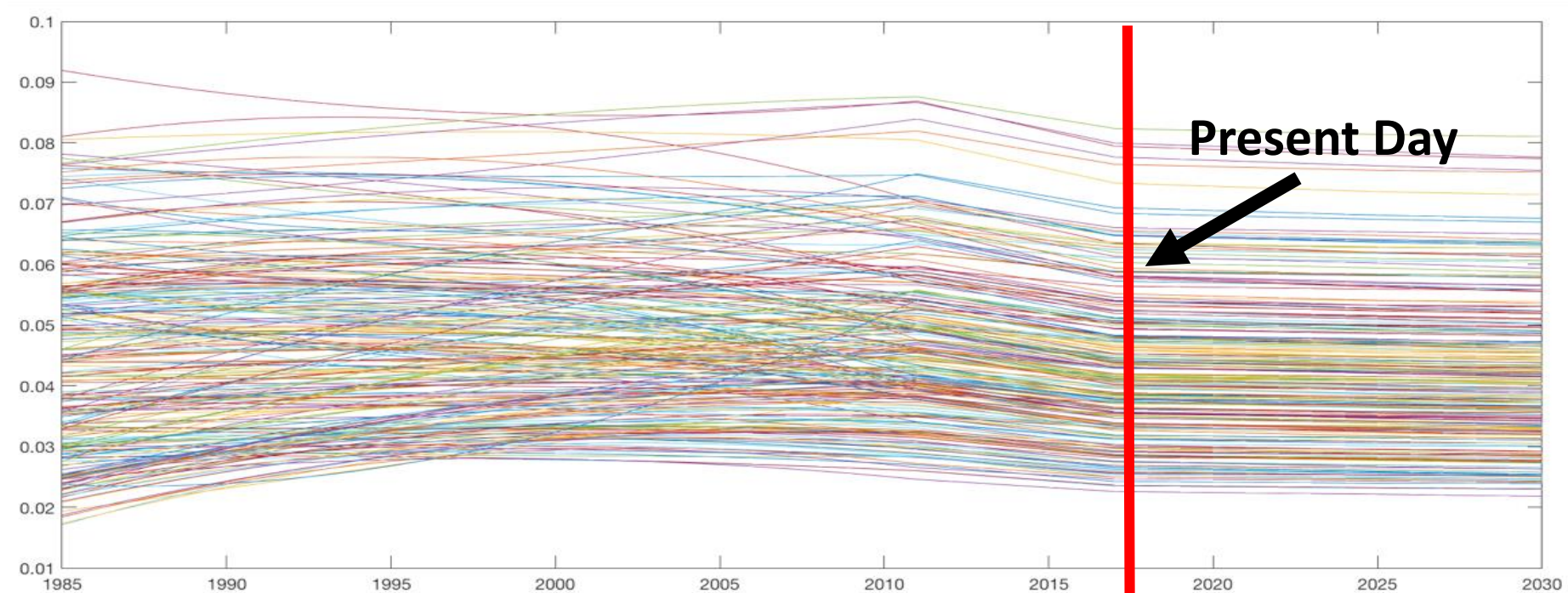


Dry NOX

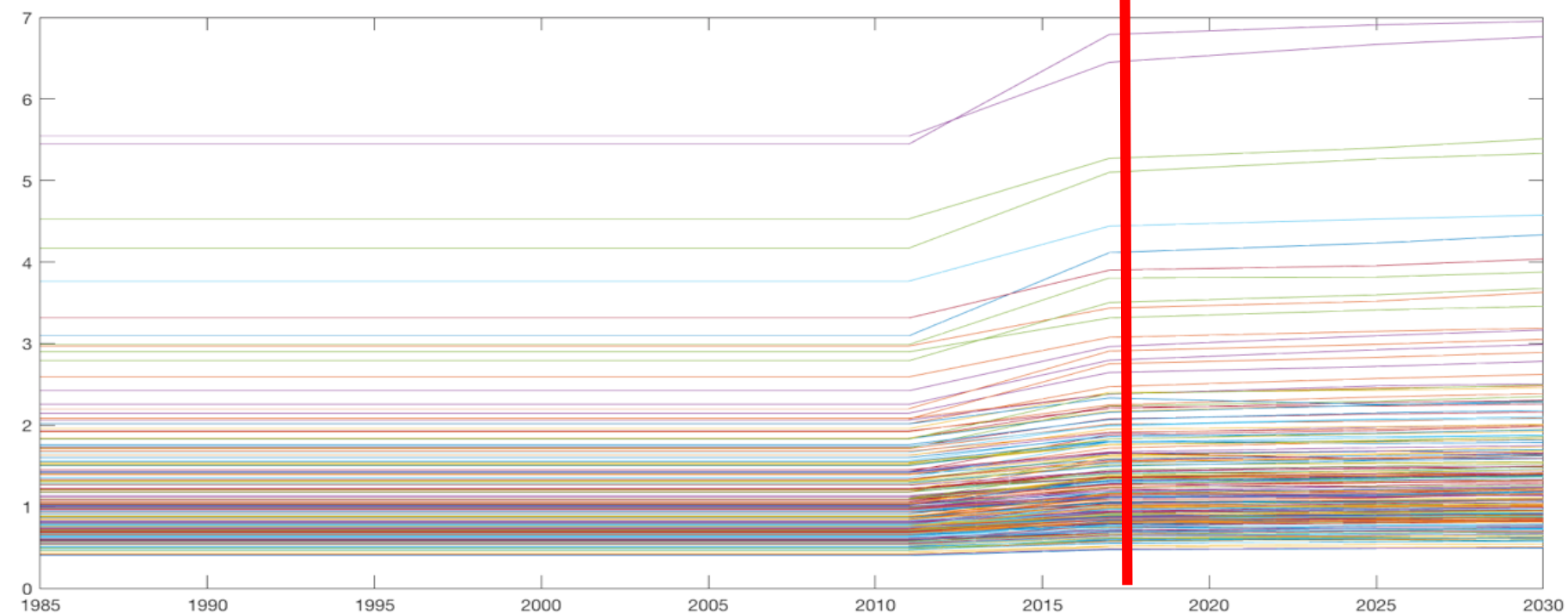


Trends of Watershed
Dry Deposition

Wet NHX



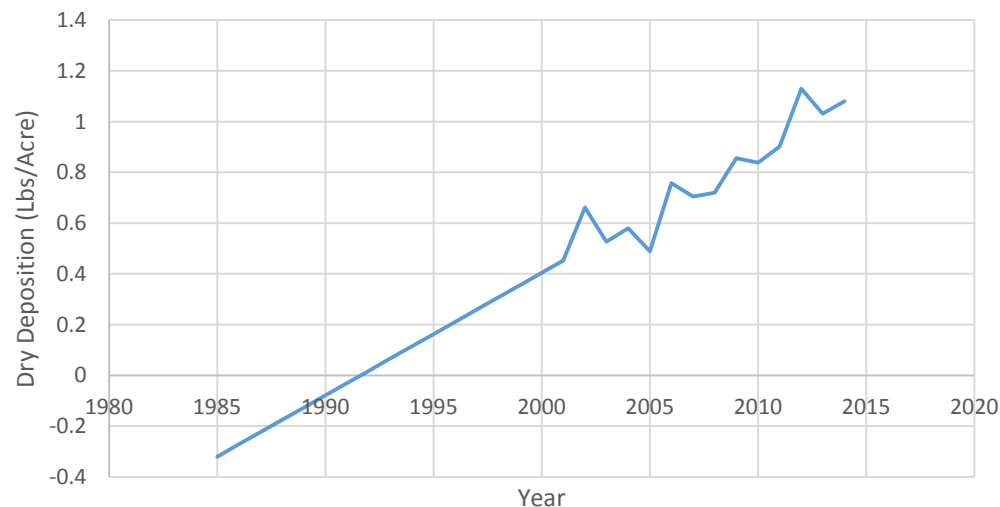
Dry NHX



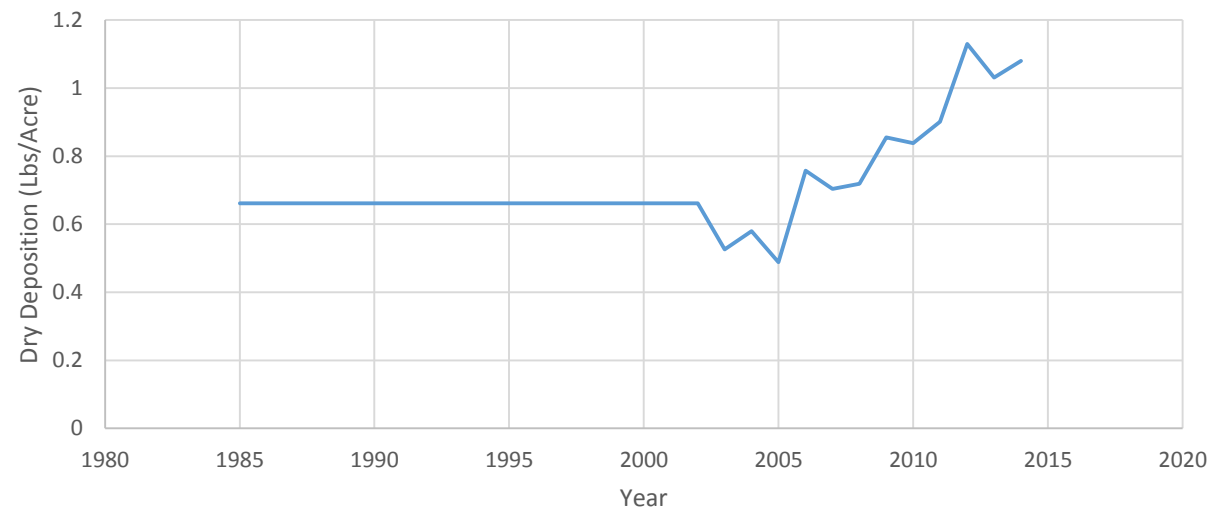
Bay Deposition

- A dry NOX dataset was developed by utilizing the relationship between CMAQ dry NOX and a time series of wet NOX provided by Jeff Grimm (same as watershed)
- Dry NHX was held constant prior to 2002, and a linear regression was used to extrapolate beyond 2012 (end of CMAQ dataset) to 2014
 - Decision made based on input and revision suggested by Dr. Marjy Friedrichs
 - Jesse Bash advised against applying the regression prior to 2002

Bay Dry Ammonia Deposition, Linear Extrapolation



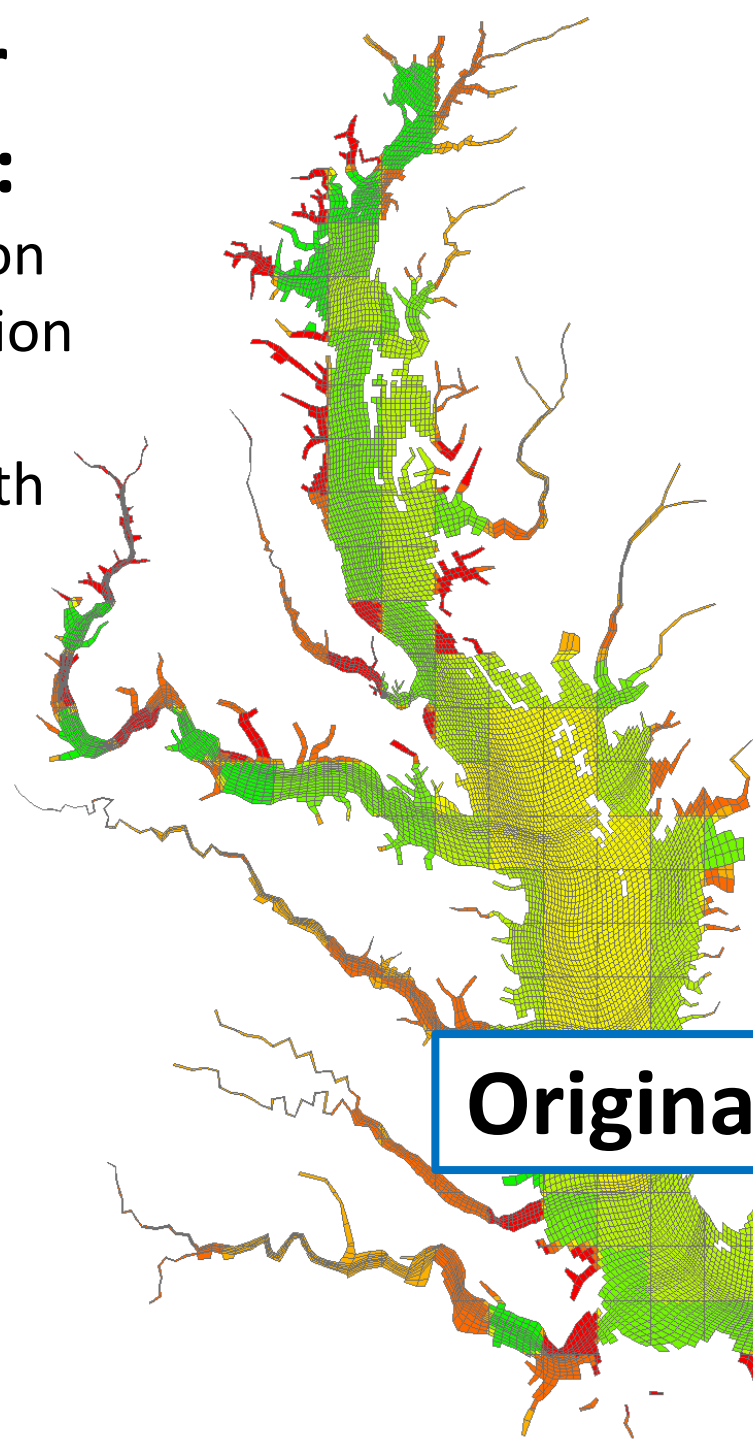
Bay Dry Ammonia Deposition, Linear Extrapolation w/ Constant



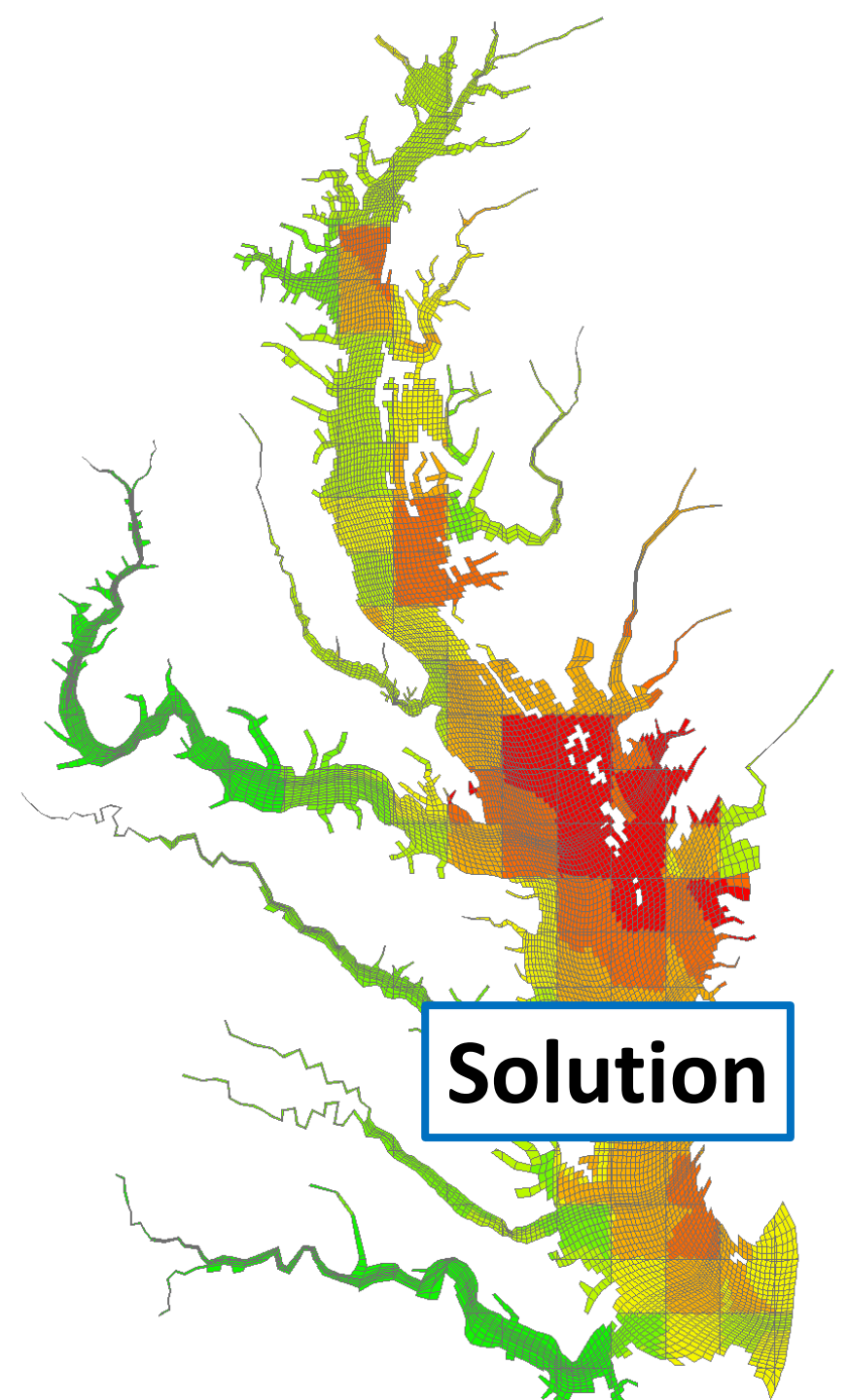
Fix Completed for Spatial Variability:

- Red = More Dry Deposition
- Green = Less Dry Deposition
- Originally faced issues with spatial distribution at the edges of the Bay
- Fix to this error is applied over on the right frame

*Different Scales in maps

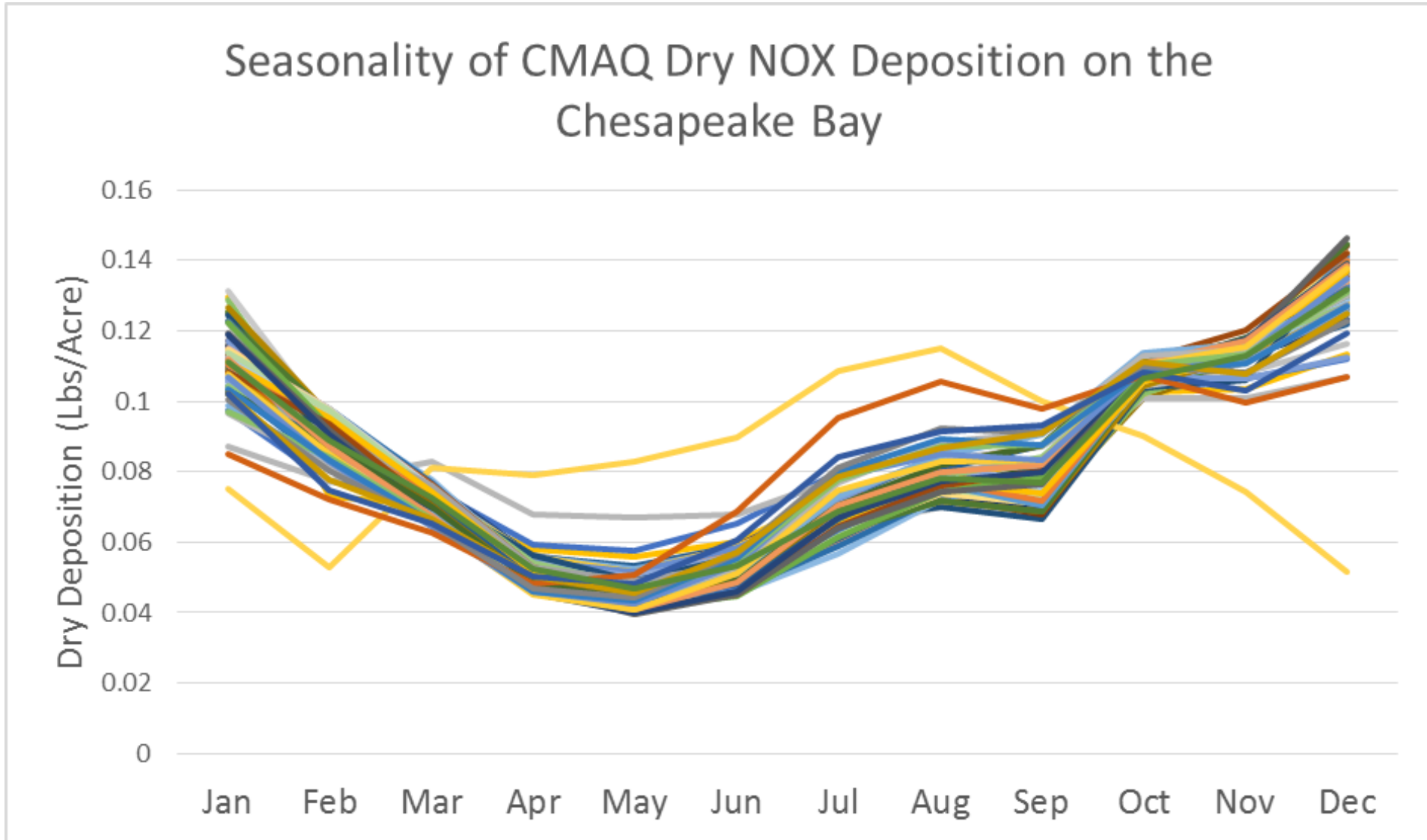


Original

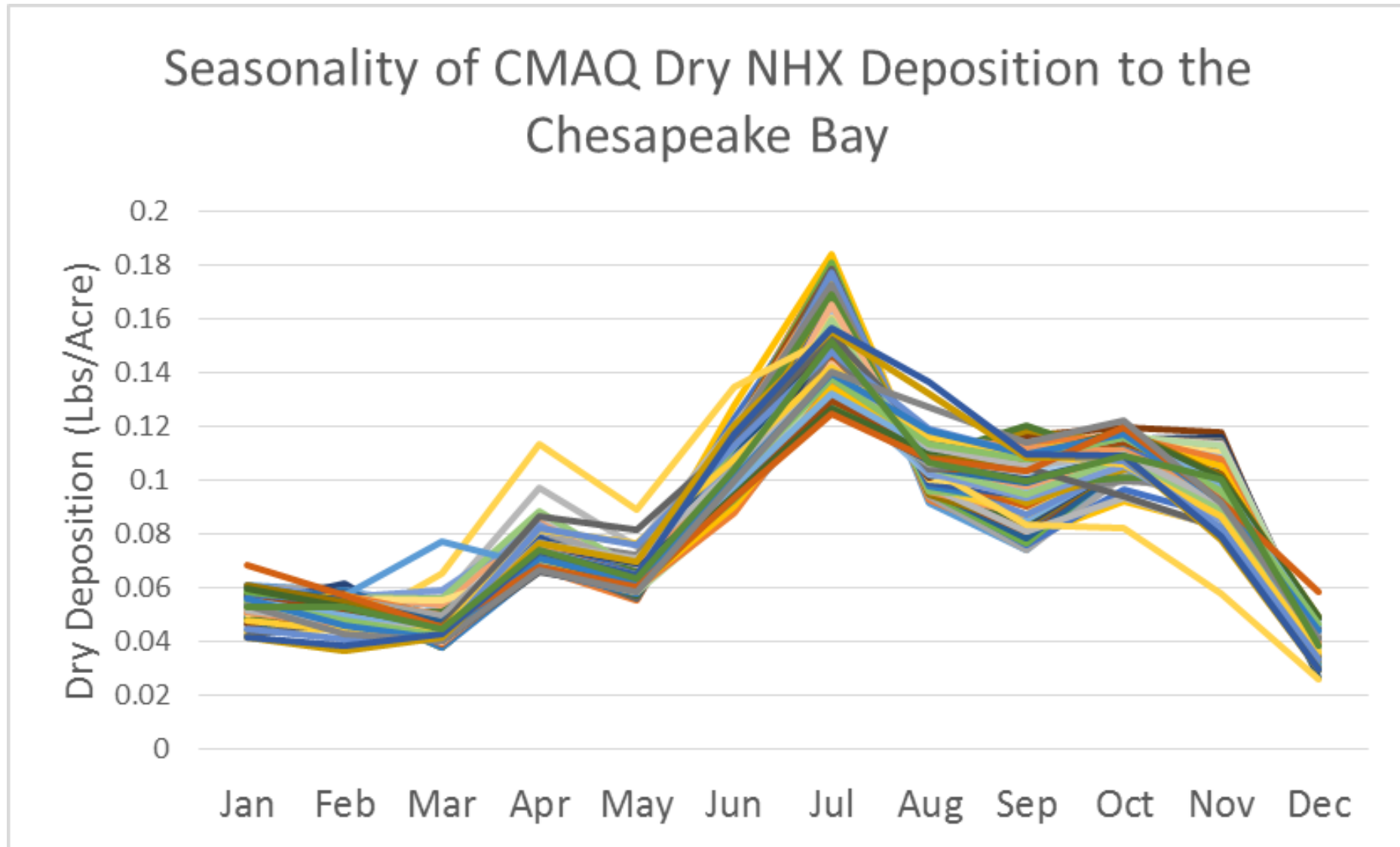


Solution

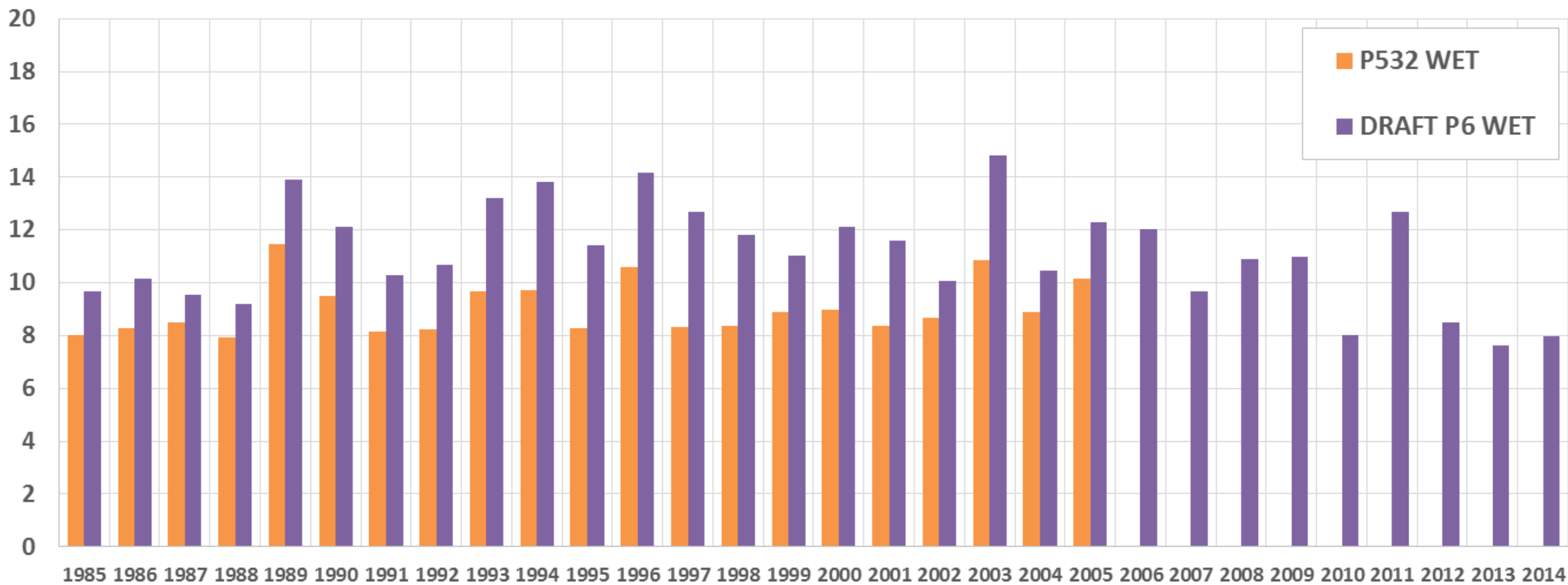
Application of Seasonality to Dataset



Application of Seasonality to Dataset

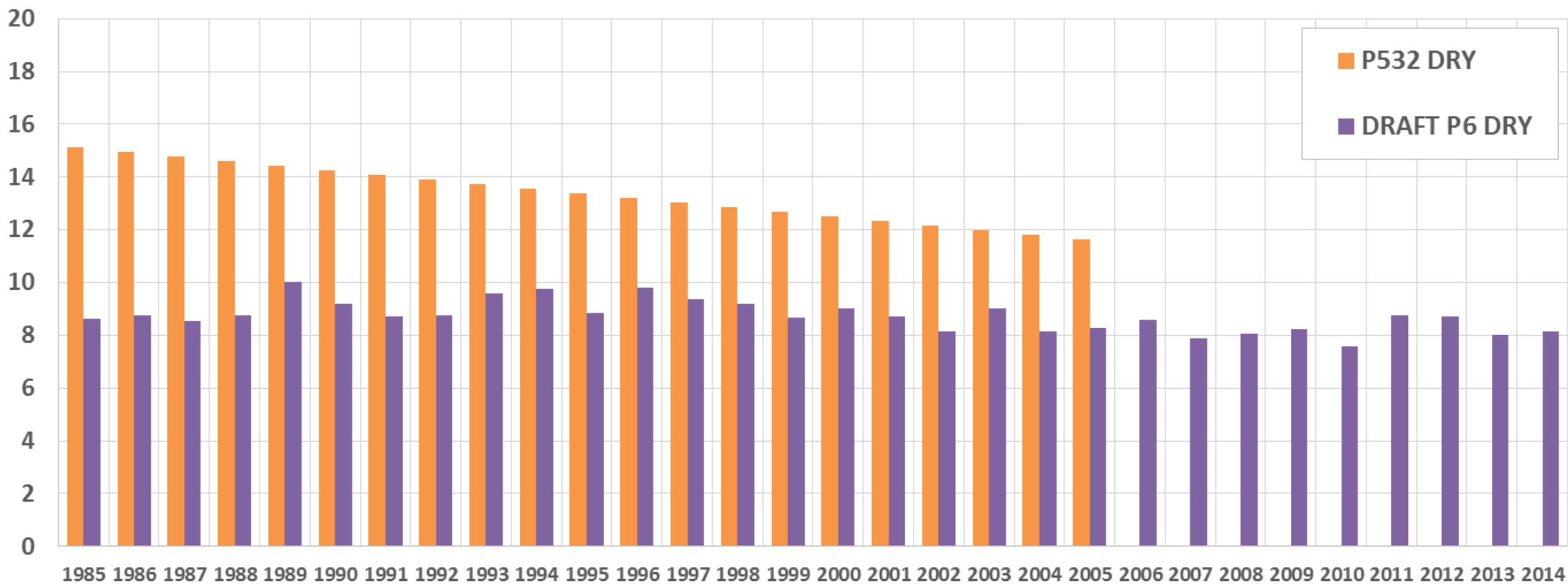


Wet NOX and NHX Deposition in million pounds



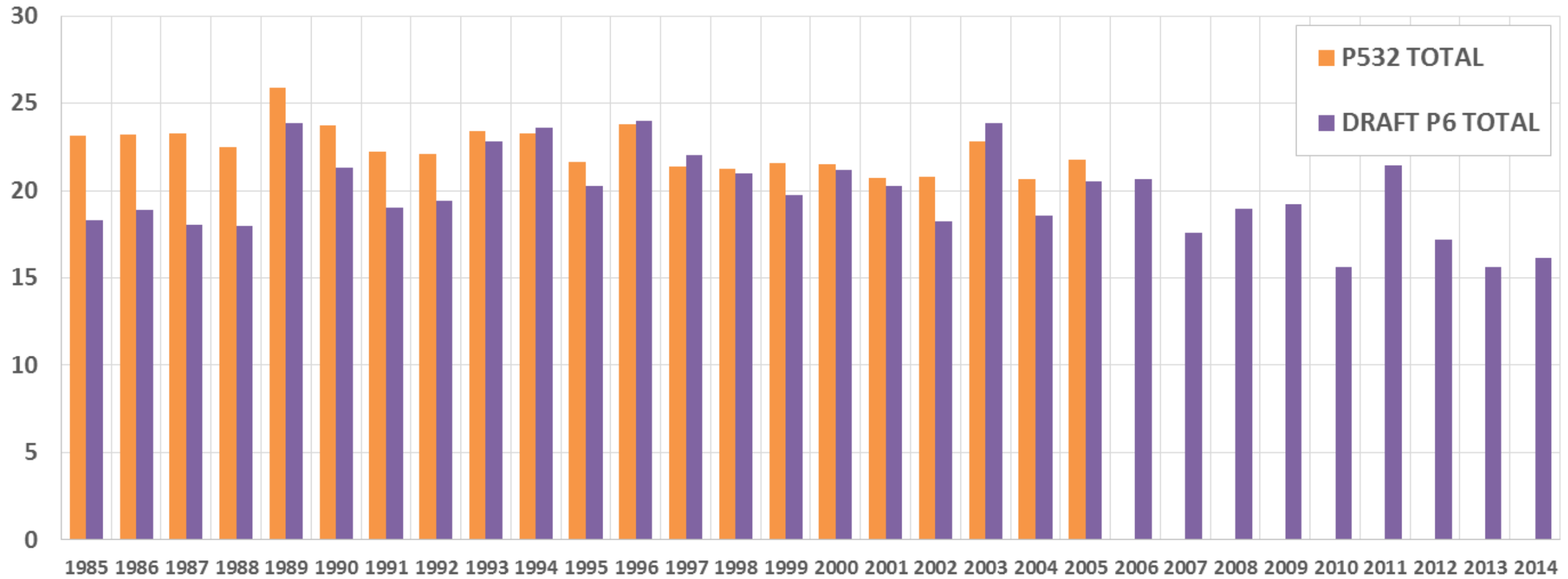
Source: Jeff Grimm

Dry NOX and NHX Deposition in million pounds



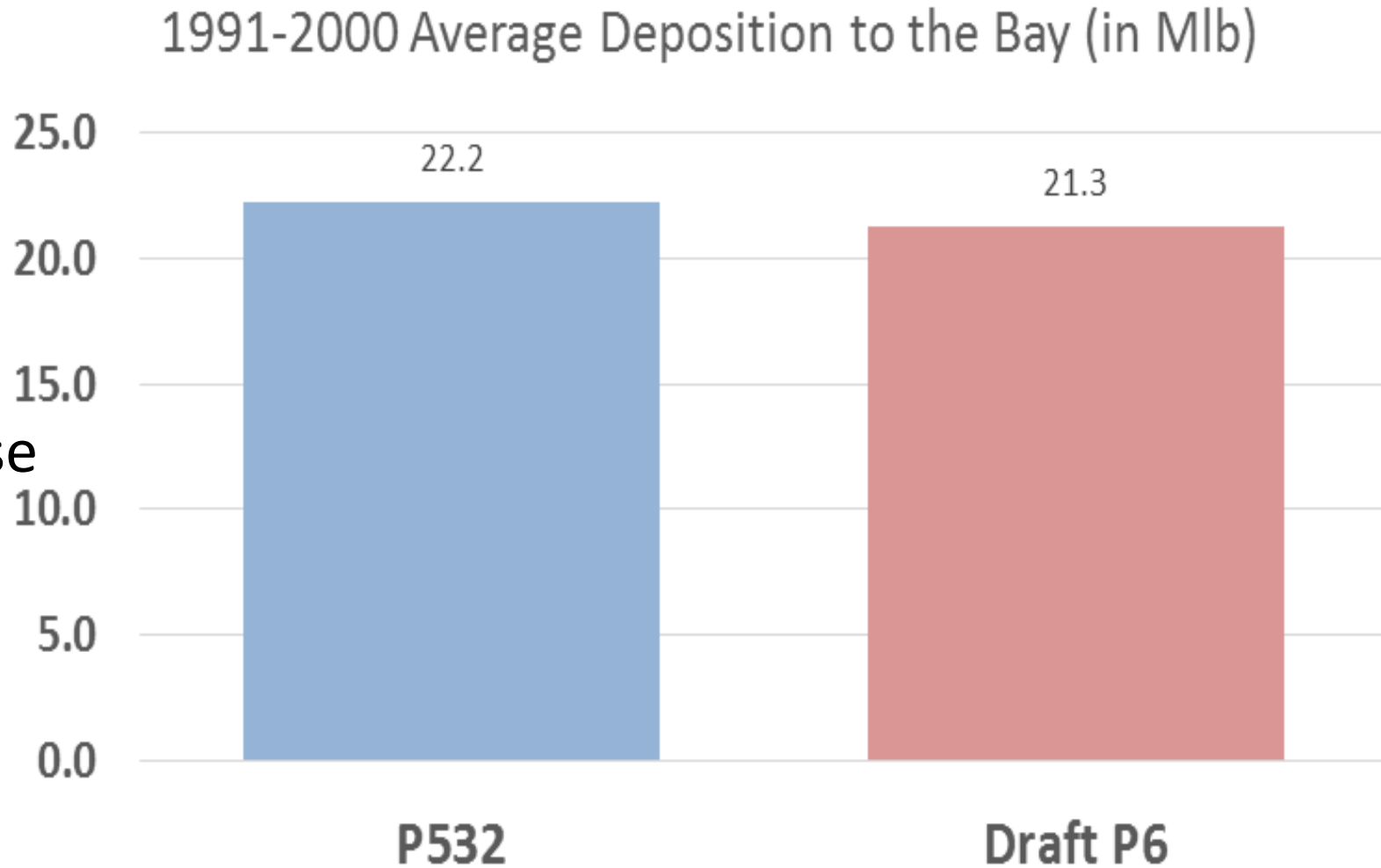
Source: CMAQ 2002-2012, Jesse Bash

Total NOX and NHX Deposition in million pounds

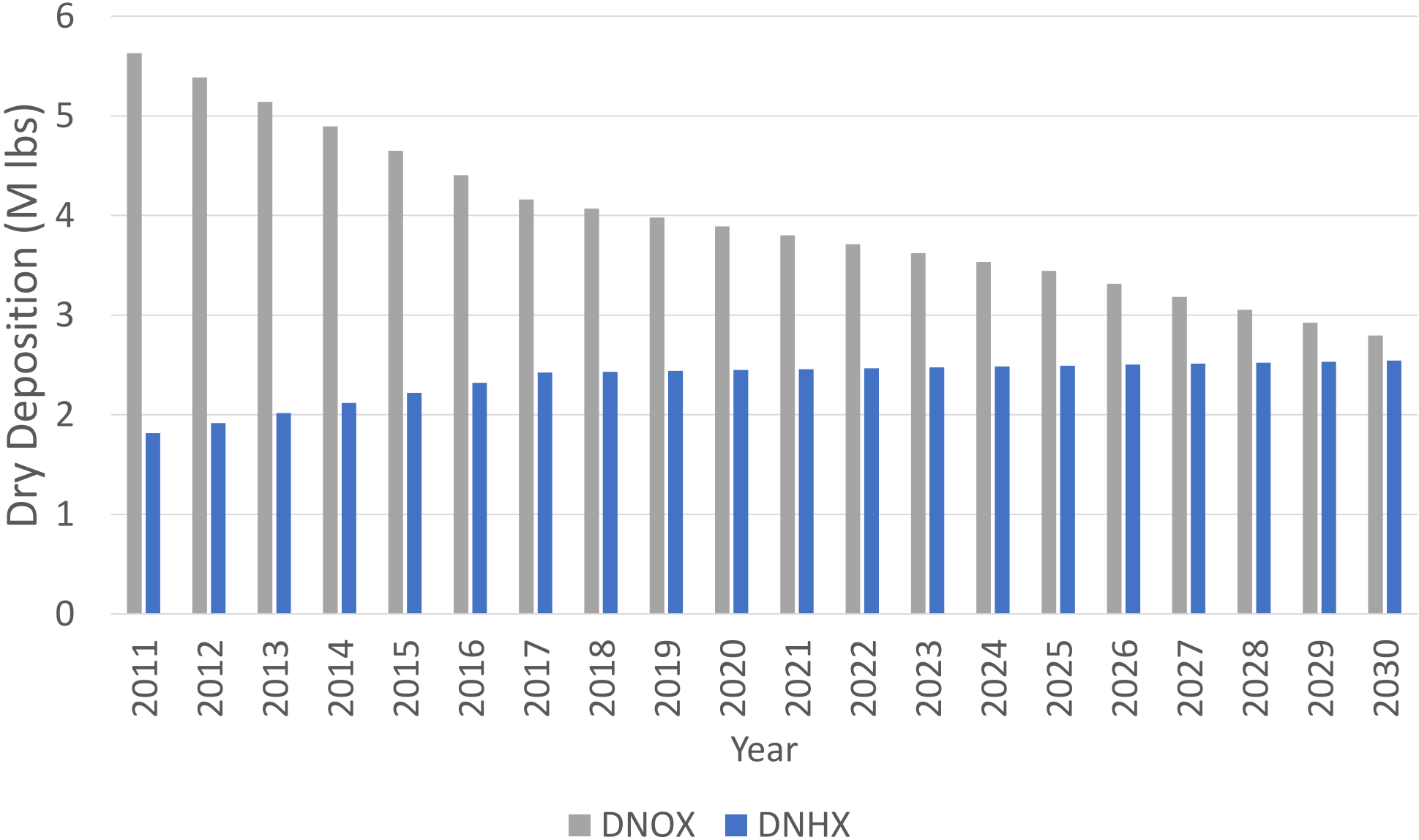


Overall Bay Deposition

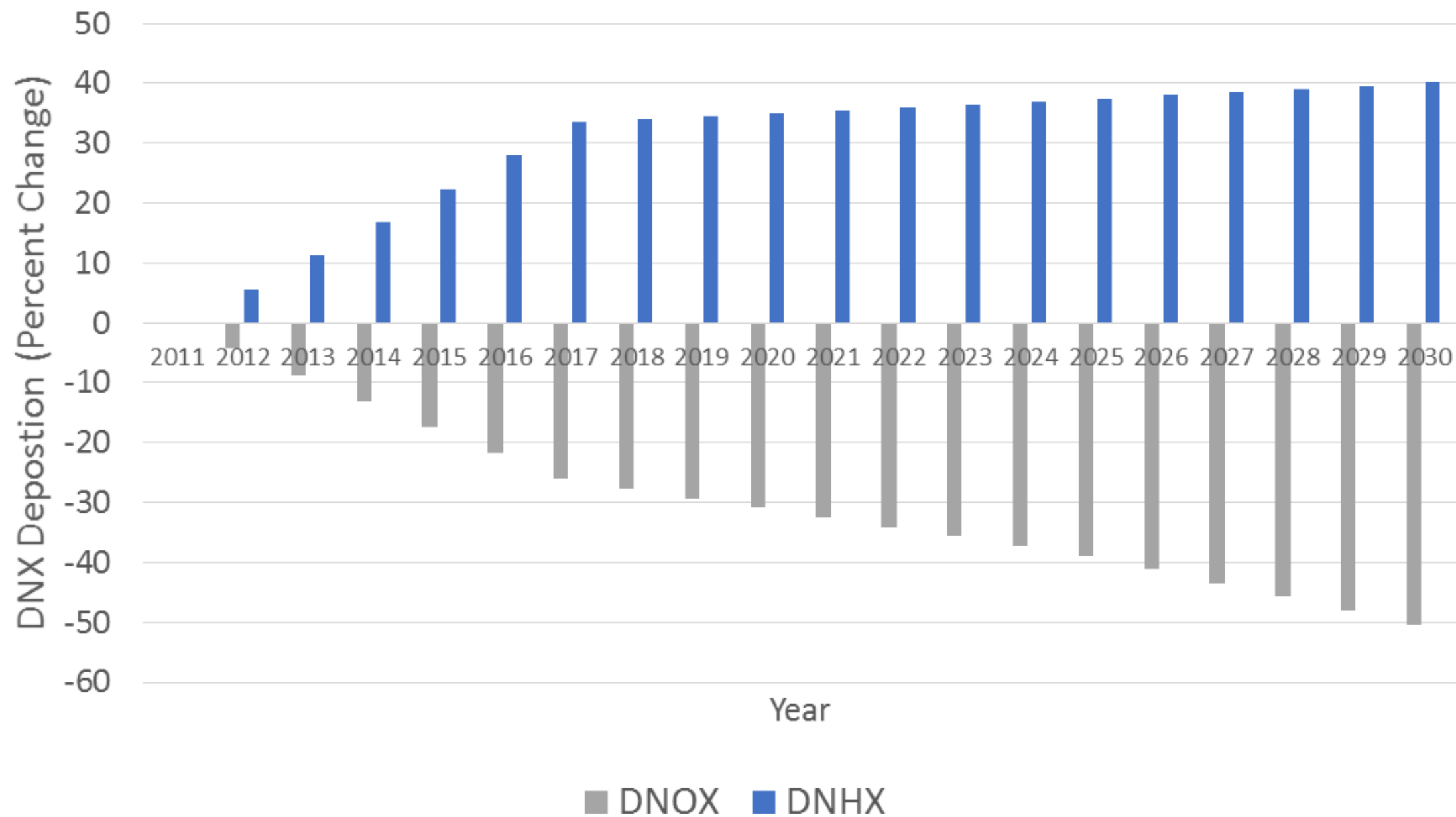
- Dry deposition has decreased in Phase 6 as compared to Phase 5.3.2
- By contrast, wet deposition recorded by Jeff Grimm has increased
- Overall, there is a net decrease in the deposition of N to the Bay in Phase 6



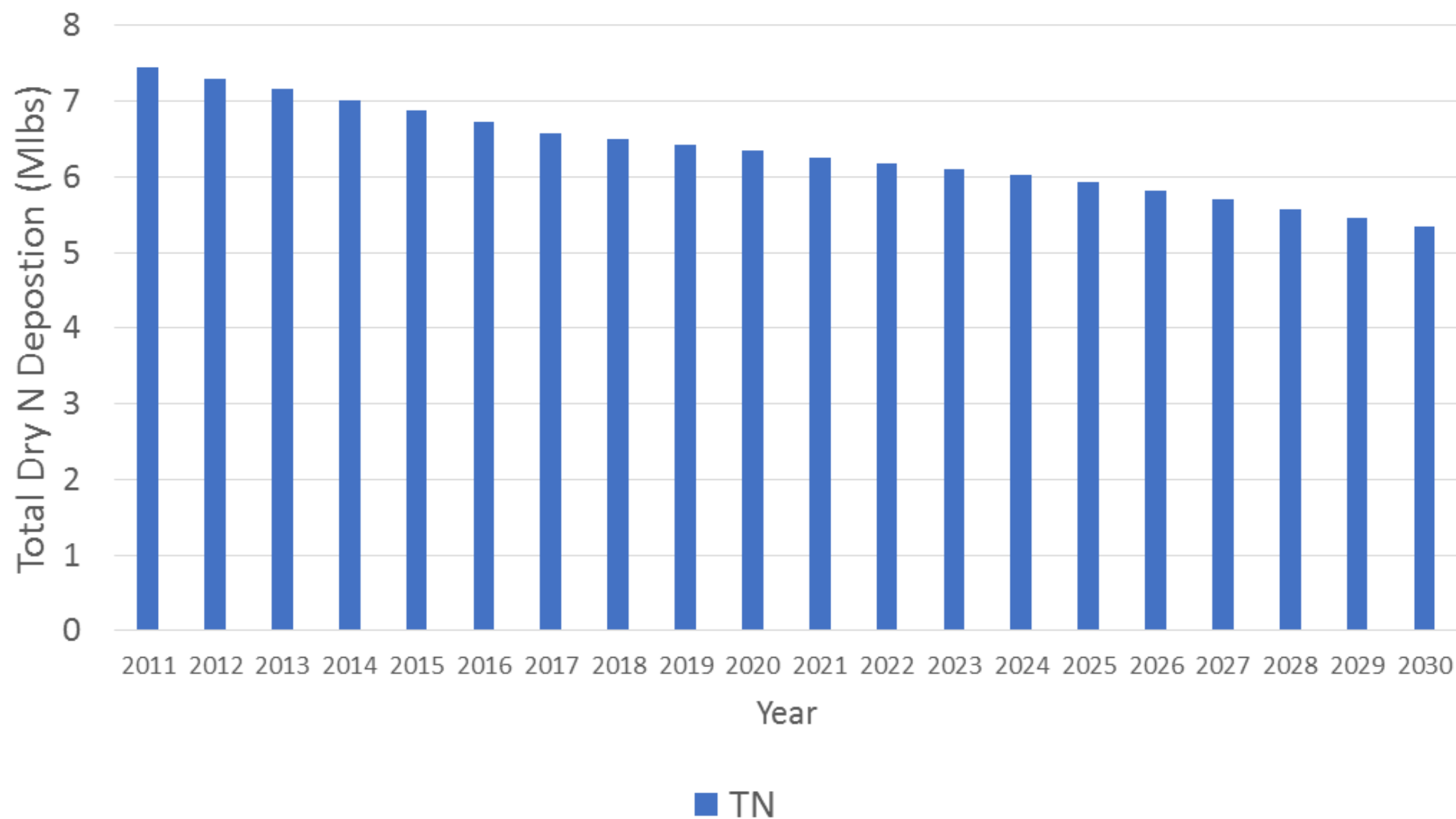
Chesapeake Bay Annual Future Dry Deposition



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