



Cross-EPA Nr & Co-pollutant Research Progress

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Summary of Products Related to Aspects of Nr & Co-pollutant Research

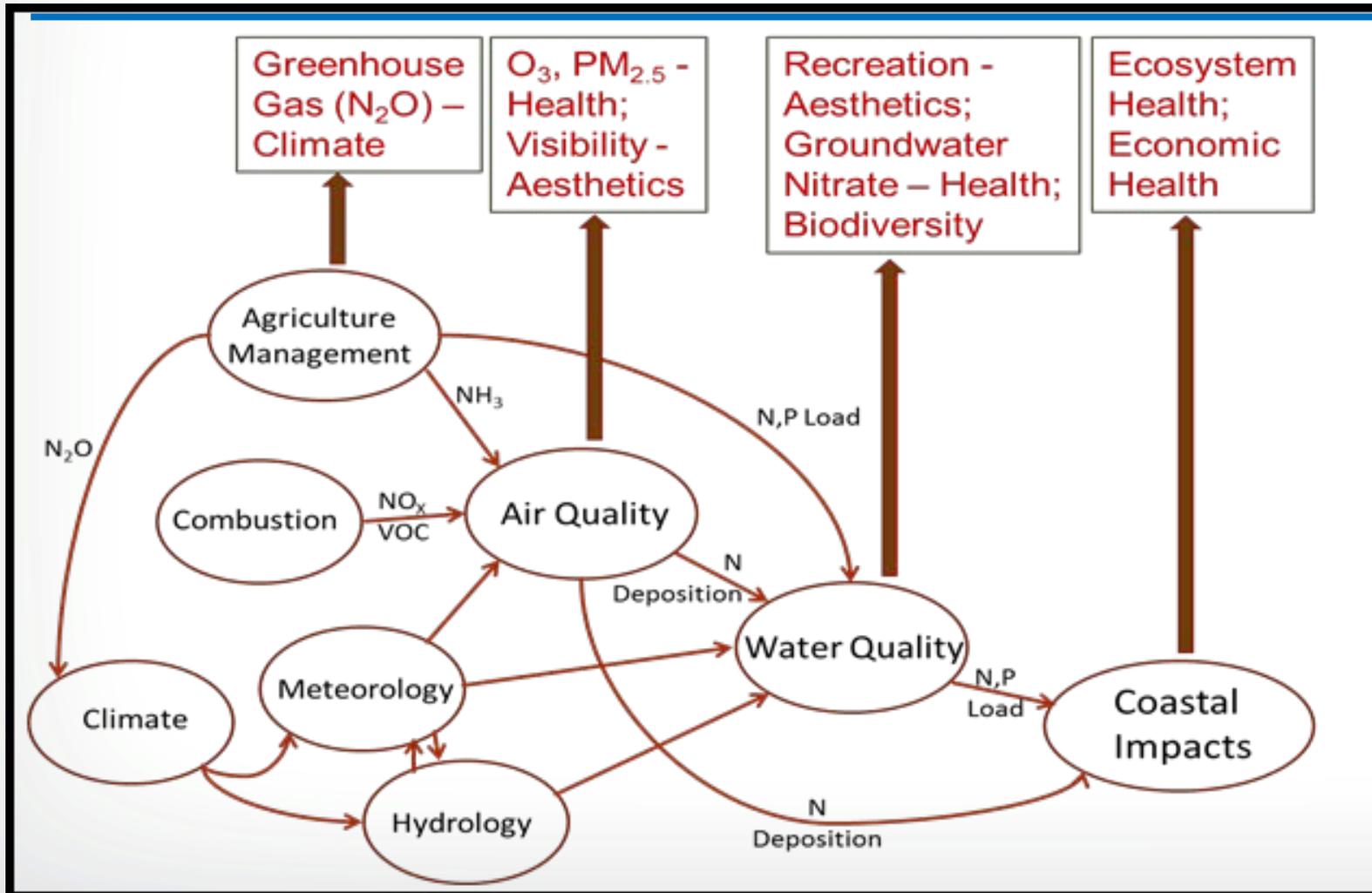
- ✓ 2 cross-ORD ORISE Fellows: BMPs & Water Quality Benefits (2014); Nr National Inventory & CLs (2015)
- ✓ 2 workshops: USDA/EPA/USGS (2014); Air Quality & Ecosystem Services (2015)
- ✓ 4 Nutrient Center Grants: [Centers for Water Research on National Priorities Related to a Systems View of Nutrient Management](#) (2013)
- ✓ 5 open innovation prizes (Challenges & data visualization)
- ✓ OSTP meeting on Visions for Optimizing Nutrient Monitoring: Deposition and Water Quality (New)

2015-2016:

- ✓ 11 High Profile Publications
- ✓ 99 Peer Reviewed Publications
- ✓ 4 Book Chapters
- ✓ 12 Reports
- ✓ 17 Miscellaneous
- ✓ 300+ Presentations
- ✓ 8 Policy Review
- ✓ 11 Regional Projects



Flagship Project: Multimedia Nitrogen Modeling for the Mississippi River Basin & Northern Gulf of Mexico



One Biosphere Modeling System: Fostering Cross-RAP Collaboration

ACE AIMS-2: Develop an integrated multimedia modeling system (*ongoing*); improve the CMAQ model to facilitate linkages with land and water (*ongoing*).

SSWR 4.02: Develop Mississippi River watershed multi-media scenarios to address nutrient management under alternative land use futures (*FY16*); apply to other coastal systems in the Gulf of Mexico, Atlantic, Great Lakes, and Pacific (*ongoing*).

SSWR 4.03: Link/couple EPIC and SWAT for the Mississippi River watershed to provide upstream P and N loading in response to land use change (*ongoing*).

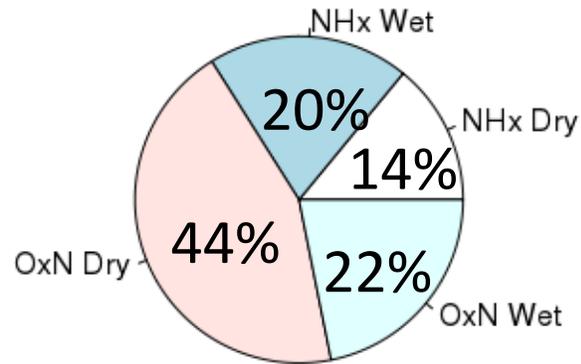
SHC 2.61: Develop national-scale air and ecosystem production functions and service estimations from one-environment (*FY16*).

SHC 4.61: Improve quantification of multi-media aspects of the N cascade (*ongoing*).

Nitrogen Deposition Budget (CONUS)

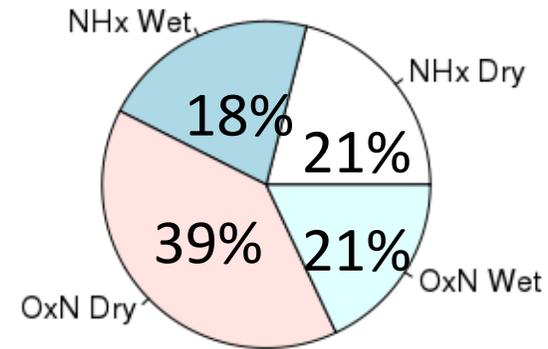
2002-2004

Mean: 7.4 kg N/ha



2010-2012

Mean: 6.0 kg N/ha



- Overall N deposition has decreased by 19% due to NAAQS
- Oxidized N deposition is decreasing
- Reduced N deposition is increasing & a larger % of total



Atmospheric N_r Deposition: Secondary NAAQS for NO_x/SO_x

ORD, OAR & OW collaboration on N_r air deposition:

- ✓ Improving methods for calculating and mapping CLs (ACE)
- ✓ Regional and national assessments of CL exceedances on aquatic and terrestrial endpoints and the modifying effects of climate on endpoint sensitivity (SHC)
- ✓ ISA critically evaluates & integrates the scientific information on the deposition & ecological effects associated with ambient air concentrations of total reactive oxidized N (NO_y), ammonia/ammonium (NH_x), and SO_x, individually and in combination (HHRA)
- ✓ Connecting N deposition & aquatic ecosystem responses using the EPA-OW national aquatic resource surveys (SSWR)



2016: Nr & Co-pollutant Workshop

Key Recommendations

- ✓ Annual face-to-face meeting in conjunction with an EPA meeting or Scientific Conference
- ✓ Areas of research emphasis to explore further:
 - ✓ Linkages between nutrients and HABs **NOV 2016**
 - ✓ Interactions between nutrients and climate, specifically biodiversity and biogeochemical cycle feedbacks **FEB 2017**
 - ✓ Integrated approaches that allow decision-makers to make trade-offs (regulatory, voluntary, incentives, markets, etc.)
 - ✓ Dose-response functions for ecological endpoints and ecosystem services **MAY 2017**
 - ✓ Measurement Model Fusion: using an integrated approach for data fusion **AUG 2017**
 - ✓ Communication



Cross-EPA Efforts on Reactive Nitrogen and Co-Pollutants: Science to Inform Action

August 31 – September 2, 2016



EPA Roadmap Addresses the 2011 Overarching SAB Recommendations

The nitrogen cascade should be used as a framework to understand the environmental impacts of Nr as it moves through multiple ecosystems & media

✓ *The Nitrogen Cascade formed the foundation for the cross-EPA Nr & Co-pollutant Research Roadmap (2015)*

Integrated cross-media management approaches & regulatory structures are needed to recognize tradeoffs & focus management efforts at points of the nitrogen cascade where they are most efficient and cost effective

✓ *Actively working on research on adaptive management; program offices are accounting for other media (land, air, water) in reduction scenarios; actively working on treatment, mitigation and damage costs*

EPA should form an intra-Agency Nr management task force to build on the existing breadth of Nr research & management capabilities within the Agency

✓ *In 2013, EPA formed the Cross-EPA Nitrogen Roadmap team that developed the Roadmap (2015), annual report (2016), meets quarterly by teleconference and one in-person meeting August 30-Sept2, 2016.*

EPA should convene an inter-Agency Nr management taskforce to coordinate federal programs that address Nr monitoring, modeling, research & management

✓ *In June 2014, EPA led the meeting of inter-agency Nr management task force which resulted in an EPA report and a journal article (in prep). Cross-agency post-doc for 2012 N inventory and science mapping. Agencies are interested in follow up meetings, proposal for joint Agency workshop being developed*



SAB Recommended Inter-Agency Task Force...

Measurement efforts

- How can we foster integration?
- How can we make it faster and easier to inventory Nr?

