

Application of US EPA's Watershed Deposition Tool to Estimate Atmospheric Deposition of Nitrogen to the Indian River Basin, Florida

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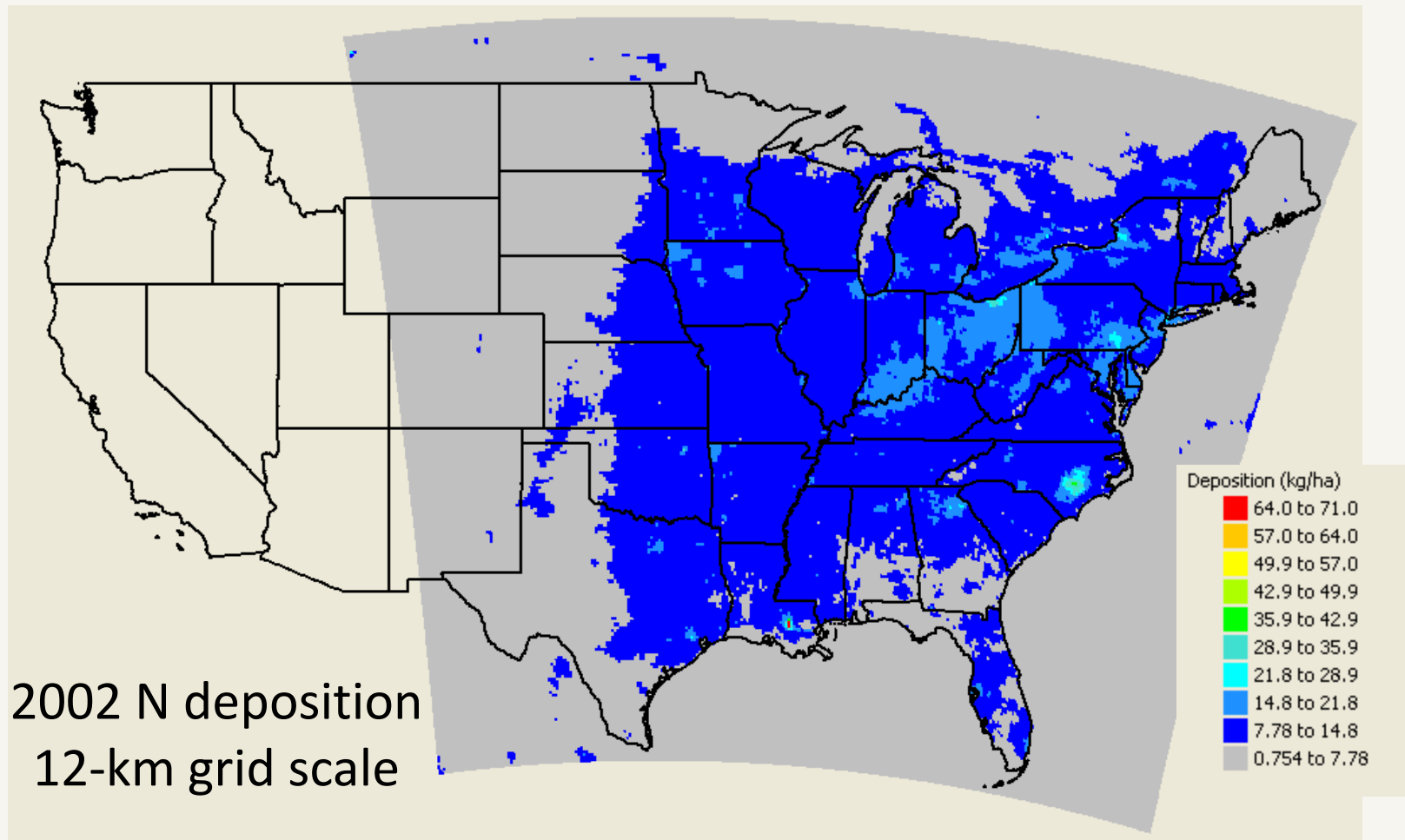
Brevard County Natural Resources Management Office, Viera, FL



Purpose of Study

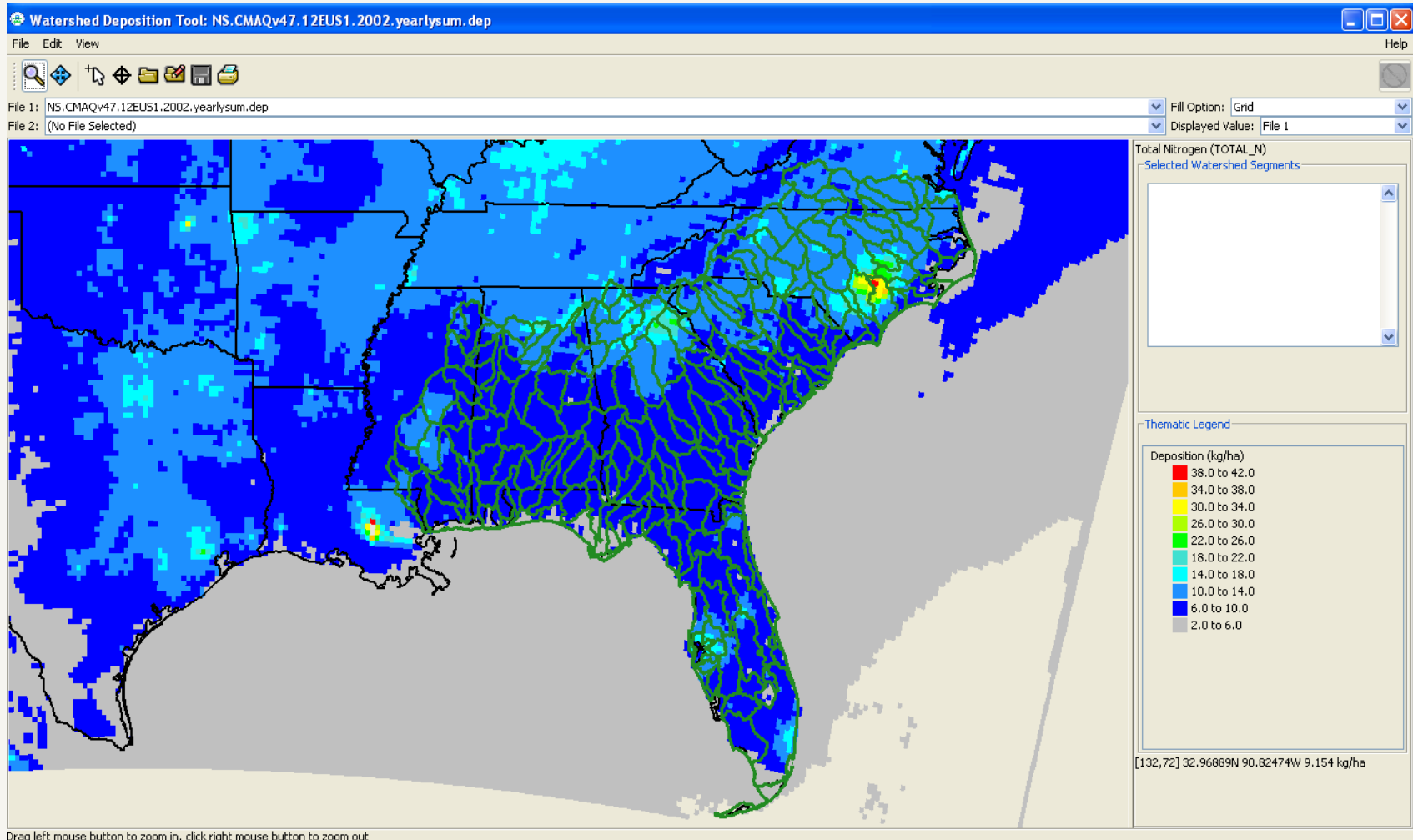
- To use the new Watershed Deposition Tool and CMAQ model output to calculate the atmospheric deposition of reactive nitrogen (N) to the Indian River Lagoon and its watershed.

Community Multiscale Air Quality (CMAQ) Model: Nitrogen Deposition



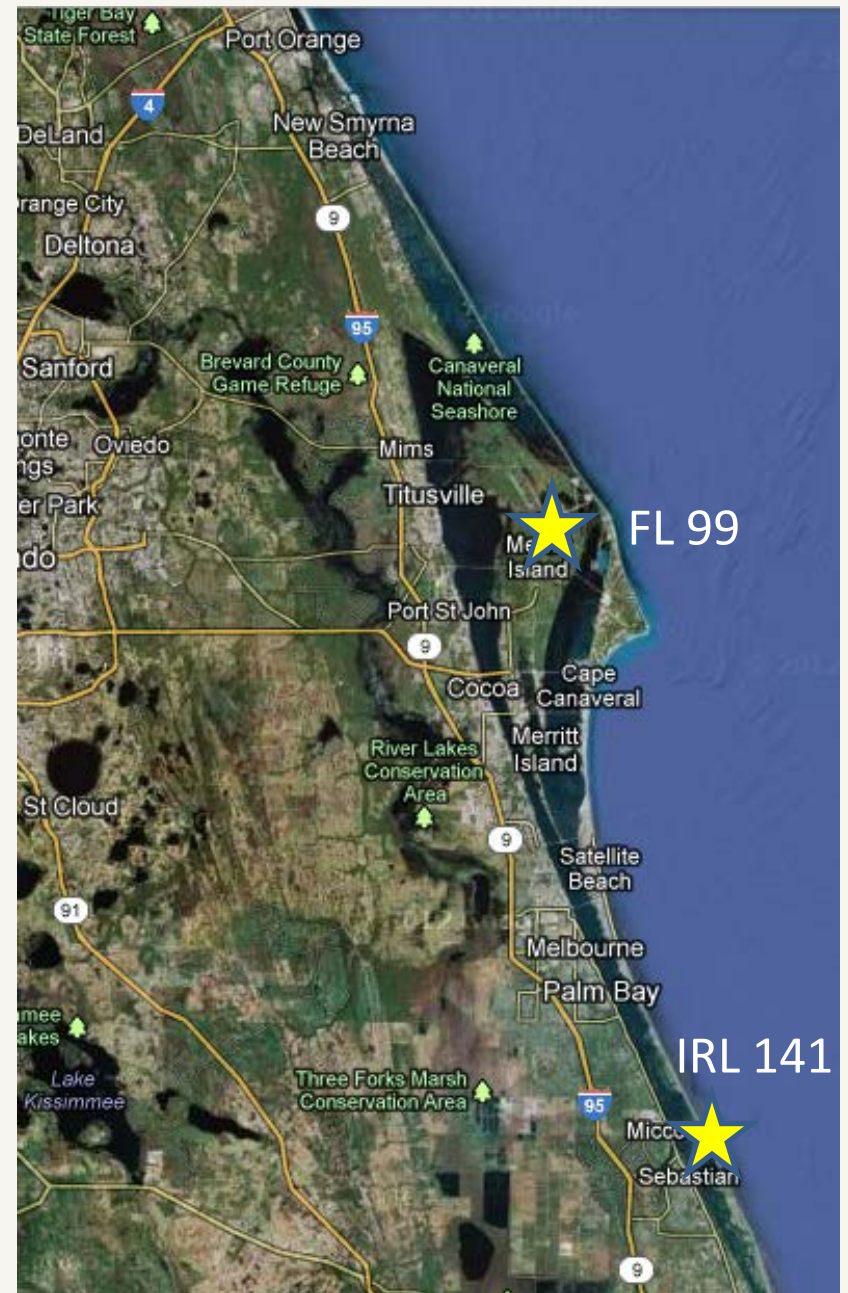
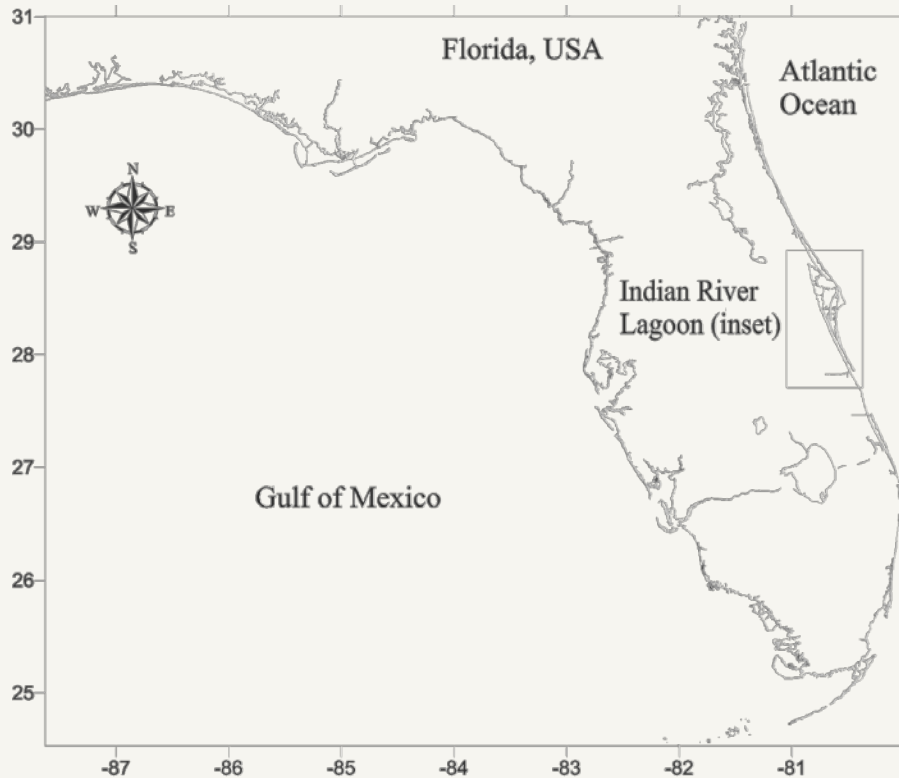
Watershed Deposition Tool

<http://www.epa.gov/AMD/EcoExposure/depositionMapping.html>



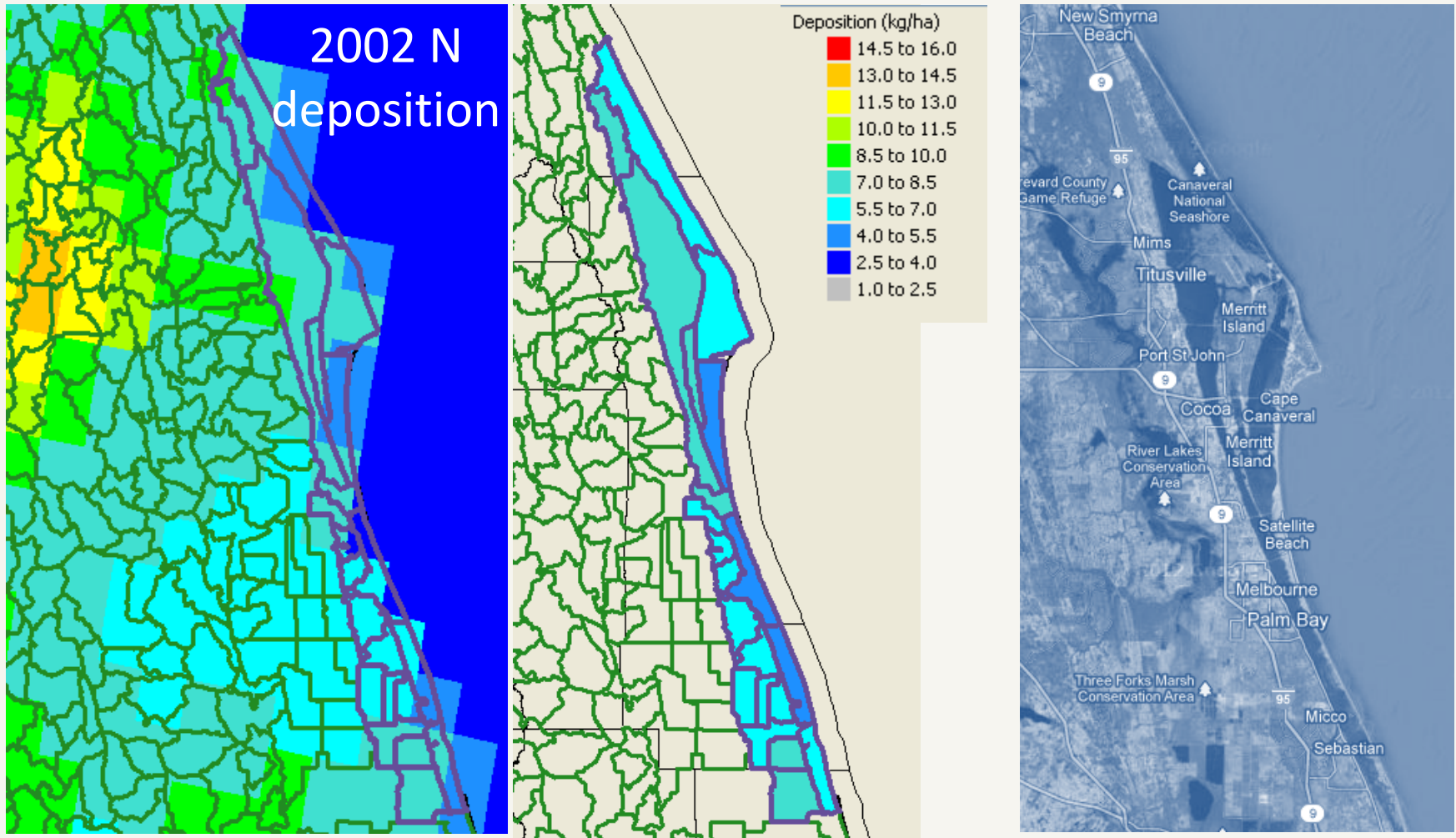
Features of the Indian River Lagoon

Long, narrow, and shallow with wind-driven circulation.



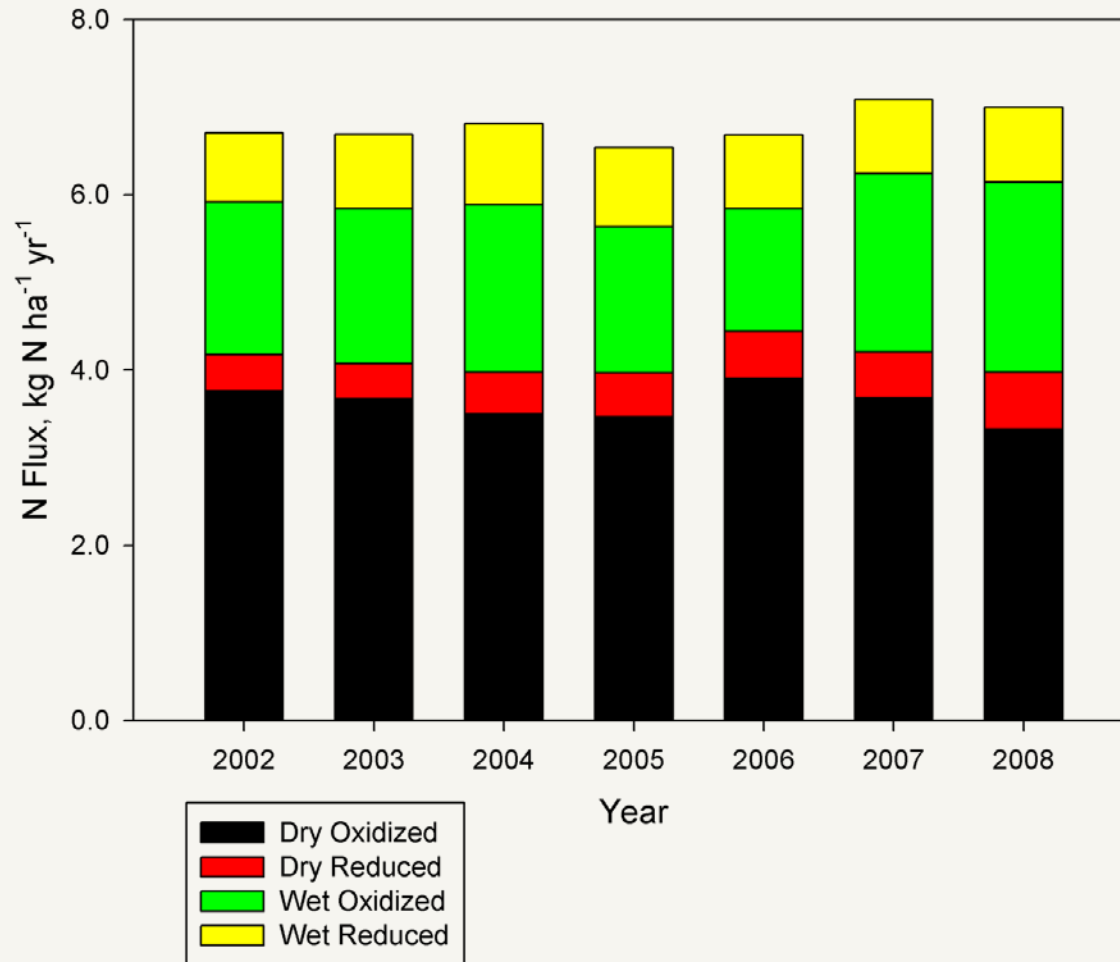
Atmospheric N Deposition Rates

CMAQ-simulated 7-yr average rate was $6.79 (\pm 0.19)$ kg N ha⁻¹



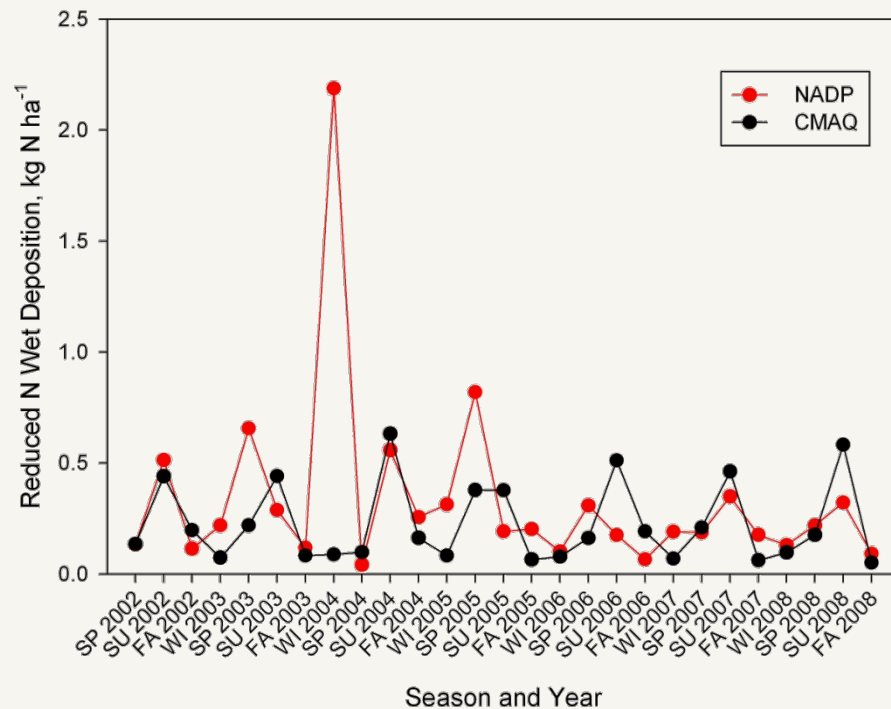
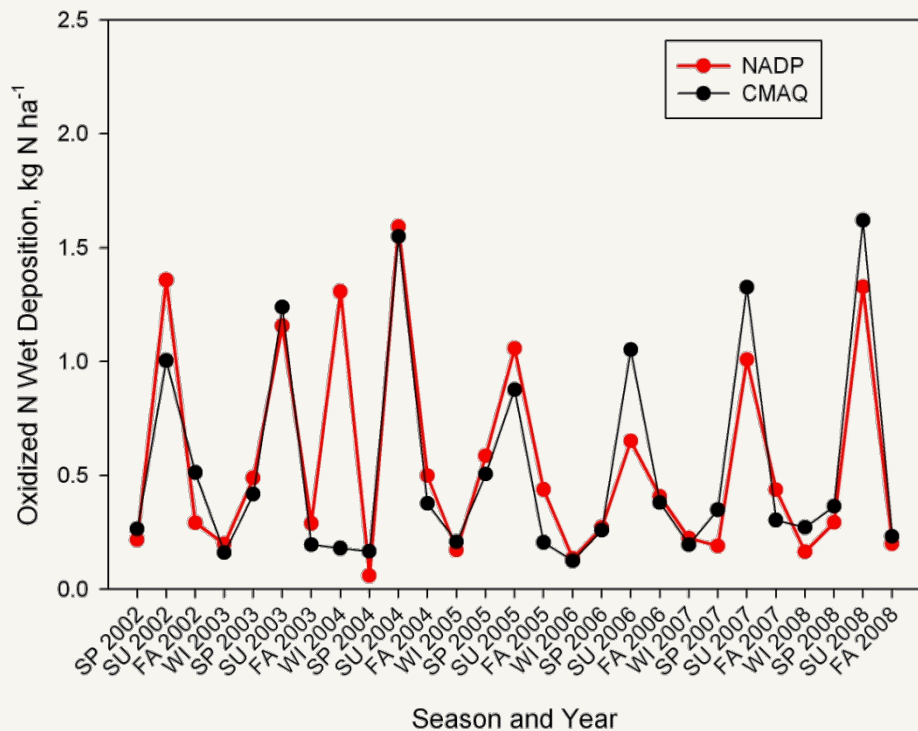
Atmospheric N Deposition Rates

60 % dry, 40 % wet; 80 % oxidized N, 20 % reduced N

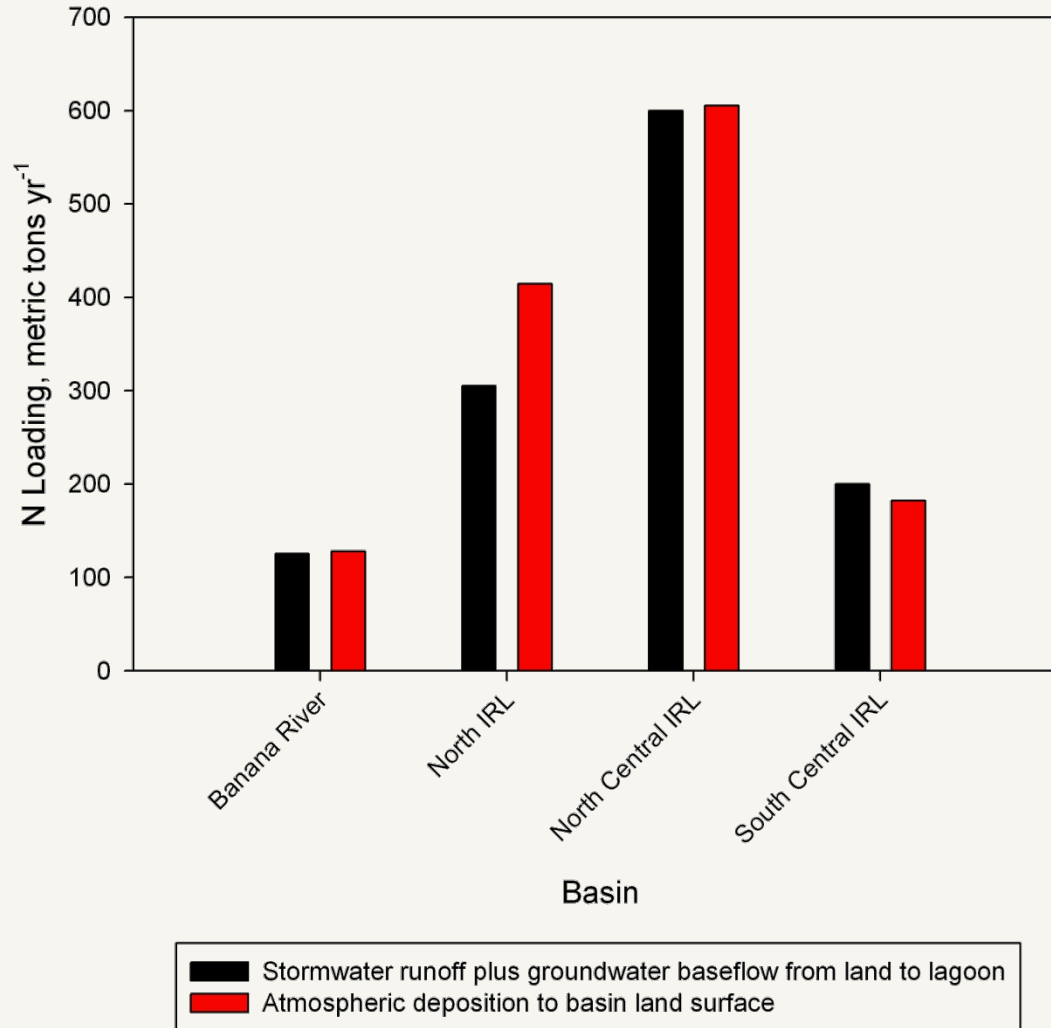


CMAQ vs NADP NTN

Wet Deposition Modeled vs Measured



Modeled N Runoff and Infiltration 2002-2008



CMAQ-Modeled vs TMDL Estimates

- CMAQ-modeled 7-yr average loading rates
 - AD direct to lagoon waters 426 metric tons
 - AD to land within the basin 1,300 metric tons
- FDEP estimates*
 - AD direct to lagoon waters 281 metric tons
 - NPS from land to lagoon 1,207 metric tons
 - AD is ~19 % of total N loading

*Florida Department of Environmental Protection (FDEP) TMDL Report: Nutrient and Dissolved Oxygen TMDLs for the Indian River Lagoon and Banana River Lagoon, March 2009

Summary

- Atmospheric N deposition rates low but significant fraction of total annual inflow of N.
- Atmospheric N loading to watershed surface and N loading from surface to lagoon appear to be similar in magnitude; total N loading to the watershed surface and thus the relative atmospheric deposition contribution is not known.

Future Work

- CMAQ 5.0 modeling with
 - 2002 and 2005 meteorology and NEI
 - Bi-directional ammonia flux and lightning-produced NO_x
 - 12 km vs 4 km grid scale
 - Changes in N deposition with underlying changes in land use...in time and space
- Determine the relationship between atmospheric N deposition and N in stormwater runoff and groundwater baseflow

Acknowledgements

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Questions?

