Summary Minutes of the U.S. EPA Clean Air Scientific Advisory Committee (CASAC)
NO_x and SO_x Secondary NAAQS Review Panel
Public Meeting on October 1-2, 2008

Panel Members: See Panel Roster provided in Attachment A.

Date and Time: October 1 – 2, 2008

Location: Marriott at Research Triangle Park
4700 Guardian Drive, Durham, NC

Purpose: To conduct a peer review of the *Integrated Science Assessment (ISA) for NO_x & SO_x – Environmental Criteria (Second External Review Draft)* accessible at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198220, and to peer review the *Risk and Exposure Assessment (REA) for Review of the Secondary NAAQS for NO_x & SO_x: First Draft (EPA-452/P-08-005a)* accessible at http://www.epa.gov/ttn/naaqs/standards/no2so2sec/cr_rea.html.

Attendees:

Chair:	Dr. Armistead (Ted) Russell
CASAC Members:	Dr. Ellis B. Cowling Dr. Douglas Crawford-Brown (by phone) Dr. Donna Kenski
Panel Members:	Dr. Praveen Amar Dr. Andrzej Bytnerowicz Ms. Lauraine Chestnut Dr. Charles T. Driscoll, Jr. Dr. Paul J. Hanson (by phone) Dr. Rudolf Husar (by phone) Dr. Dale Johnson (by phone) Dr. Myron Mitchell Mr. Richard L. Poirot Mr. David J. Shaw* Dr. Kathleen Weathers*
EPA SAB Staff:	Ms. Kyndall Barry, Designated Federal Officer Dr. Anthony Maciorowski, Deputy Director

NOTE: The asterisk (*) denotes members that did not join the meeting by phone or in person, but submitted review comments.

Other EPA Staff:	Lea Anderson, EPA Jeffrey Arnold, EPA Ila Cote, EPA Chris Davis, EPA Jean-Jacques Dubois, EPA Dale Evarts, EPA Tara Greaver, EPA Dave Guinnup, EPA Jeffrey Herrick, EPA Bryan Hubbell, EPA Amy Larson, EPA Meredith Lassiter, EPA Lingli Liu, EPA Jason Lynch, EPA Karen Martin, EPA Connie Meacham, EPA Kristopher Novak, EPA Norm Possiel, EPA Anne Rea, EPA Adam Reff, EPA Mary Ross, EPA Vicki Sandiford, EPA Ginger Tennant, EPA John Vandenberg, EPA Randy Waite, EPA Debra Walsh, EPA Nealson Watkins, EPA Lydia Wegman, EPA
Other Participants:	Jamie Cajka, RTI William Cooter, RTI Michele Cutrofello, RTI Marion Deerhake, RTI Cindy Langworthy, Hunton & Williams Ona Papageorgiou, NYSDEC Jennifer Phelan, RTI Ellen Porter, NPS George Van Houtven, RTI

Attachments: (A) NO_x & SO_x Secondary Review Panel roster; (B) agenda; (C) Federal Register notice announcing the meeting; (D) "Background and Schedule" presentation by OAR; (E) "ISA for NO_x & SO_x – Environmental Criteria" presentation by ORD; (F) "Highlights of the R/EA" presentation by OAR; and (G) public comments.

Panelists' Individual Comments: The individual committee members' comments for the ISA and REA are located on the meeting website (http://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCal/10F6F14502E354B98525745F005E86C4?OpenDocument)

Meeting Summary

The discussion followed the issues and general timing as presented in the agenda (Attachment B).

Wednesday, October 1, 2008

Ms. Kyndall Barry convened the meeting and explained that the CASAC NO_x & SO_x Secondary Review Panel will operate under the Federal Advisory Committee Act (FACA). She also announced that there would be a conference call on October 30, 2008, for the CASAC to review and approve the Panel's letters to the EPA Administrator concerning the peer reviews of the ISA and REA. Dr. Anthony Maciorowski thanked the Panel for their hard work. He also thanked staff members from EPA and members of the public for attending the meeting.

Dr. Armistead (Ted) Russell, thanked the EPA staff for preparing the draft ISA and the draft REA. The Panel was introduced, and Dr. Russell then reviewed the agenda. He noted that the Panel would draft two separate letters to EPA's Administrator, one for the ISA and the other for the REA, and would vote on the main points of both letters the following day.

In his presentation of the *Background and Schedule for the Secondary NO_x/SO_x NAAQS Review* (Attachment D), Dr. Dave Guinnup of EPA's Office of Air and Radiation (OAR) walked the panelists through the timeline for the current review. Dr. Ila Cote, EPA Office of Research and Development (ORD), welcomed everyone and introduced Dr. John Vandenberg as the new Director of the National Center for Environmental Assessment.

Drs. Mary Ross, Jeffrey Arnold, Tara Greaver, Jeff Herrick, and Kris Novak, EPA ORD, presented *Integrated Science Assessment for NO_x and SO_x – Environmental Criteria* (Attachment E). The presentation outlined the process the Agency adopted in using science to establish the links between emissions, deposition, loads, and ecological effects. Revisions to the second draft ISA were also highlighted in the presentation.

As there were no public comments, discussions moved to ISA charge questions 1 – 3 until the lunch break. Panelists presented their various comments captured in *Preliminary ISA comments* that are posted on the meeting URL. The Panel stressed the following ways to improve the ISA: the inclusion of a segue for ecological effects of reduced forms of N; the need for more information on N deposition, specifically language to capture the relationship between N deposition and nutrient leaching; consistent use of the appropriate form of N (i.e. N_r, oxidized or reduced forms of N); adding contributing factors as a subset of causality by pollutant; including more deposition information from CMAQ; the need to use the appropriate units throughout the document; using deposition velocity as a tool to evaluate model sensitivity to various parameters; expanding the model's timescales and impacted areas; the need to balance the discussion of N deposition; the addition of effects on terrestrial food chain, for example Hg accumulation in songbirds; and a comparison of models' biases and assumptions.

Following the lunch break, the Panel addressed the "Key Findings" and charge questions 4 and 5. Panelists again urged ORD to consider the ecologically beneficial effects of N deposition and move away from the use of overly general statements throughout the document. The inclusion of the policy-relevant questions in the REA was suggested by a member of the Panel. Dr. Russell then summarized the major review comments discussed by the CASAC Panel.

Following the afternoon break, Drs. Dave Guinnup, Anne Rea, and Bryan Hubbell from OAR presented *Highlights of the NO_x/So_x Secondary NAAQS R/EA* (Attachment F) and engaged the Panel in discussions. The presentation began with a reiteration that Clean Air Act defines the standard for only "oxidized forms

of nitrogen" in terms of concentration. The current approach, while similar to the present standard, leaves room for the Agency to consider additional parameters and/or reduced forms of N. The Panel sought clarification on the Agency's selection of acid neutralizing capacity of 50 (ANC50) and pointed out that the change in ANC (Δ ANC) might be the better indicator of adverse effects. Additional topics of discussion included: the feasibility of a deposition standard; a standard expressed in terms of Nr as opposed to NOx; revisiting the 1995 report to Congress entitled "Acid Deposition Standard Feasibility Study"; and a welfare standard expressed in terms of critical loads. The Panel then moved into their writing session to draft responses to the five ISA charge questions and language for the body of the letter to the Administrator, which would be voted on in Thursday's morning session.

Thursday, October 2, 2008

Ms. Barry reconvened the meeting of the CASAC NO_x and SO_x Secondary NAAQS Review Panel. Public comments on the REA were made by Ellen Porter of the National Park Service Air Resource Division and can be found in Attachment I.

Following the public comment period, the Panel discussed the draft letter on the second draft ISA. The Chair and the DFO compiled the language submitted from the workgroups into a single letter. The letter was projected onto the screen and discussed by the Panel. By the end of the session, the Panel reached consensus on the major points as required by FACA and approved the intent of the letter. Editorial changes to the letter would be handled by the Chair and the workgroup leads. The draft letter with final review comments will be posted on the meeting website prior to the final review and approval by the statutory CASAC on October 30th.

As reflected in the agenda, the Panel moved on to its peer review of the first draft REA and follow-on discussions with Drs. Dave Guinnup, Anne Rea, Bryan Hubbell, Karen Martin, Mr. Randy Waite, and Ms. Lydia Wegman, of EPA's Office of Air and Radiation (OAR). In discussing the *Scope of the Review*, the Panel emphasized: the disconnect with ecosystem services; the need for the Agency to consider variability and uncertainty with linkages to other parts of the REA; the lack of diversity in the selection of coastal sites; and the need to broaden the REA to include N_r, which would ultimately lead to a better handle on deposition and a better ANPR.

The Panel's comments on the Air Quality Analyses included: the challenges with reconciling the differing grid scales of the atmospheric and watershed models; inclusion of maps to capture the seasonal variability of NO_x and SO_x concentrations; using longer-term trends to analyze the seasonal impacts on CMAQ model output; inclusion of oxidation as a model output. Dr. Russell expressed a desire to see the following figures for the contiguous US: annual emissions in kg/ha/yr followed by NO2 concentration, then deposition in kg/ha/yr (or $kg/m^2/s$). The Agency could then determine mass balance by taking the ratio of the annual average deposition to the annual average NO_2 concentration. The Panel urged EPA to smooth the scales of the respective maps' grids.

Following a short break, the Panel moved on to the *Case Study Analyses* followed by *Additional Effects*. The Panel offered the following recommendations to strengthen both portions of the REA: editorial corrections needed to clean up language in the poorly written parts; consistent use of the appropriate units and molecular weights; evaluate the spectrum of ecosystem response to acidification; analysis of capacity and intensity; consideration of the complexity carbon and mercury interactions; uncertainty in determining new Hg from legacy Hg. Several members of Panel strongly endorsed the use of critical loads and offered to identify specific case studies in their respective comments.

The Panel discussed REA Chapters 7 and 8 following the lunch break and focused on the form of the standard. Overwhelmingly, the Panel endorsed the Agency consider an alternative of the present form of the oxides of nitrogen standard that would include reduced forms, as well.

At the close of the meeting, the Panel worked on drafting the REA report in their respective workgroups. Before the meeting adjourned, the following dates and action items were agreed upon by the Chair, Panel, and DFO:

- 16 October 2008 – deadline to submit all final review comments on the ISA and REA,
- 16 October 2008 – deadline for revisions to the draft ISA letter,
- 17 October 2008 – post the draft ISA letter on the SAB website,
- 30 October 2008 – teleconference for CASAC to approve the ISA letter,
- TBD – follow-on NOx-SOx Secondary Panel teleconference to draft the REA letter, and
- TBD – CASAC teleconference to approve the REA letter.

Respectfully Submitted:

/Signed/

Ms. Kyndall Barry
Designated Federal Officer

Certified as True:

/Signed/

Dr. Ted Russell, Chair
CASAC NO_x & SO_x Secondary
NAAQS Review Panel

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by committee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings.

Attachment A: Roster of CASAC NO_x & SO_x Secondary NAAQS Review Panel

U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee
NO_x & SO_x Secondary NAAQS Review Panel

CASAC MEMBERS

Dr. Armistead (Ted) Russell *(Chair)*, Professor, Department of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

Dr. Ellis B. Cowling, University Distinguished Professor At-Large Emeritus, Colleges of Natural Resources and Agriculture and Life Sciences, North Carolina State University, Raleigh, NC

Dr. Douglas Crawford-Brown, Professor Emeritus and Director Emeritus, Department of Environmental Sciences and Engineering and UNC Institute for the Environment, University of North Carolina at Chapel Hill, Chapel Hill, NC

Dr. Donna Kenski, Data Analysis Director, Lake Michigan Air Directors Consortium, Rosemont, IL

PANEL MEMBERS

Dr. Praveen Amar, Director, Science and Policy, NESCAUM, Boston, MA

Dr. Andrzej Bytnerowicz, Senior Scientist, Pacific Southwest Research Station, USDA Forest Service, Riverside, CA

Ms. Lauraine Chestnut, Managing Economist, Stratus Consulting Inc., Boulder, CO

Dr. Charles T. Driscoll, Jr., Professor, Environmental Systems Engineering, College of Engineering and Computer Science, Syracuse University, Syracuse, NY

Dr. Paul J. Hanson, Distinguished R&D Staff Member, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN

Dr. Rudolf Husar, Professor and Director, Mechanical Engineering, Engineering and Applied Science, Center for Air Pollution Impact & Trend Analysis (CAPITA), Washington University, St. Louis, MO

Dr. Dale Johnson, Professor, Department of Environmental and Resource Sciences, College of Agriculture, University of Nevada, Reno, NV

Dr. Naresh Kumar,* Senior Program Manager, Environment Division, Electric Power Research Institute, Palo Alto, CA

Dr. Myron Mitchell, Distinguished Professor and Director of Council on Hydrologic Systems Science, College of Environmental and Forestry, State University of New York, Syracuse, NY

Mr. Richard L. Poirot, Environmental Analyst, Air Pollution Control Division, Department of Environmental Conservation, Vermont Agency of Natural Resources, Waterbury, VT

Mr. David J. Shaw, Director, Division of Air Resources, New York State Department of Environmental Conservation, Albany, NY

Dr. Kathleen Weathers, Senior Scientist, Institute of Ecosystem Studies, Millbrook, NY

SCIENCE ADVISORY BOARD STAFF

Ms. Kyndall Barry, Designated Federal Officer, 1200 Pennsylvania Avenue, NW 1400F, Washington, DC, Phone: 202-343-9868, Fax: 202-233-0643, (barry.kyndall@epa.gov)

*Dr. Kumar did not participate in this CASAC Panel meeting.

Attachment B

U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee (CASAC)
NO_x & SO_x Secondary NAAQS Review Panel

Public Meeting: October 1-2, 2008

Marriott at Research Triangle Park, 4700 Guardian Drive, Durham, NC, 27703

Purpose: To conduct a peer review of the *Integrated Science Assessment for Oxides of Nitrogen and Sulfur – Environmental Criteria (Second External Review Draft)(EPA/600/R-08/082)* accessible at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198220, and to peer review the *Risk and Exposure Assessment for Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur: First Draft (EPA-452/P-08-005a)* accessible at http://www.epa.gov/ttn/naaqs/standards/no2so2sec/cr_rea.html.

Wednesday, 1 October 2008

8:30 a.m.	Convene the meeting	Ms. Kyndall Barry, EPA SAB Staff Office, Designated Federal Officer
	Welcome and remarks	Dr. Anthony Maciorowski, Deputy Director, EPA SAB Staff Office
8:40 a.m.	Introduction of Members, Review Agenda	Dr. Ted Russell, Chair
8:55 a.m.	Background and Schedule for Review	Dr. Dave GuinnupTBD EPA's Office of Air Quality Planning and Standards
9:10 a.m.	Highlights of 2nd Draft ISA and Agency Charge Questions (Attachment A)	Dr. Jeffrey R. Arnold Dr. Jeff Arnold Dr. Ila Cote Dr. Tara Greaver Dr. Tara Greaver Dr. Jeff Herrick Dr. Kris Novak Dr. Mary RossDr. Paul F. Wagner EPA's National Center for Environmental Assessment
9:30 a.m.	Public Comment Period	To be announced
9:45 a.m.	Response to ISA Charge Question 1	Ms. Lauraine Chestnut Dr. Douglas Crawford-Brown (by phone) Dr. Paul Hanson (by phone)

10:15 a.m.	Break	
10:30 a.m.	Response to ISA Charge Question 2	Mr. Rich Poirot Dr. Dale Johnson (by phone) Mr. David Shaw
11:15 p.m.	Response to ISA Charge Question 3	Dr. Donna Kenski Dr. Praveen Amar Dr. Naresh Kumar (by phone)
12:00 p.m.	Lunch	
1:00 p.m.	Response to ISA Charge Question 4	Dr. Ellis Cowling Dr. Andrzej Bytnerowicz Dr. Charles Driscoll Dr. Myron Mitchell
2:00 p.m.	Response to ISA Charge Question 5	Dr. Dale Johnson (by phone)(by phone) Dr. Rudolf Husar Dr. Kathleen Weathers (by phone)
2:45 p.m.	Summary of Major Review Comments for 2nd Draft ISA	Dr. Ted Russell
3:15 p.m.	Break	
3:30 p.m.	Highlights of 1st Draft REA and Agency Charge Questions (Attachment B)	Dr. Dave GuinnupDr. Dave Dr. Bryan HubbellDr. Anne Rea Dr. Anne Rea EPA's Office of Air Quality Planning and Standards
4:30 p.m.	Adjourn Meeting (Writing Session)	Ms. Kyndall Barry

Thursday, 2 October 2008

8:00 a.m.	Reconvene the Panel Meeting	Ms. Kyndall Barry
8:05 a.m.	Public Comment Period	To be announced
8:20 a.m.	Discussion of Draft Responses to ISA Charge Questions	Dr. Russell and Panel
9:05 a.m.	REA Discussion -- Scope of the Review phone)(phone)	Dr. Douglas Crawford-Brown (by Ms. Lauraine Chestnut Dr. Paul Hanson (by phone) Mr. David Shaw
9:35 a.m.	REA Discussion -- Air Quality Analyses	Mr. Rich Poirot

		Dr. Praveen Amar Dr. Naresh Kumar (by phone) DMr. David Shaw
10:20 a.m.	Break	
10:35 a.m.	REA Discussion -- Case Study Analyses	Dr. Donna Kenski Dr. Ellis Cowling Dr. Andrzej Bytnerowicz Dr. Charles Driscoll Dr. Dale Johnson (by phone)(by phone) Dr. Myron Mitchell Dr. Kathleen Weathers (by phone)
11:30 a.m.	REA Discussion -- Additional Effects	Dr. Rudolf Husar Dr. Paul Hanson (by phone) Dr. Dale Johnson (by phone)(by phone) Dr. Myron Mitchell
12:00 p.m.	Lunch	
1:00 p.m.	REA Discussion -- Synthesis and Integration and Structure of the Standard	Dr. Paul Hanson (by phone) Dr. Ellis Cowling Dr. Dale Johnson (by phone)
2:00 p.m.	Writing period	All
2:30 p.m.	Discussion of Draft Responses to REA Charge Questions	Dr. Ted Russell
3:00 p.m.	Adjournment	Ms. Kyndall Barry

Attachment A: Agency ISA Charge Questions

1. We have added an executive summary of the major findings and conclusions to the second draft ISA. We have also created a "key findings" section that is intended to provide highlights of these conclusions. We are seeking CASAC panel advice and comments on these additions to the ISA. To what extent do they provide an appropriate level of detail and convey the important scientific conclusions of the assessment?

2. Chapter 1 has been revised to clarify the scope or focus of this assessment on effects related to the deposition of nitrogen and sulfur compounds. In addition, we have added a discussion of the framework for evaluation of causality for assessing ecological effects. Do these revisions adequately characterize the scope of the assessment? Does the CASAC panel have recommendations for revisions to the causality framework? Is it appropriately applied in the draft ISA?

3. Chapters 2 and 3 from the first draft have been combined. Substantially more information has been included on NH_3 emissions, NH_3 measurement techniques, NH_3 and NH_4^+ concentrations. Additionally, information on NOx and SOx including ambient concentrations, deposition levels and their spatial and temporal relationships has been added. Have these revisions to Chapter 2 improved its assessment of the currently available scientific knowledge on atmospheric sciences and its relevance to the evaluation of environmental effects presented in later chapters?

4. We removed or eliminated redundancy, added summary sections, added additional references and reorganized Chapter 3. Revisions to the ecological effects sections are given below. Have the revisions improved the characterization of the ecological effects?

    a. Consistent with CASAC comments, we expanded our characterization of the quantification of chemical effects of acidification in aquatic ecosystems, added new conceptual diagrams, and further discussed interactions between acidification and plant disease.

    b. We expanded the discussion of quantitative relationships between nitrogen deposition and ecological effects, including published critical loads in the U.S. and Europe. In addition, the nitrogen enrichment section was expanded to include new discussions on carbon budgeting, biogenic nitrous oxide and methane. Information on the linkages between effects and both reduced and oxidized forms of nitrogen was emphasized, to the extent data were available.

    c. The section on “other” welfare effects was updated to include information on the direct phytotoxic effects of nitric acid.

5. In revising the ISA, we have incorporated additional information on the indicators of exposure and ecological effects, including increased emphasis on quantified relationships in the presentation of information of results in tables and summary discussions in Chapter 4. What are the views of the CASAC panel on our revisions to focus on quantitative relationships between airborne nitrogen and sulfur compounds and ecological indicators?

Attachment B: Agency REA Charge Questions

Scope of the Review

1. Chapters 1 and 2 provide the background, history, and framework for this review, including a discussion of our focus on the four key ecological effect areas (aquatic acidification, terrestrial acidification, aquatic nutrient enrichment, terrestrial nutrient enrichment). Is this review appropriately focused in terms of characterizing the important atmospheric and ecologic variables that influence the deposition and, ultimately, the ecologic impacts of nitrogen and sulfur? Does the Panel have any further suggested refinements at this time?

Air Quality Analyses

1. To what extent are air quality characterizations and analyses presented in Chapter 3 technically sound, clearly communicated, appropriately characterized, and relevant to the review of the secondary NAAQS for NOx and SOx?

2. Section 3.2.1 describes an approach for evaluating the spatial and temporal patterns for nitrogen and sulfur deposition and associated ambient concentrations in the case study locations. This draft document includes the analysis for the Adirondacks case study. Does the Panel agree with this approach and should it be applied to the other Case Study Areas?

3. Section 3.2.2 describes the relative contributions of ambient emissions of nitrogen and ammonia to nitrogen deposition for the case study areas. To what extent is the approach taken technically sound, clearly communicated, and appropriately characterized?

Case Study Analyses

1. Attachment 2 presents a GIS analysis to define geographical areas that are sensitive to acidification and nutrient enrichment. Are the national geospatial data sets chosen adequate to identify sensitive areas? Are there other data sets that have not identified by this analysis that we should consider? Does the Panel agree with approach or can they suggest alternatives?

2. Attachment 3 presents our current progress on evaluating the effect of aquatic acidification in the Adirondacks. It describes the use of the MAGIC model to evaluate ANC levels in selected lakes and streams in the Adirondacks and Shenandoahs. To what extent is the approach taken technically sound, clearly communicated, and appropriately characterized?

3. Attachment 4 presents our current progress on evaluating the effect of terrestrial acidification. It outlines a plan to use the Simple Mass Balance Model to evaluate current deposition levels on forest soil ANC for sugar maple in the Kane Experimental Forest and red spruce in the Hubbard Brook Experimental Forest. To what extent is the approach taken technically sound, clearly communicated, and appropriately characterized?

4. Attachment 5 presents our current progress on evaluating the effect of aquatic nutrient enrichment. It outlines a plan to evaluate how changes in nitrogen deposition affect the eutrophication index in two estuaries: the Chesapeake Bay and Pamlico Sound. The analysis will model one stream reach (Potomac River and Neuse River) to determine the impact on the eutrophication index for the estuary. To what extent is the approach taken technically sound, clearly communicated, and appropriately characterized?

5. Attachment 6 presents our current progress on evaluating the effects of terrestrial nutrient enrichment. It describes an approach to evaluate the effects of nitrogen deposition on the Coast Sage Scrub community in California and in mixed conifer forests in the San Bernardino and Sierra Nevada Mountains. To what extent is the approach taken technically sound, clearly communicated, and appropriately characterized?

Additional Effects

1. In this chapter, we have presented results from some initial qualitative analyses for additional effects including the impact of sulfur deposition no mercury methylation, the impact of nitrous oxide on climate change, and the impact of nitrogen deposition on carbon sequestration. Are these effects sufficiently addressed in light of the focus of this review on the other targeted effects in terms of available date to analyze them?

Synthesis and Integration of the Case Study Results into the Standard Setting Process

1. The purpose of Chapter 7 is to summarize the Case Study results and characterize the relationship between levels of an ecological indicator and the associated degree of ecologically adverse effects. To what extent is this approach characterized at this point of the review? Does the Panel have any further suggested refinements at this time?

Considerations in the Structure of the NOx/SOx Secondary Standard

1. Chapter 8 begins to explore how a secondary NAAQS might be structured to address the targeted ecological effects discussed in the risk assessment. The next draft of this document will include one or more examples of how this structure might be used to relate specific levels of air quality indicators with a corresponding ecological indicator for a given location and/or scenario. To what extent is the described approach technically sound, clearly communicated and appropriately characterized at this point of the review? Does the Panel have any further suggested refinements at this time?

Attachment C

Meetings—Fall 2008 and Winter 2009 Docket, Mailcode: 28221T, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention Docket ID No. EPA–HQ–ORD–2008–0649.

• *Hand Delivery or Courier.* Deliver comments to: EPA Docket Center (EPA/DC), Room B102, EPA West Building, 1301 Constitution Avenue, NW., Washington, DC, Attention Docket ID No. EPA–HQ–ORD–2008–0649.

Note: This is not a mailing address. Such deliveries are only accepted during the docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–ORD–2008–0649. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *www.regulations.gov*, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *www.regulations.gov* or e-mail. The *www.regulations.gov* Web site is an ''anonymous access'' system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through *www.regulations.gov*, your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

Docket: All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, *e.g.*, CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at the Board of Scientific Counselors (BOSC), Human Health Subcommittee Meetings—Fall 2008 and Winter 2009 Docket, EPA/DC, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the ORD Docket is (202) 566–1752.

FOR FURTHER INFORMATION CONTACT: The Designated Federal Officer via mail at: Heather Drumm, Mail Code 8104–R, Office of Science Policy, Office of Research and Development, Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Washington, DC 20460; via phone/voice mail at: (202) 564–8239; via fax at: (202) 565–2911; or via e-mail at: *drumm.heather@epa.gov.*

SUPPLEMENTARY INFORMATION:

General Information

Any member of the public interested in receiving a draft BOSC agenda or making a presentation at any of the meetings may contact Heather Drumm, the Designated Federal Officer, via any of the contact methods listed in the **FOR FURTHER INFORMATION CONTACT** section above. In general, each individual making an oral presentation will be limited to a total of three minutes.

Proposed agenda items for the first teleconference include, but are not limited to: Overview of materials provided to the subcommittee; Overview of ORD; Overview of ORD's Human Health Program; Subcommittee discussion. Proposed agenda items for the second teleconference include, but are not limited to: Overviews of each of the four Long Term Goals for the Human Health Research Program. Proposed agenda items for the face-to-face meeting include, but are not limited to: Overviews, poster sessions and client testimonials for each of the long term goals; Subcommittee discussions. The meetings are open to the public.

Information on Services for Individuals with Disabilities: For information on access or services for individuals with disabilities, please contact Heather Drumm at (202) 564–8239 or *drumm.heather@epa.gov.* To request accommodation of a disability, please contact Heather Drumm, preferably at least ten days prior to the meeting, to give EPA as much time as possible to process your request.

Dated: September 4, 2008.

Fred Hauchman,

Director, Office of Science Policy.

[FR Doc. E8–21462 Filed 9–12–08; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–8715–9]

Science Advisory Board Staff Office; Clean Air Scientific Advisory Committee (CASAC); NO_X & SO_X Secondary NAAQS Review Panel Meeting and Teleconference

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: The Environmental Protection Agency (EPA) Science Advisory Board (SAB) Staff Office announces a public meeting of the Clean Air Scientific Advisory Committee Oxides of Nitrogen (NO_X) and Sulfur Oxides (SO_X) Secondary National Ambient Air Quality Standards (NAAQS) Review Panel (CASAC Panel) to peer review EPA's *Integrated Science Assessment for Oxides of Nitrogen and Sulfur—Environmental Criteria (Second External Review Draft) (EPA/600/R–08/082)* and EPA's *Risk and Exposure Assessment for Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur: First Draft (EPA–452/P–08–005a).* The chartered CASAC will review and approve the Panel's reports by public teleconference.

DATES: The CASAC Panel will meet from 8:30 a.m. Wednesday, October 1, 2008 through 3 p.m. Thursday, October 2, 2008 (Eastern Time). The chartered CASAC will meet by public teleconference from 1 p.m. to 3 p.m. on October 30, 2008 (Eastern Time).

ADDRESSES: The October 1–2, 2008 public meeting will take place at the Marriott at Research Triangle Park, 4700 Guardian Drive, Durham, NC 27703, telephone (919) 941–6200. The October 30, 2008 public teleconference will be conducted by phone only.

FOR FURTHER INFORMATION CONTACT: Any member of the public who wants further information concerning the October 1–2, 2008 meeting may contact Ms. Kyndall Barry, Designated Federal Officer (DFO), EPA Science Advisory Board (1400F), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Washington, DC 20460; via telephone/voice mail (202) 343–9868; fax (202) 233–0643; or e-mail at *barry.kyndall@epa.gov.* For information

on the CASAC teleconference on October 30, 2008, please contact Mr. Fred Butterfield, Designated Federal Officer (DFO), at the above listed address; via telephone/voice mail (202) 343–9994 or e-mail at *butterfield.fred@epa.gov*. General information concerning the CASAC can be found on the EPA Web site at *http://www.epa.gov/casac.*

SUPPLEMENTARY INFORMATION:

Background: The Clean Air Scientific Advisory Committee (CASAC) was established under section 109(d)(2) of the Clean Air Act (CAA or Act) (42 U.S.C. 7409) as an independent scientific advisory committee. CASAC provides advice, information and recommendations on the scientific and technical aspects of air quality criteria and national ambient air quality standards (NAAQS) under sections 108 and 109 of the Act. The CASAC is a Federal advisory committee chartered under the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. App. The Panel will comply with the provisions of FACA and all appropriate SAB Staff Office procedural policies.

Section 109(d)(1) of the CAA requires that the Agency periodically review and revise, as appropriate, the air quality criteria and the NAAQS for the six ''criteria'' air pollutants, including NO_X and SO_X. EPA is in the process of reviewing the secondary NAAQS for NO_X and SO_X. Welfare effects as defined in the CAA includes, but is not limited to, effects on soils, water, wildlife, vegetation, visibility, weather, and climate, as well as effects on materials, economic values, and personal comfort and well-being. As part of that process, EPA's Office of Research and Development (ORD) issued the *Draft Integrated Science Assessment fox Oxides of Nitrogen and Sulfur—Environmental Criteria* (ISA) in December 2007 and recently issued the second draft ISA in August 2008. EPA's Office of Air and Radiation (OAR) released its Scope and Methods Plan for Risk/Exposure Assessment (REA) in March 2008. OAR completed the first draft REA in August 2008. The CASAC reviewed the first draft ISA and provided consultative advice on the Scope and Methods plan on April 1–2, 2008. The CASAC's reports to the Administrator can be found on the SAB Web site at *http://www.epa.gov/casac* (*see* EPA–CASAC–08–011 and EPA–CASAC–08–012 both dated May 19, 2008).

The purpose of the October 1–2, 2008 meeting is for the CASAC Panel to conduct a peer review of the second draft ISA and the first draft REA. The chartered CASAC will review and approve the Panel's draft reports on the ISA and REA by public conference call on October 30, 2008.

Technical Contacts: Any questions concerning EPA's *Integrated Science Assessment for Oxides of Nitrogen and Sulfur—Environmental Criteria (Second External Review Draft)* should be directed to Dr. Tara Greaver, ORD, at (919) 541–2435 or *greaver.tara@epa.gov*. Any questions concerning EPA's *Risk and Exposure Assessment for Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur: First Draft* should be directed to Dr. Anne Rea, OAR, at (919) 541–0053 or *rea.anne@epa.gov.*

Availability of Meeting Materials: EPA–ORD's *Integrated Science Assessment for Oxides of Nitrogen and Sulfur—Environmental Criteria (Second External Review Draft)* can be accessed at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198220.* EPA–OAR's *Scope and Methods Plan for Risk/Exposure Assessment: Secondary NAAQS Review for Oxides of Nitrogen and Oxides of Sulfur* can be accessed at *http://www.epa.gov/ttn/naaqs/standards/no2so2sec/cr_pd.html.* The agenda and other materials for the CASAC meetings will be posted on the SAB Web site at *http://www.epa.gov/casac.*

Procedures for Providing Public Input: Interested members of the public may submit relevant written or oral information for consideration on the topics included in this advisory activity. *Oral Statements:* To be placed on the public speaker list for the October 1–2, 2008 meeting, interested parties should notify Ms. Kyndall Barry, DFO, by e-mail no later than September 24, 2008. To be placed on the public speaker list for the October 30, 2008 teleconference, interested parties should notify Mr. Fred Butterfield, DFO, by e-mail no later than October 23, 2008. Oral presentations will be limited to one-half hour for all speakers. *Written Statements:* Written statements for the October 1–2, 2008 meeting should be received in the SAB Staff Office by September 24, 2008, so that the information may be made available to the CASAC Panel for its consideration prior to this meeting. For the teleconference meeting of the chartered CASAC on October 30, 2008, statements should be received in the SAB Staff Office by October 23, 2008. Written statements should be supplied to the appropriate DFO in the following formats: one hard copy with original signature and one electronic copy via e-mail (acceptable file format: Adobe Acrobat PDF, MS Word, WordPerfect, MS PowerPoint, or Rich Text files in IBM-PC/Windows 98/2000/XP format).

Accessibility: For information on access or services for individuals with disabilities, please contact Ms. Barry at the phone number or e-mail address noted above, preferably at least ten days prior to the face-to-face meeting, to give EPA as much time as possible to process your request.

Dated: September 8, 2008.

Anthony F. Maciorowski,

Deputy Director, EPA Science Advisory Board Staff Office.

[FR Doc. E8–21492 Filed 9–12–08; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[FRL–8716–4]

National Drinking Water Advisory Council: Request for Nominations

AGENCY: Environmental Protection Agency.

ACTION: Notice.

SUMMARY: The U.S. Environmental Protection Agency (EPA or Agency) invites all interested persons to nominate qualified individuals to serve a three-year term as members of the National Drinking Water Advisory Council (Council). This 15-member Council was established by the Safe Drinking Water Act (SDWA) to provide practical and independent advice, consultation, and recommendations to the Agency on the activities, functions, policies, and regulations required by the SDWA. The terms of five (5) members expire in December 2008. To maintain the representation required in the statute, nominees for the 2009 Council should represent State and local officials concerned with public water supply and public health protection (1 vacancy), the general public (2 vacancies) and interest groups (2 vacancies), with at least one of these vacancies representing small systems. All nominations will be fully considered, but applicants need to be aware of the specific representation needed as well as geographical balance so that all major areas of the U.S. (East, Mid-West, South, Mountain, South-West, and West) will be represented. The current list of members is available on the EPA Web site at *http://www.epa.gov/safewater/ndwac.*

DATES: Submit nominations via U.S. mail on or before October 19, 2008.

ADDRESSES: Address all nominations to Veronica Blette, Designated Federal Officer, National Drinking Water

Attachment D

Background and Schedule for the Secondary NOx/SOx NAAQS Review

Dr. Dave Guinnup

Office of Air Quality Planning and Standards

Stage of Review	Major Milestone	NO_2/SO_2 Secondary
Integrated Review Plan	Call for information Workshop Draft Integrated Review Plan CASAC/public review Final Integrated Review Plan	Dec 2005 July 2007 Sept 2007 Oct 30, 2007 Dec 2007
Integrated Science Assessment (ISA)	1st Draft ISA CASAC/public review ***2nd Draft ISA*** ***CASAC/public review*** Final ISA	Dec 2007 Mar 2008 ***Aug 11, 2008*** ***Oct 1-2, 2008*** Dec 12, 2008
Risk/Exposure Assessment (R/EA)	R/EA scope/methods plan CASAC/public review ***1st Draft R/EA*** ***CASAC/public review*** 2nd Draft R/EA CASAC/public review Final R/EA	Mar 2008 Apr 2008 ***Aug 29, 2008*** ***Oct 1-2, 2008*** Mar 2009 May 2009 Jul 2009
Policy Assessment/ Rulemaking	ANPR CASAC/public review NPRM FRM	Aug 2009 Oct 2009 Feb 12, 2010 Oct 19, 2010

Attachment E

Integrated Science Assessment for Oxides of Nitrogen and Sulfur – Environmental Criteria

2nd External Review Draft

Presentation to the

Clean Air Scientific Advisory Committee

National Center for Environmental Assessment
US EPA Office of Research and Development

October 1, 2008

NCEA-RTP NO_X and SO_X ISA TEAM

Dr. Ila Cote – Acting Division Director
Ms. Debra Walsh – Deputy Director
Dr. Mary Ross – Branch Chief

Dr. Tara Greaver – NO_X and SO_X Team Leader

Dr. Jeffrey R. Arnold
Dr. Jean-Jacques B. Dubois
Dr. Jeffrey Herrick
Dr. Lingli Liu
Dr. Kristopher Novak
Dr. Paul F. Wagner

Framework for Causal Determinations

- A two-step approach is used to judge the scientific evidence about relevant exposures to criteria pollutants and risks to the environment
  - The first step is to determine causality
    - Sufficient to infer a causal relationship
    - Sufficient to infer a likely causal relationship (i.e., more likely than not)
    - Suggestive but not sufficient to infer a causal relationship
    - Inadequate to infer the presence or absence of a causal relationship
    - Suggestive of no causal relationship
  - The second step is further characterization of the ecological response (e.g., the concentration-response relationship, deposition loads and exposure time periods at which effects are observed)

General Revisions

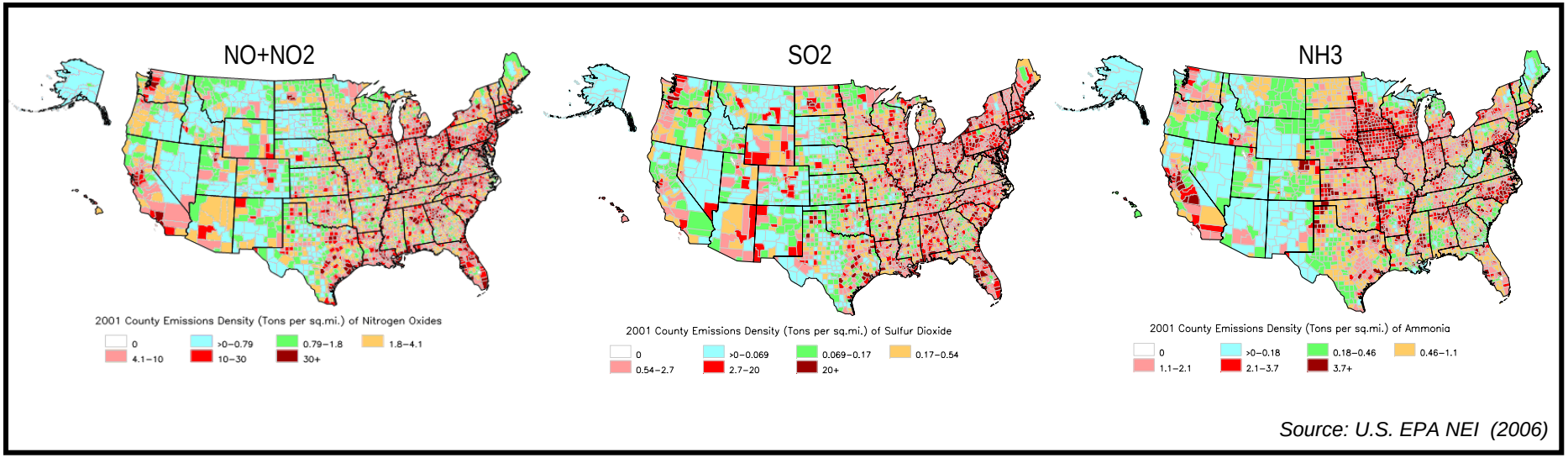
Applied causal framework

New sections to summarize the main conclusions

- Executive Summary
- Key Findings

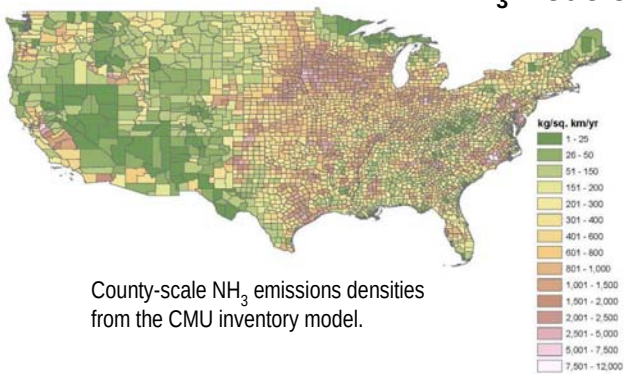
Reduced redundancy

Chapter 2 Major Revisions: Emissions

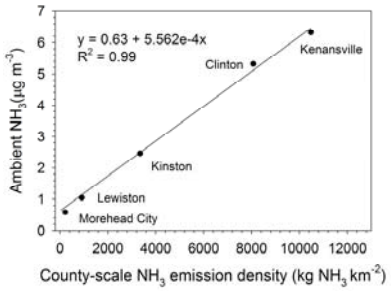


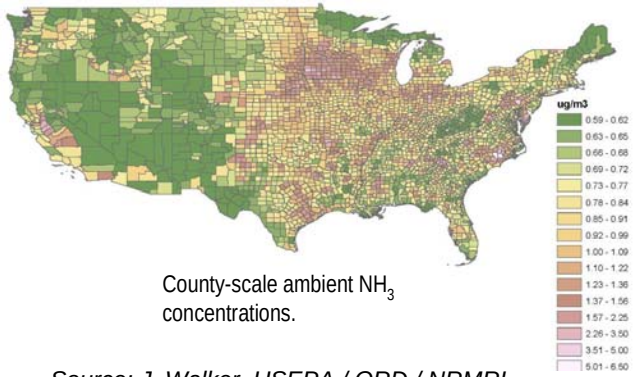
Source: U.S. EPA NEI (2006)

NH_3 Modeled Emissions and Ambient Concentrations



County-scale NH_3 emissions densities from the CMU inventory model.



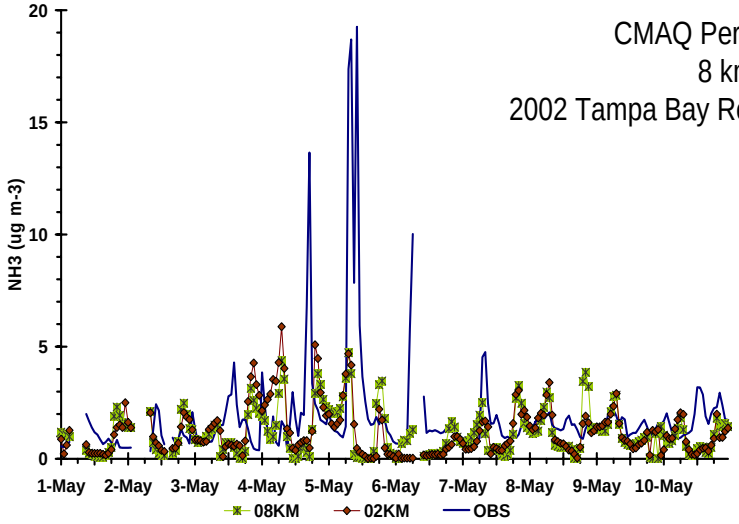


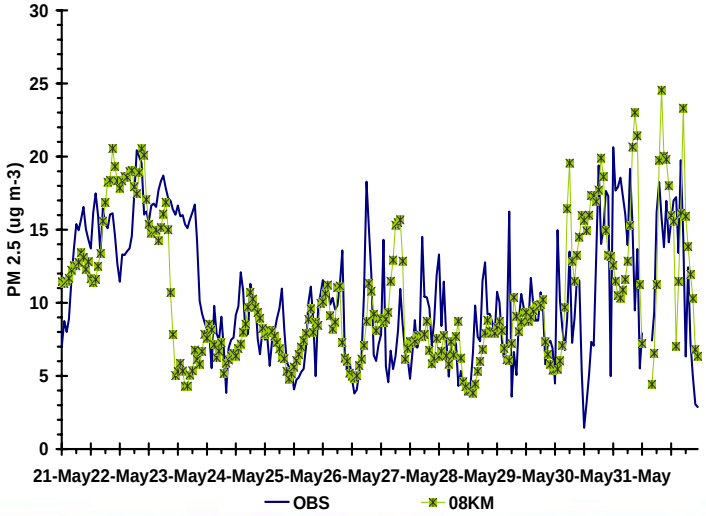
County-scale ambient NH_3 concentrations.

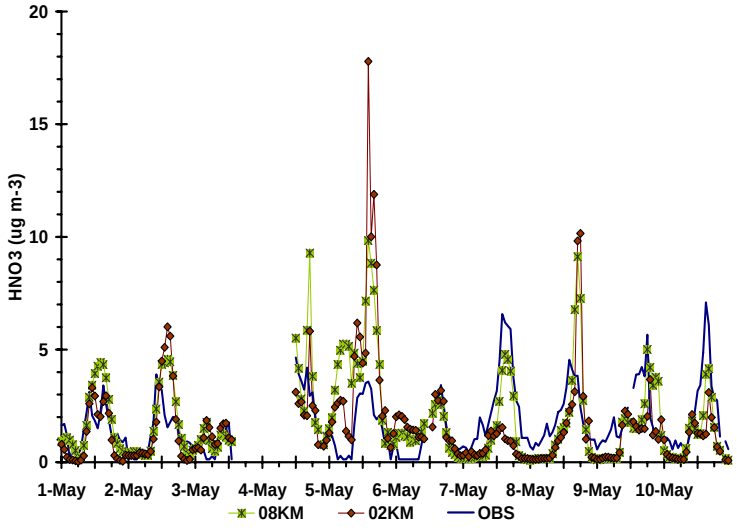
Source: J. Walker, USEPA / ORD / NRMRL

Chapter 2 Major Revisions: Air Quality Model Components & Testing

CMAQ Performance for Selected Relevant Ambient Species
8 km and 2 km CMAQ-UCD Solutions against
2002 Tampa Bay Regional Atmospheric Chemistry Experiment (BRACE) Data

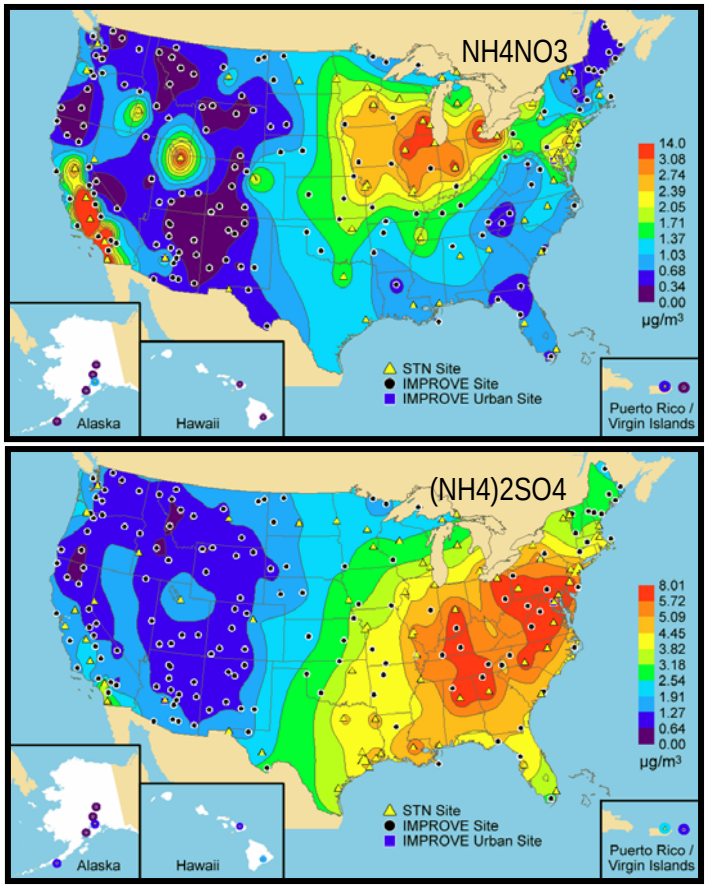






Chapter 2 Major Revisions: Deposition

IMPROVE and CSN (labeled STN) monitored mean concentrations, 2000 -- 2004



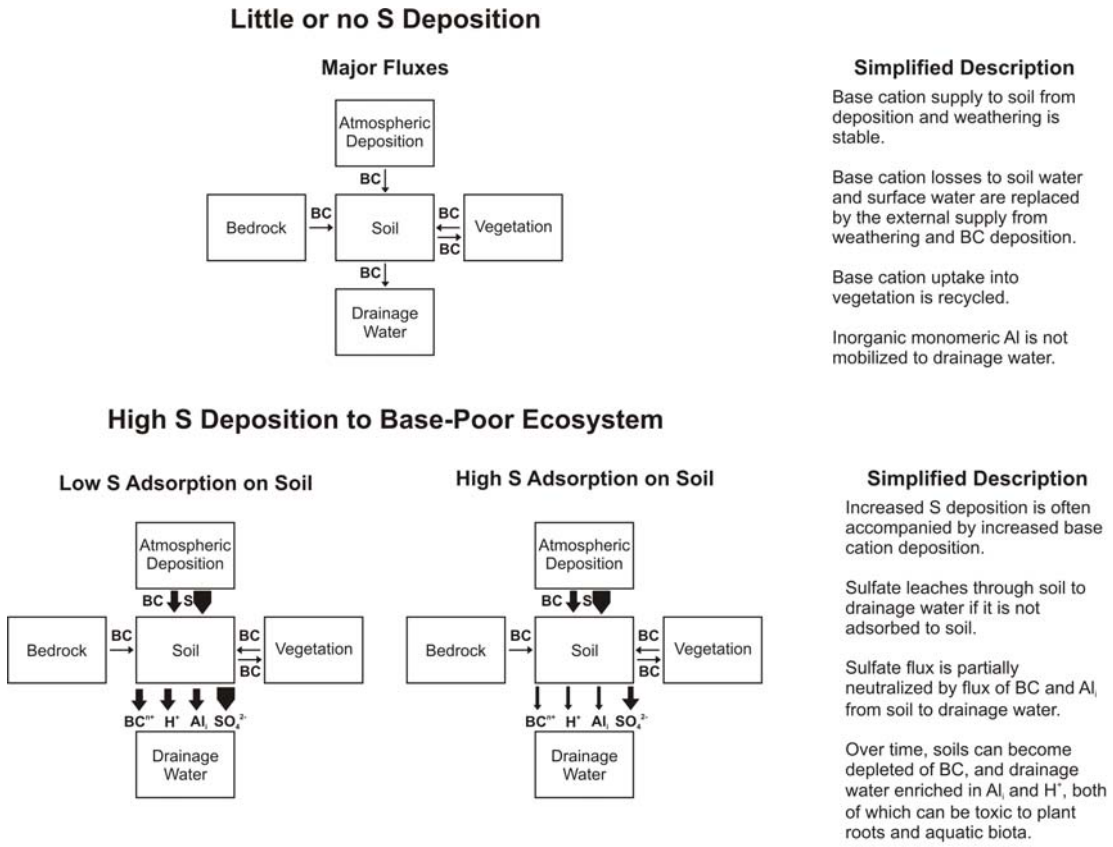
Regional Changes in Air Quality and Deposition for S and N, 1989—1991 vs. 2003--2005

Measurement	Unit	Region	Average 1989–1991	Average 2003–2005	Percent Change
Wet Sulfate Deposition	kg/ha	Mid-Atlantic	27	20	-24
		Midwest	23	16	-32
		Northeast	23	14	-36
		Southeast	18	15	-19
Wet Sulfate Concentration	mg/L	Mid-Atlantic	2.4	1.6	-33
		Midwest	2.3	1.6	-30
		Northeast	1.9	1.1	-40
		Southeast	1.3	1.1	-21
Ambient Sulfur Dioxide Concentration	µg/m³	Mid-Atlantic	13	8.4	-34
		Midwest	10	5.8	-44
		Northeast	6.8	3.1	-54
		Southeast	5.2	3.4	-35
Ambient Sulfate Concentration	µg/m³	Mid-Atlantic	6.4	4.5	-30
		Midwest	5.6	3.8	-33
		Northeast	3.9	2.5	-36
		Southeast	5.4	4.1	-24
Wet Inorganic Nitrogen Deposition	kg/ha	Mid-Atlantic	5.9	5.5	-8
		Midwest	6.0	5.5	-8
		Northeast	5.3	4.1	-23
		Southeast	4.3	4.4	+2
Wet Nitrate Concentration	mg/L	Mid-Atlantic	1.5	1.0	-29
		Midwest	1.4	1.2	-14
		Northeast	1.3	0.9	-33
		Southeast	0.8	0.7	-9
Ambient Nitrate Concentration	µg/m³	Mid-Atlantic	0.9	1.0	+5
		Midwest	2.1	1.8	-14
		Northeast	0.4	0.5	+20
		Southeast	0.6	0.7	+17
Total Ambient Nitrate Concentration (Nitrate + Nitric acid)	µg/m³	Mid-Atlantic	3.5	3.0	-14
		Midwest	4.0	3.5	-12
		Northeast	2.0	1.7	-13
		Southeast	2.2	2.1	-5

Source: U.S. EPA CAMD CASTNET and NADP / NTN.

Revisions to Chapter 3: Acidification

- New conceptual diagram (Figure 3-1) of major ionic fluxes associated with sulfur-driven acidification of drainage water
- New section discussing the quantification of acidification in aquatic ecosystems
- Expanded the discussion of *Health, Vigor, and Reproduction of Tree Species in Forests* to include interactions between acidification and plant disease (e.g., dogwood anthracnose)



Revisions to Chapter 3: Nitrogen Enrichment

New section on primary productivity and C budget

- Primary productivity
  - In terrestrial ecosystems, N deposition can increase plant growth rates and change carbon allocation patterns, which may lead to increased susceptibility to severe fires, drought and windthrow
  - Most freshwater, coastal and estuarine ecosystems are N limited, N deposition has been shown to cause eutrophication

- Carbon budgets
  - A meta-analysis conducted by the EPA indicated
    - N addition (10 to 562 kg N/ha/yr) has no significant effect on net ecosystem CO_2 exchange of non-forest ecosystems
    - N addition (25 to 200 kg N/ha/yr) increased ecosystem carbon content (sum of carbon content of vegetation, forest floor and soil) of forest ecosystems

Revisions to Chapter 3: Nitrogen enrichment

New section on N_2O and CH_4 flux from ecosystems

- A meta-analysis conducted by the EPA indicated that N addition increased N_2O emission, reduced CH_4 uptake and increased CH_4 emission

	N_2O fluxes		CH_4 fluxes	
	terrestrial	**wetland**	**terrestrial**	**wetland**
# observations	80	19	41	17
N forms	NH_4^+, NO_3^-, NH_4NO_3, urea	NH_4^+, NO_3^-, NH_4NO_3, urea	NH_4^+, NO_3^-, NH_4NO_3, urea	NH_4^+, NO_3^-, NH_4NO_3, urea
N addition rates	10 to 562 kg N $ha^{-1}yr^{-1}$	15.4 to 300 kg N $ha^{-1}yr^{-1}$	10 to 560 kg N $ha^{-1}yr^{-1}$	30 to 240 kg N $ha^{-1}yr^{-1}$
Responses	Increased N_2O emission by *234%* [95% CI: 171% to 312%].	increased N_2O emission by *207 %* [95% CI: 64% to 418%].	reduced CH_4 uptake by -39% [95% CI: -25% to -50%]	increased CH_4 emission by 109% [95% CI: 56% to 182%] from the source wetlands, but had no impact on CH_4 uptake from the sink wetlands

Revisions to Chapter 3: Nitrogen Enrichment

- Reorganization and expanded discussion on species richness, composition and biodiversity
- New section on U.S and European empirical critical loads and other quantified relationships between deposition load and ecological effects
  - N critical loads for ecosystems found in Europe (Table 3-24)
  - Summary of dose-response curve for N deposition and ecological responses (Table 3-25)
  - Summary of deposition levels and corresponding ecological effects focused on U.S. ecosystems (Table 4 - 4)
- New case study on the San Bernardino Mountains
- New section on ecosystem services affected by N deposition

Revisions to Chapter 3: Phytotoxic effects of gas-phase NO_x & SO_x

- Added new section on the direct effects of nitric acid to vegetation
  - Some evidence that current levels of nitric acid vapor could have caused a decline of sensitive lichens in southern CA
- Included additional recent studies on the direct effects of SO_2 on vegetation
- Brought forward key studies from the 1993 AQCD on NO_2 effects on plants and included additional recent studies

Key Conclusions

At current deposition levels, the available evidence is *sufficient to infer a causal relationship* between

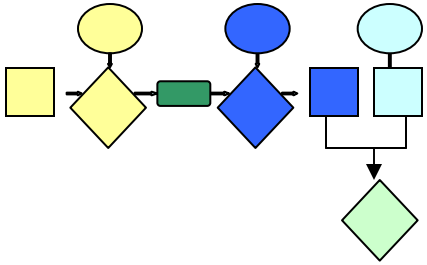
- Acidifying deposition and effects on
  - (1) biogeochemistry in terrestrial and aquatic ecosystems
  - (2) biota in terrestrial and aquatic ecosystems
- Nitrogen deposition and effects on
  - (1) biogeochemical cycling of N and C in terrestrial, wetland, freshwater aquatic, and coastal marine ecosystems
  - (2) biogenic flux of CH_4 and N_2O in terrestrial and wetland ecosystems
  - (3) species richness, species composition, and biodiversity in terrestrial, wetlands freshwater aquatic and coastal marine ecosystems
- Sulfur deposition and effects on mercury methylation

Attachment F

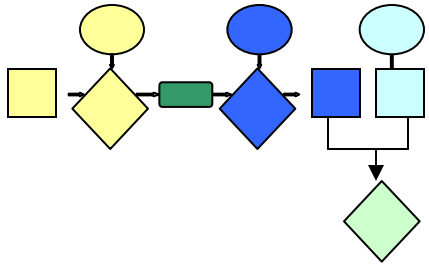
Highlights of the NOxSOx Secondary NAAQS R/EA

Presentation to CASAC
October 1, 2008

Office of Air Quality Planning and Standards
Health and Environmental Impacts Division
Air Quality Analysis Division
Office of Air Programs
Clean Air Markets Division

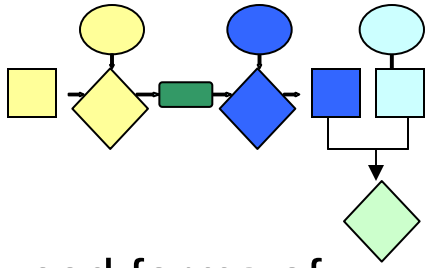


Purpose



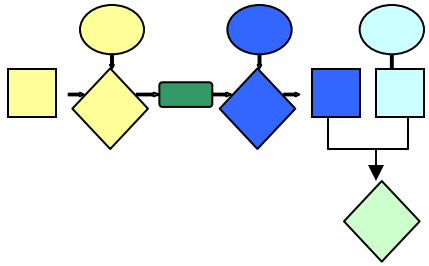
- Solicit feedback on EPA's first draft risk assessment for the NOx/SOx Secondary NAAQS review
  - Obtain guidance on the case study analyses and current risk assessment approach, and working structure for a secondary standard
  - Introduce some new material on policy-relevant interpretation of the science

In this review…



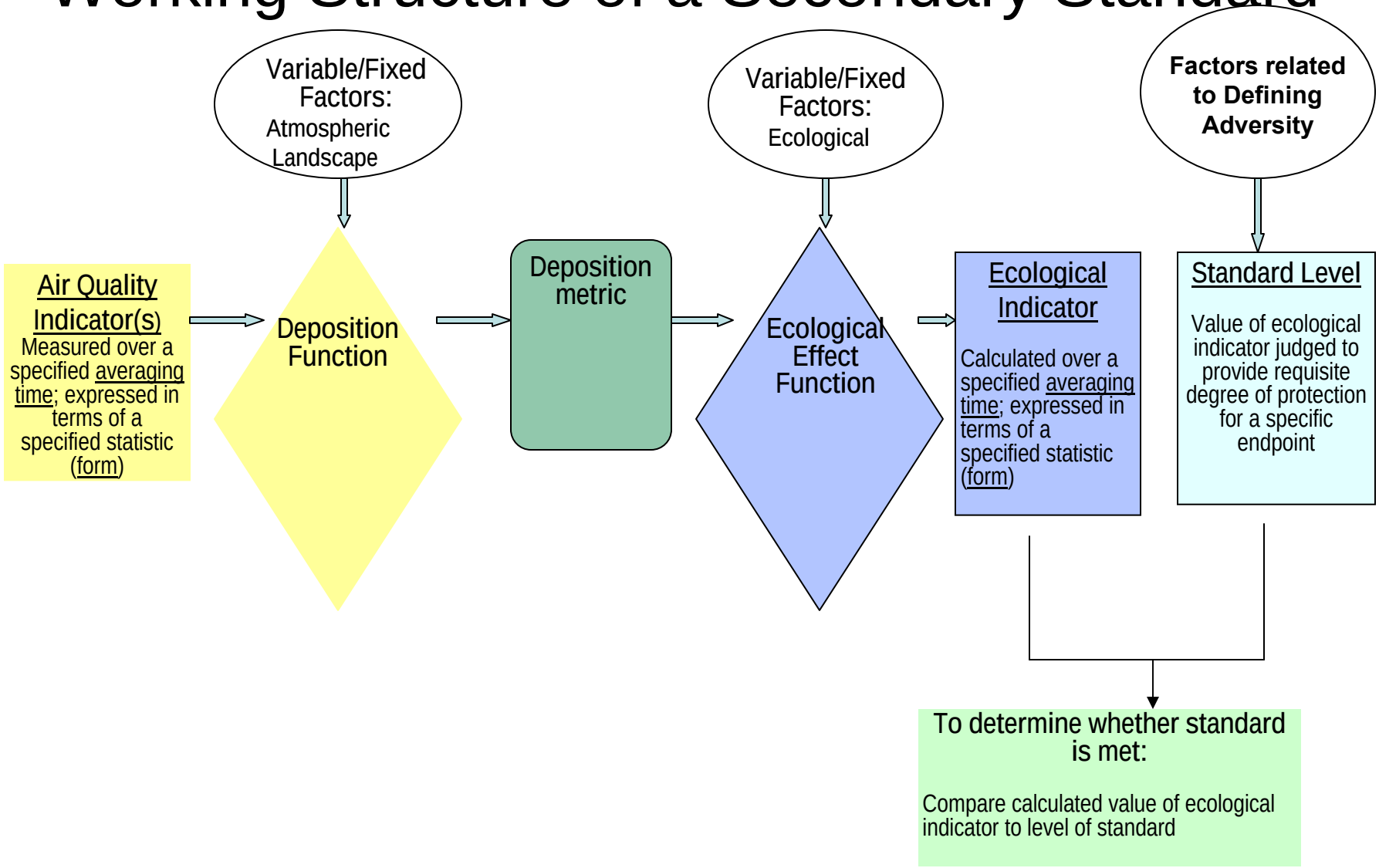
- Rationale, multi-pollutant approach, oxidized and reduced forms of nitrogen, policy-relevant questions (Ch 1)
- Overview of risk and exposure assessment, case study locations, effects, ecosystem services (Ch 2)
- Atmospheric analysis of spatial and temporal patterns of deposition; emissions and deposition relationships (Ch 3)
- Focus on environmental effects related to deposition of sulfur and reactive nitrogen into sensitive terrestrial and aquatic ecosystems
  - Acidification (Ch 4)
  - Nutrient Enrichment (Ch 5)
  - Additional Effects (Ch 6)
- Take a broad view of potential policy outcomes, after first evaluating relevant science and designing/conducting relevant assessments (Ch 7 & 8)

Complexities



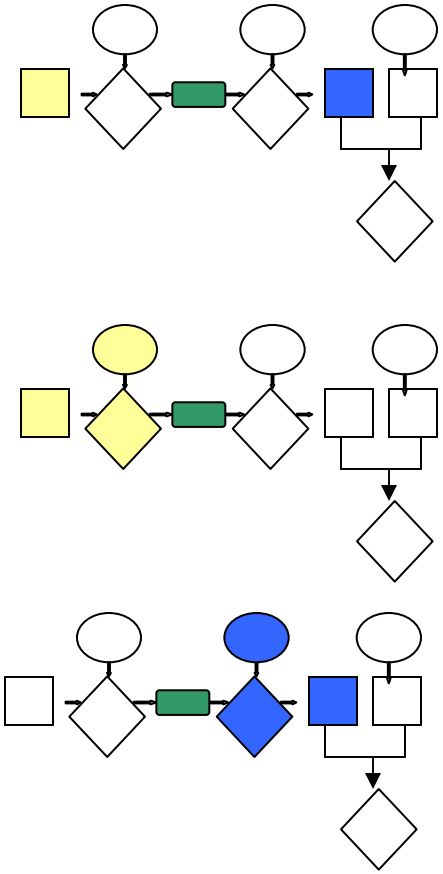
- Ecological effects linked to atmospheric concentrations of NOx and SOx through deposition of N and S
- Multi-pollutant, multi-source
- Many ecological endpoints
- Definition of adversity
- Many variables affect deposition rates and ecological effects
- Enhanced use of modeling and observational data of both ecological and atmospheric processes

Working Structure of a Secondary Standard

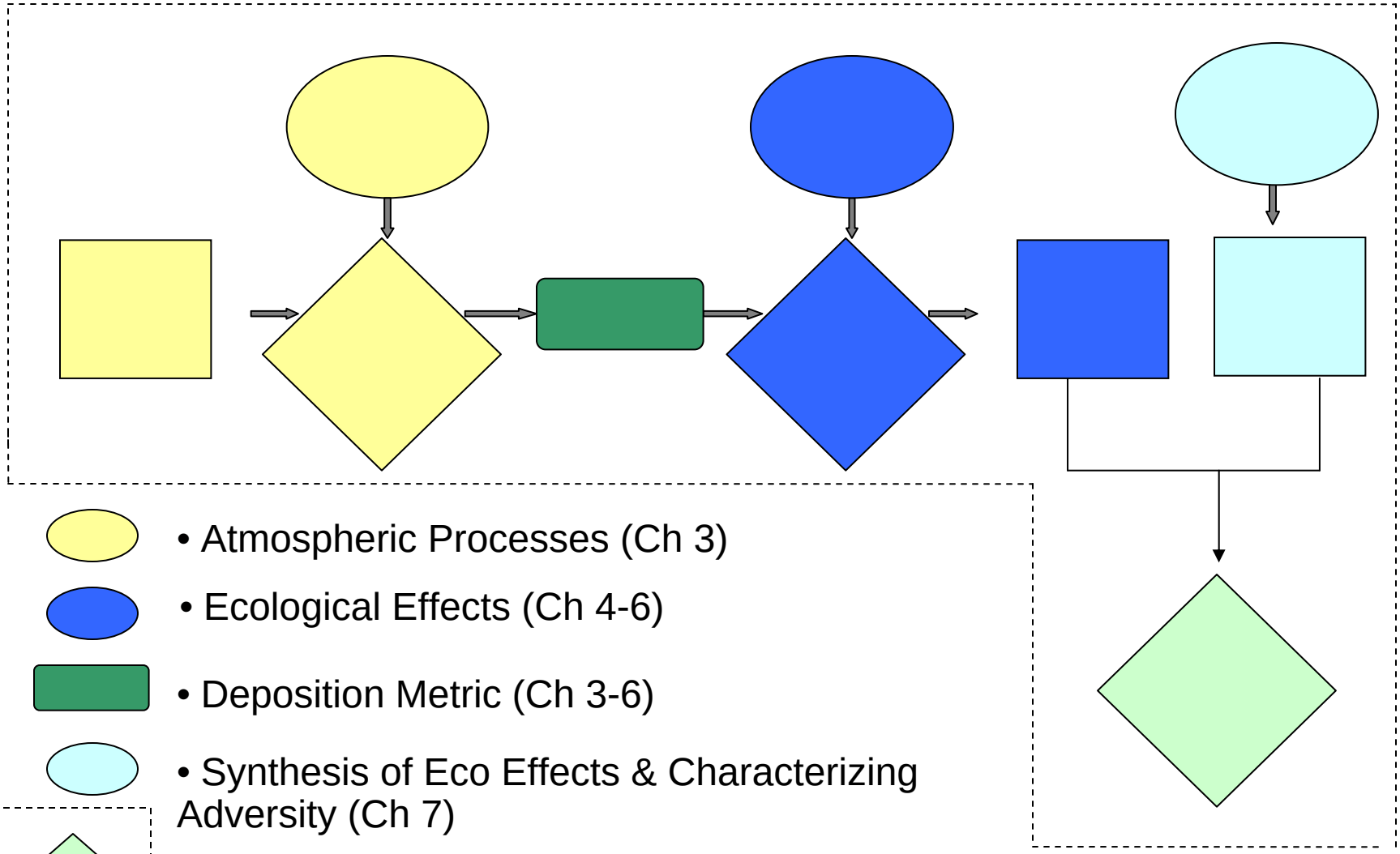


Key Concepts and Outline

- Scientifically Sound Structure: *examines linkages between atmospheric concentrations of NOx and SOx, deposition of N and S, and ecological indicators*
  - Adirondacks Case Study Location
  - Ecological Effect of Aquatic Acidification
- Atmospheric Influences: *vary based on sources, transport, deposition, co-pollutants*
  - spatial and temporal characterization
  - emission and deposition relationships
- Ecological Influences: *reflect characteristics of ecological sensitivity (geology, weathering rates, soil thickness)*
  - Ecological Indicator: ANC
  - Relationship between ANC and deposition

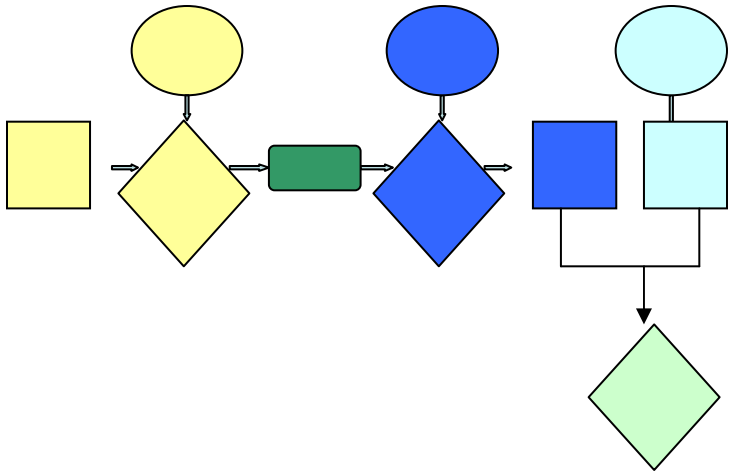


Second Draft Risk Assessment



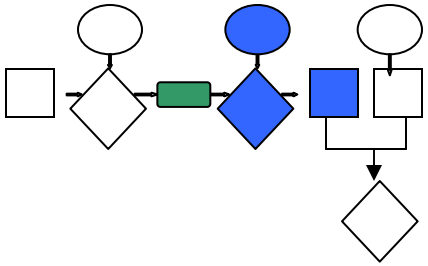
- Atmospheric Processes (Ch 3)
- Ecological Effects (Ch 4-6)
- Deposition Metric (Ch 3-6)
- Synthesis of Eco Effects & Characterizing Adversity (Ch 7)
- Statutory Interpretation: Structure of a Secondary Standard (Ch 8)

Illustrative Example



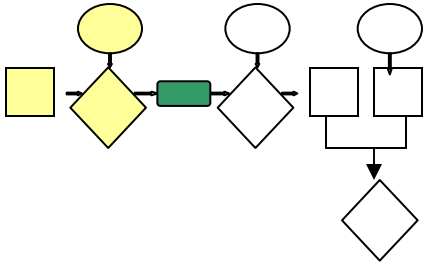
- Ecological Effect: Aquatic Acidification
- Case Study Location: Adirondacks

Ecological Effects and Indicators



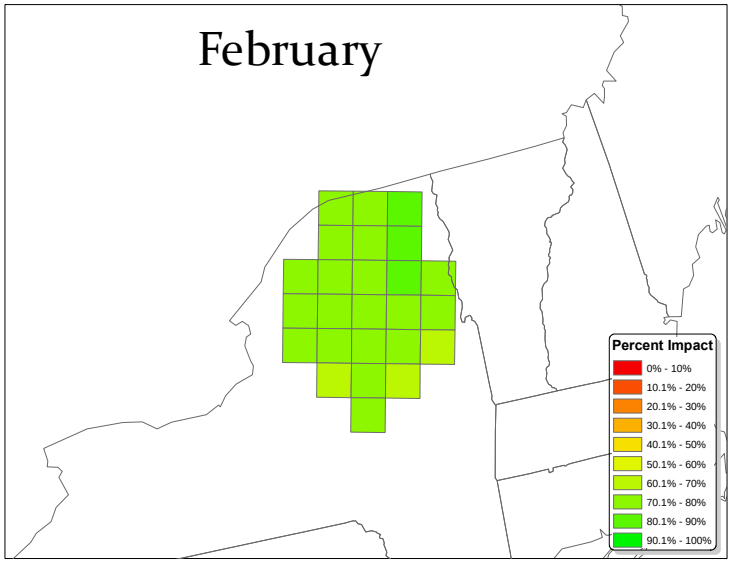
Targeted Effect area	Characteristics of Sensitivity (Variable Ecological Factors)	Ecological Indicator	Case Study Locations
Aquatic Acidification	geology, surface water flow, soil depth, weathering rates	Species richness, abundance, composition, **ANC**	Adirondack Mountains (NY) Blue Ridge Mountains, Shenandoah National Park (VA)
Terrestrial Acidification	geology, surface water flow, soil depth, weathering rates	Tree health Red spruce, sugar maple **ANC**	Kane Forest (Allegheny Plateau, PA) Hubbard Brook Experimental Forest (White Mountains, NH)
Aquatic Nutrient Enrichment	N-limited systems, presence of nitrogen in surface water, eutrophication status, nutrient criteria,	**Eutrophication Index (EI)**	Potomac River Basin, Chesapeake Bay Neuse River Basin, Pamlico Sound
Terrestrial Nutrient Enrichment	Presence of Acidophytic Lichens, anthropogenic land cover	**Species composition**	Coastal Sage Scrub and mixed conifer forest (San Bernadino and Sierra Nevada Mountain Ranges, California)

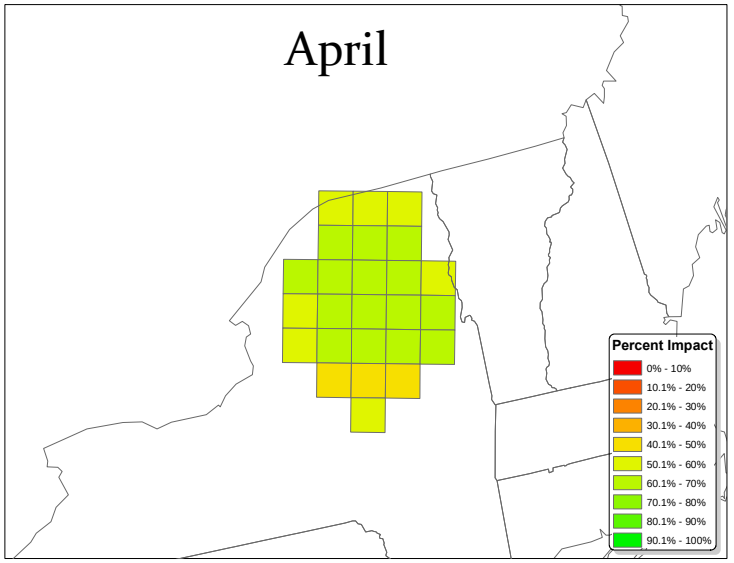
Role of NOx in N Deposition

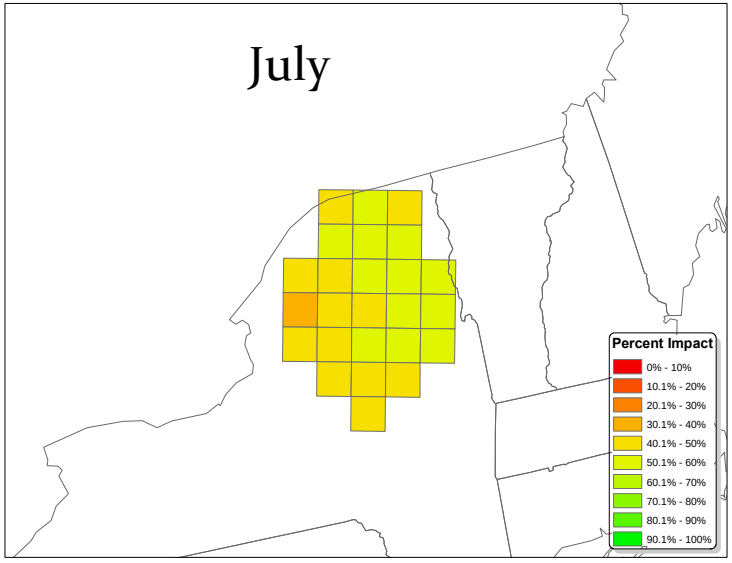


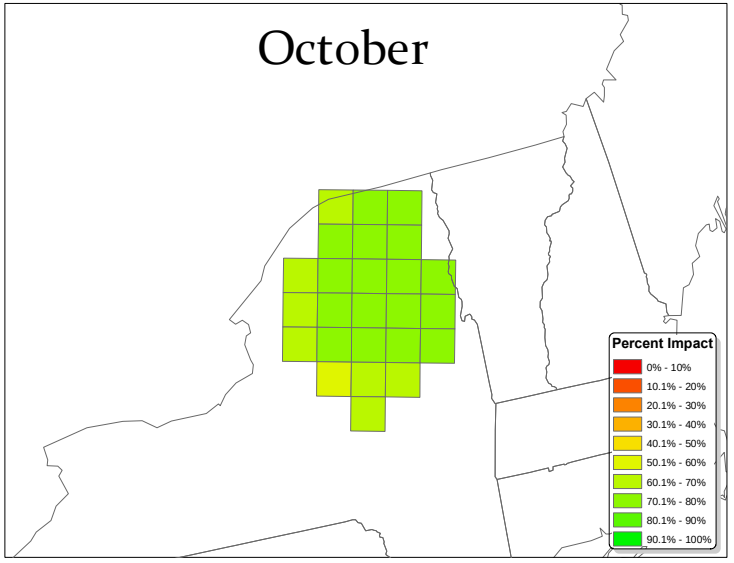
- Ecological effects are associated with total nitrogen. NOx contribution relative to ammonia and other sources of N is important.
- RSM analysis of N deposition for case studies indicates that NOx emissions play significant role in total N deposition.
- In some areas (e.g. Neuse Basin) NH3 plays lead role but NOx still important.
- In Western U.S., international emissions of NOx and NH3 contributing to total N but domestic emissions still dominant.
- RSM analysis supports addressing ambient NOx to reduce nitrogen related ecological impacts, and also supports the separation of total nitrogen into oxidized and reduced forms for the purposes of constructing ambient standards.

Contribution of Anthropogenic NOx Emssions to Total Nitrogen Deposition in the Adirondacks Case Study Area

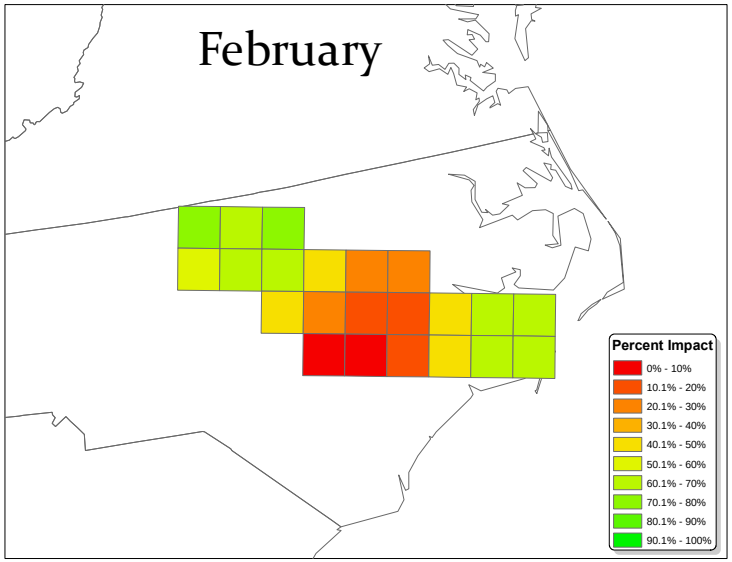


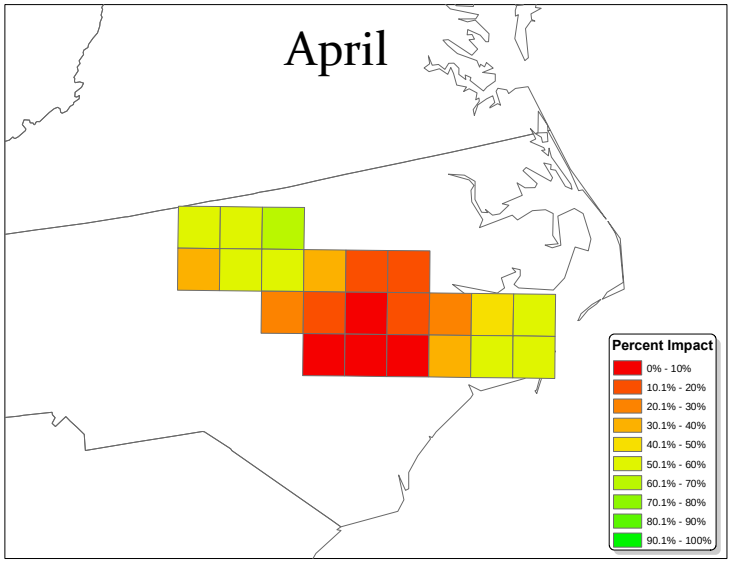


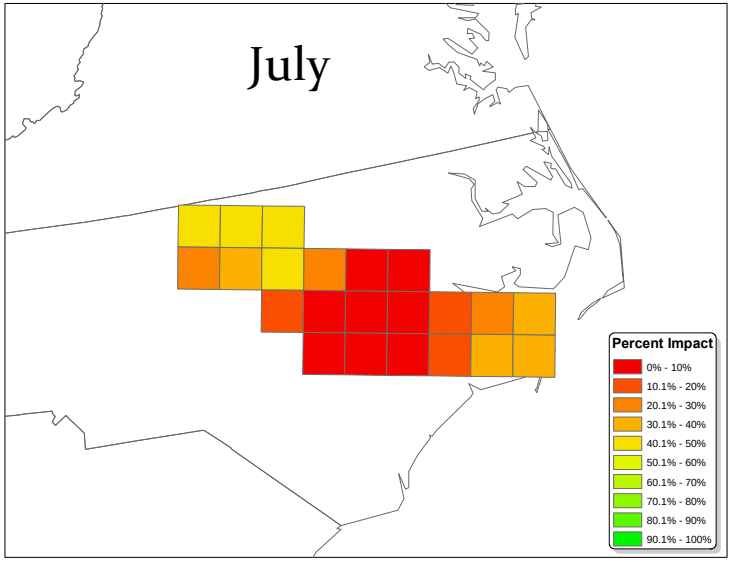


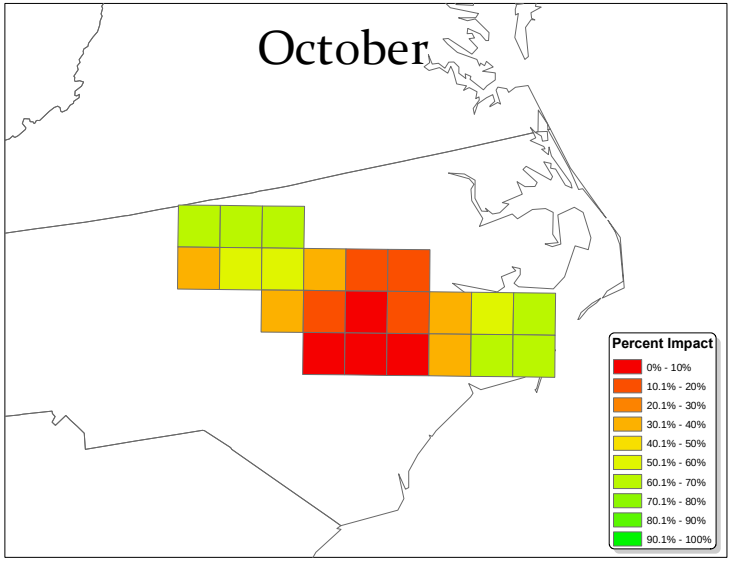


Contribution of Anthropogenic NOx Emissions to Total Nitrogen Deposition in the Neuse Case Study Area

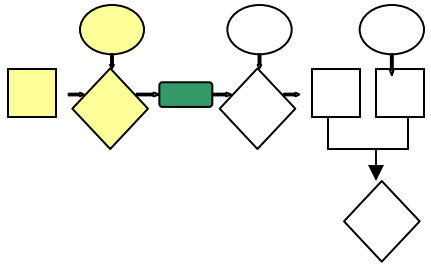








Characterization of Deposition and Concentrations



- Purpose: Describe the magnitude, spatial gradients, and intra-annual and inter-annual variations in NOx and SOx in and near the Case Study Areas

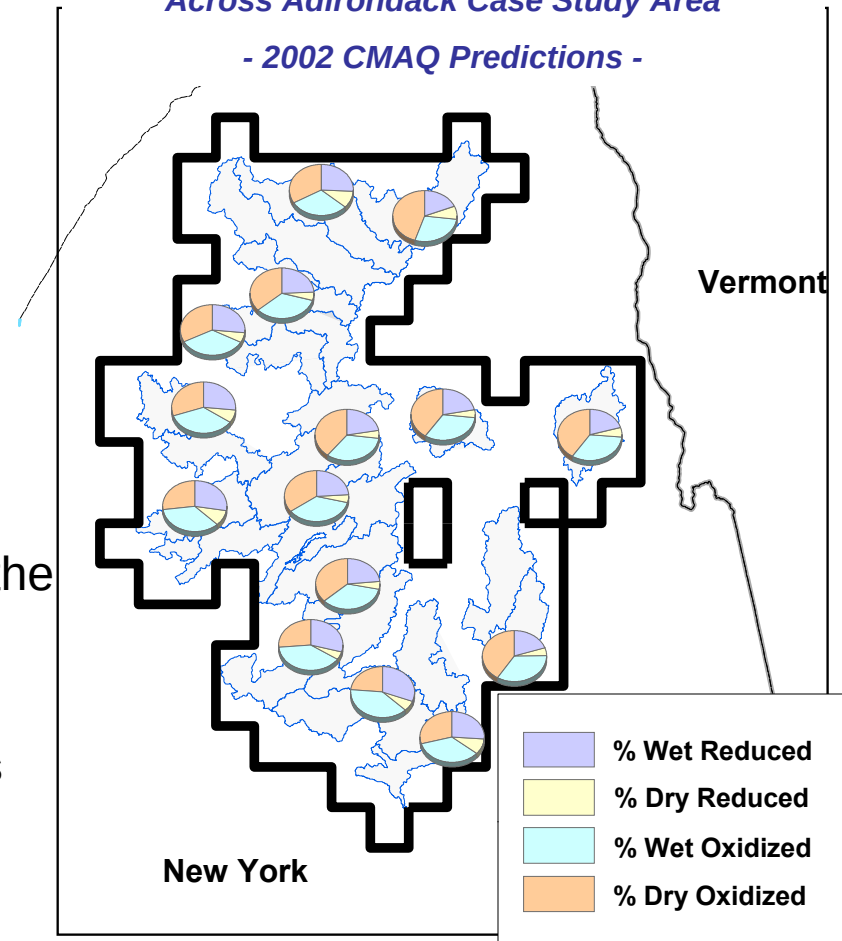
- Compare the relative amounts of…
  - wet vs dry deposition of N and S
  - oxidized vs reduced N deposition

- Based on modeled and measured data
  - National Air Deposition Network (NADP) wet deposition
  - CMAQ wet and dry deposition

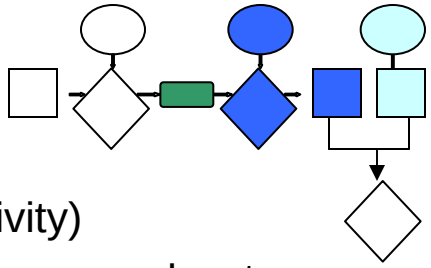
- Example: Of the total annual N deposition in the Adirondacks……
  - oxidized N dominates over reduced N (~ 70% vs 30%)
  - relative amount of wet vs dry oxidized N varies across the region
  - total wet deposition dominates over dry deposition (~60% vs 40%)

Example: Relative Amount of Wet / Dry, Oxidized / Reduced Nitrogen Deposition Across Adirondack Case Study Area

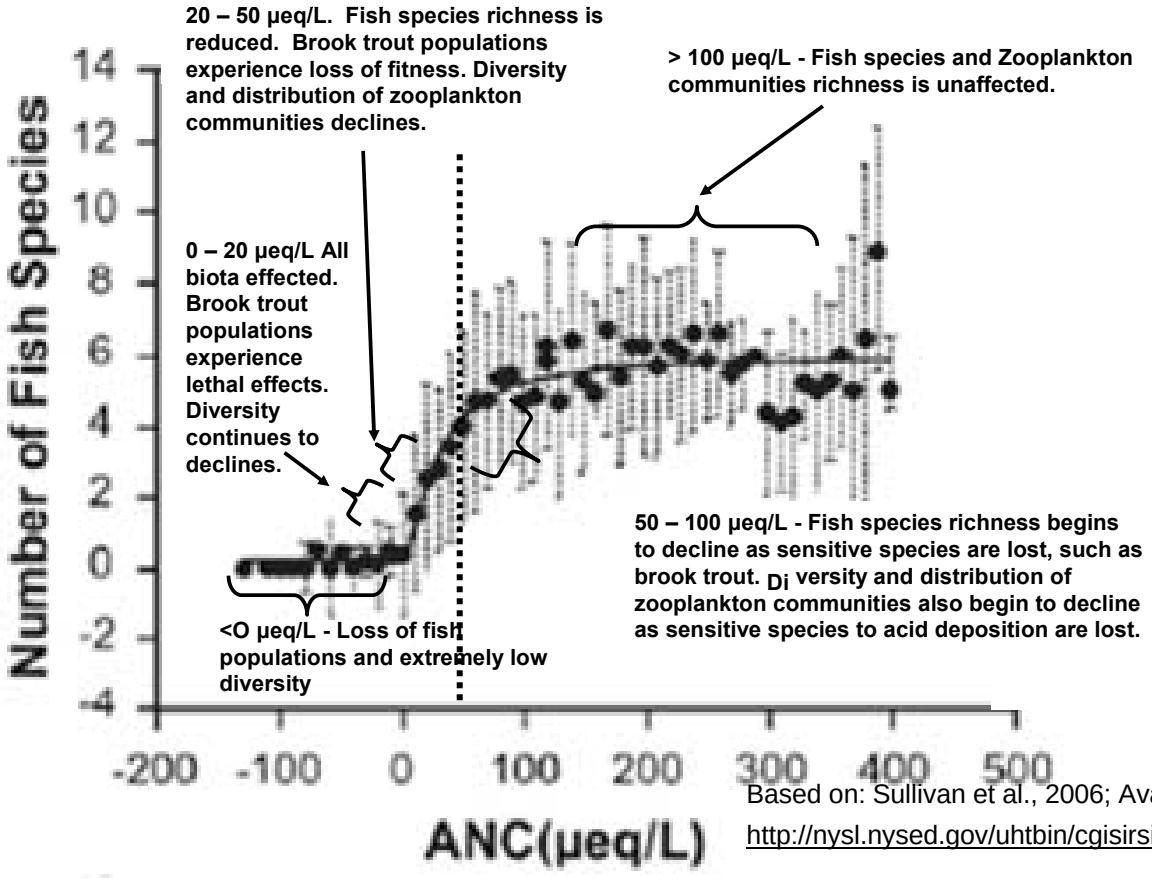
- 2002 CMAQ Predictions -



Aquatic Acidification

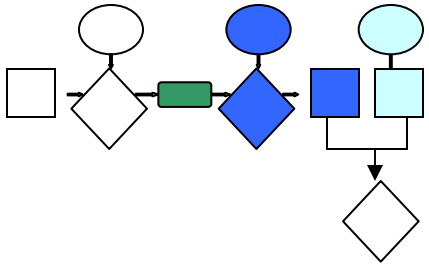


- Case Study Areas: Adirondacks and Shenandoahs (sensitivity)
- 2002 CMAQ predicted dry deposition coupled with NADP measured wet deposition, MAGIC model
- Ecological Indicator: Acid Neutralizing Capacity (ANC)
- Ecosystem Services: Fisheries, recreation, food, natural habitat, tourism



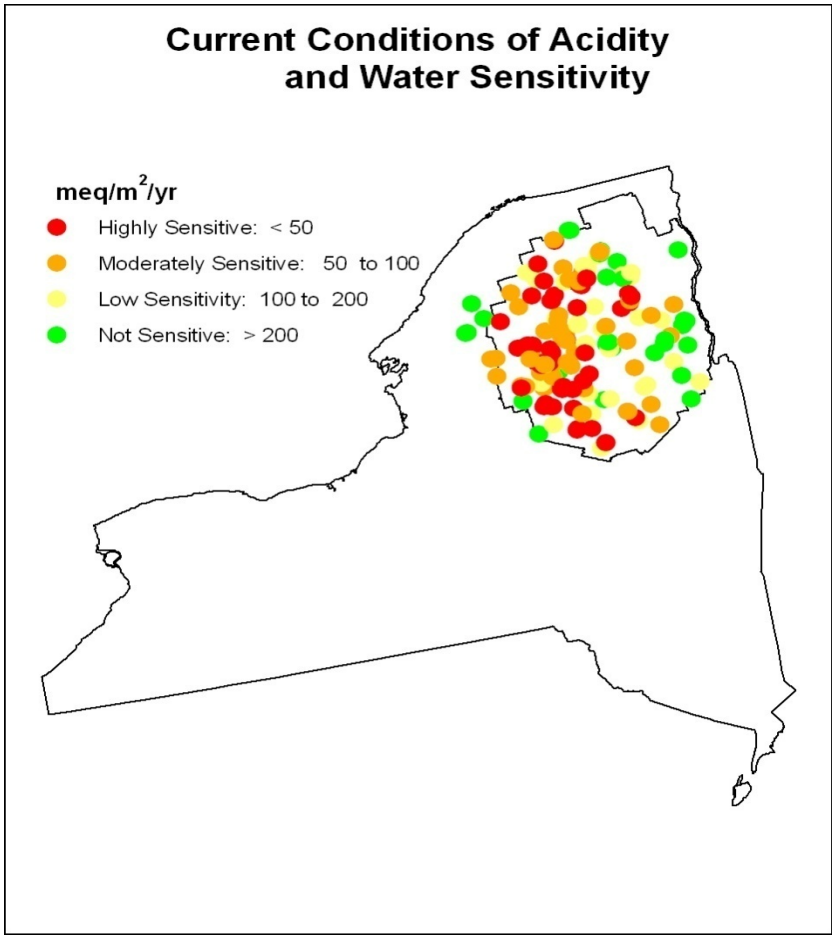
Based on: Sullivan et al., 2006; Available: http://nysl.nysed.gov/uhtbin/cgisirsi/Qcwd6NzFby/NYSL/138650099/8/429847

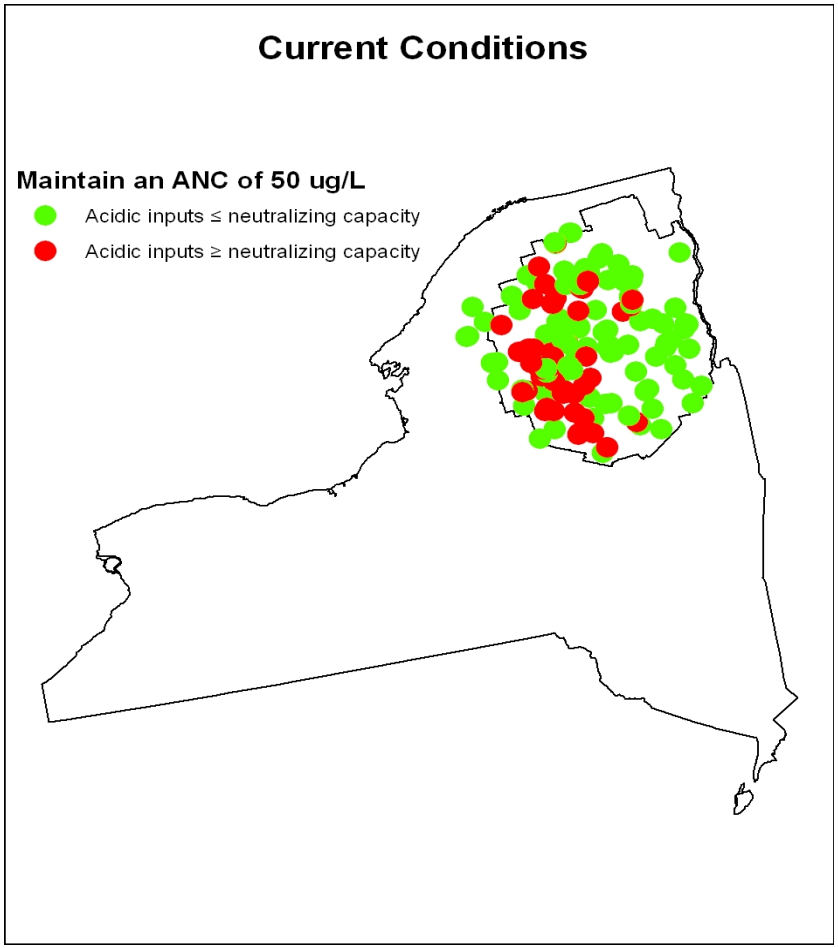
Preliminary Current Conditions Results for the Adirondacks



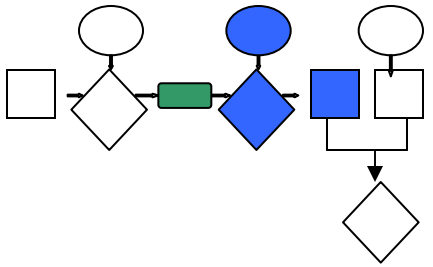
- Amount of acidity a lake can neutralize and still maintain and ANC of 50

- Lakes that are receiving more acidity than they can neutralize

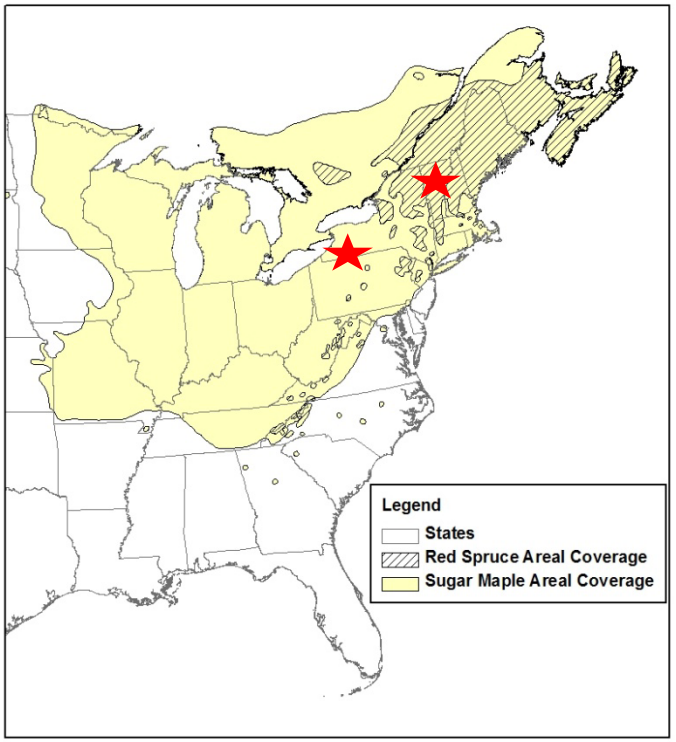




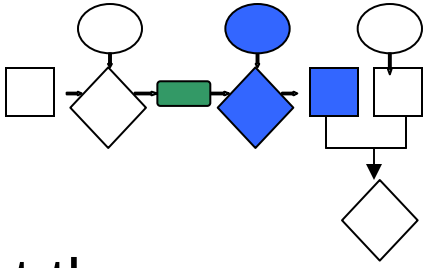
Terrestrial Acidification



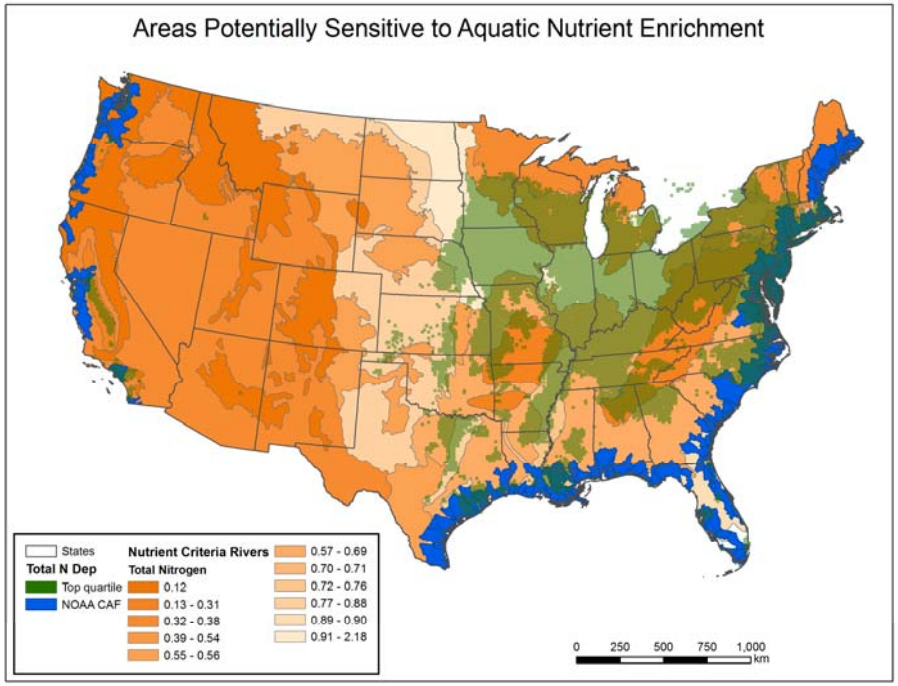
- Case Studies:
  - Sugar Maple: Kane Experimental Forest in PA
  - Red Spruce: Hubbard Brook Experimental Forest in NH
- Model deposition effects on acid neutralizing capacity of forest soil
- Results expected early fall
- Ecosystem services: food, natural habitat, tourism



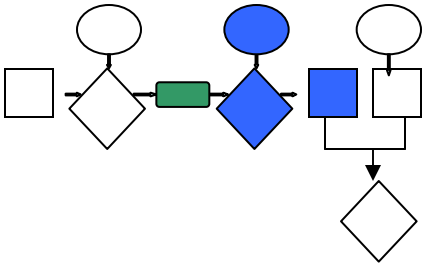
Aquatic Nutrient Enrichment

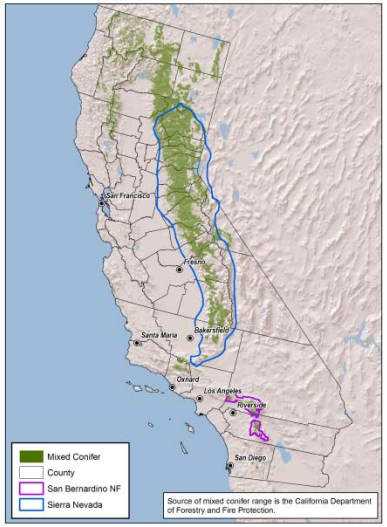


- Model how changes to nitrogen deposition affect the eutrophication index in an estuary
  - Deposition Data
    - Dry deposition from CMAQ model
    - Wet deposition from NADP
  - Watershed Fate and Transport model(SPARROW)
  - NOAA Eutrophication Index
- Case Study Areas:
  - Potomac River (Chesapeake Bay)
  - Neuse River (Pamlico Sound)
- Results expected early fall
- Ecosystem Services: fisheries, recreation, tourism



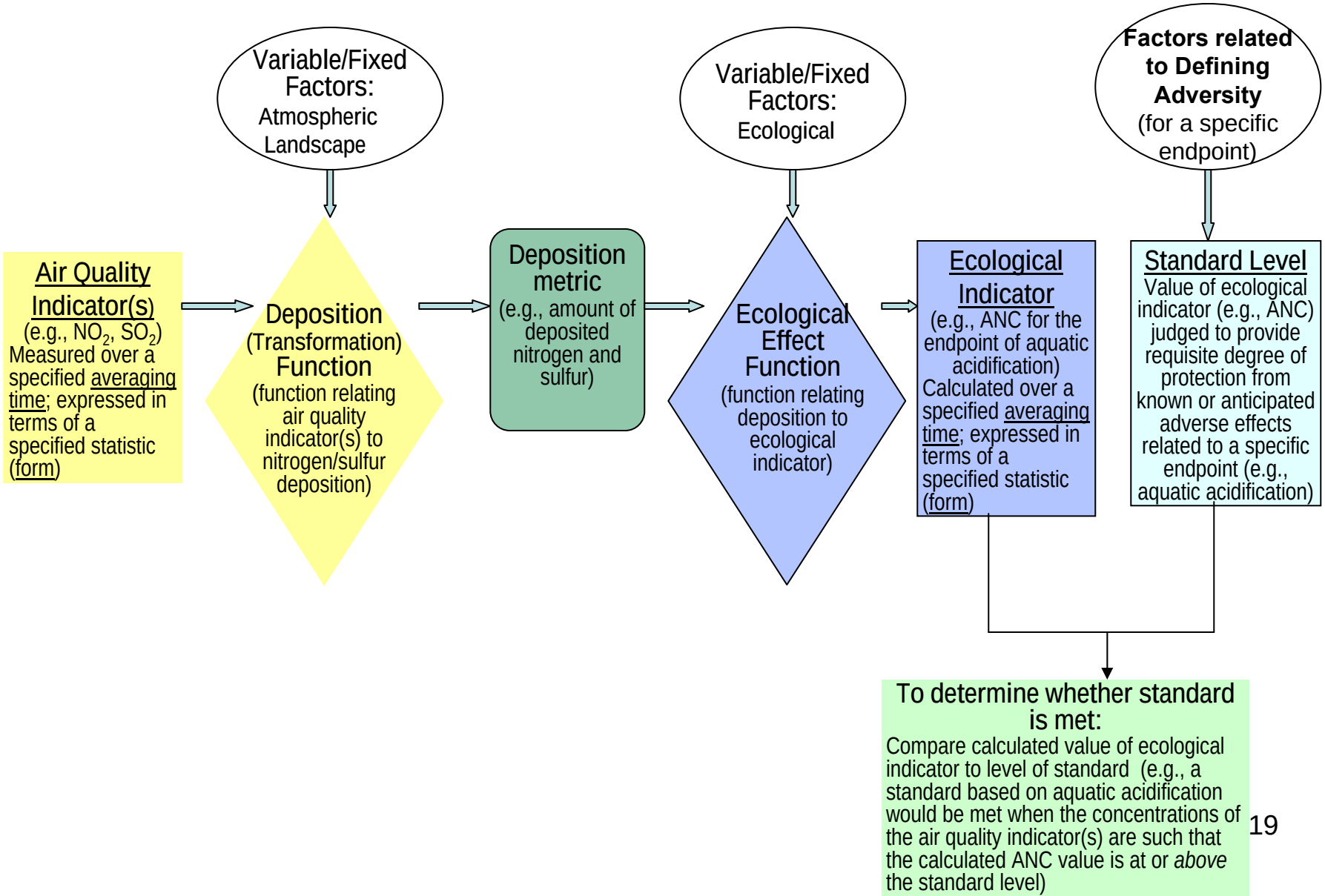
Terrestrial Nutrient Enrichment



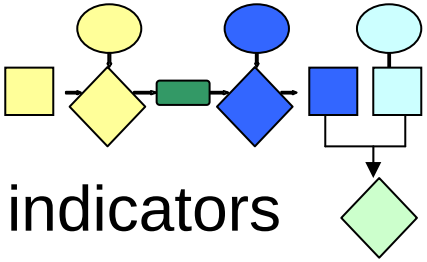


- Coastal Sage Scrub
  - Nitrogen deposition believed to enhance invasive grasses and increase fire threat
  - Habitat for threatened and endangered species
  - Developing a conceptual model to estimate effects from various loadings
- Mixed Conifer Forests in San Bernardino and Sierra Nevada Mountains
  - Decreased root biomass in Ponderosa Pine
  - Nitrate leaching due to soil saturation
  - Declines in sensitive lichen species
  - Analyzing loads versus effect levels from research reports
- Ecosystem Services: biodiversity, water quality, timber, recreation, fire hazard mitigation
- Results expected early fall

Challenges for Translating these Concepts into a Secondary Standard

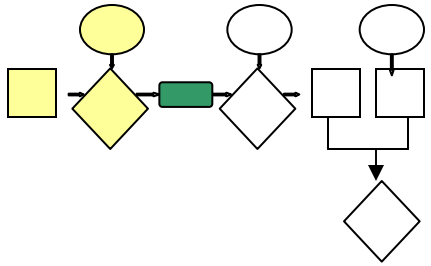


Conceptual Model



- Set of linked functions translating atmospheric indicators (NOx and SOx) to an ecological indicator that expresses the potential for deposition of nitrogen and sulfur to acidify an ecosystem
- Two parts to this system of functions:
  - deposition transformation function, which transforms ambient atmospheric concentrations (the atmospheric indicators) into a deposition metric
  - ecological effect function which converts the deposition metric to an ecological indicator (ANC) by adjusting for levels of other ecological factors that contribute to ANC
- The atmospheric levels of NOx and SOx that satisfy a particular level of ecosystem protection are those concentrations that lead to a deposition which achieves a given ANC.

Mathematical Representation: Deposition Transformation Function



(1) $S_D = f_S(NO_x, SO_x \mid Z)$

$N_D = f_N(NO_x, SO_x \mid Z)$

S_D is sulfur deposition,

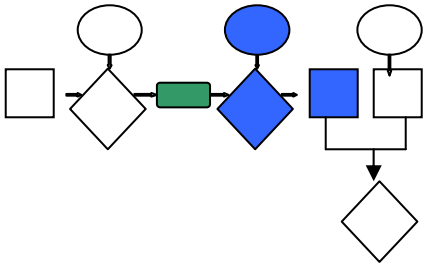
N_D is nitrogen deposition,

Z is a vector of parameters affecting deposition of ambient SO_x and NO_x (primarily determinants of deposition velocities),

f_S is a function relating S_D to ambient concentrations of NO_x and SO_x, given Z,

f_N is a function relating N_D to ambient concentrations of NO_x and SO_x, given Z.

Mathematical Representation: Ecological Effect Function



$$(2) \quad I = ANC = g(\cdot) - S_D - N_D$$

I is an ecological indicator

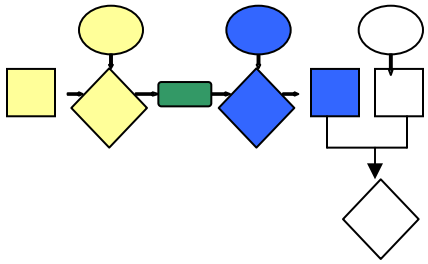
ANC is the indicator for protection against acidification

g(·) is a series of non-atmospheric environmental factors (e.g., runoff, weathering rates, geology, etc.), and NHx

S_D is sulfur deposition

N_D is nitrogen deposition

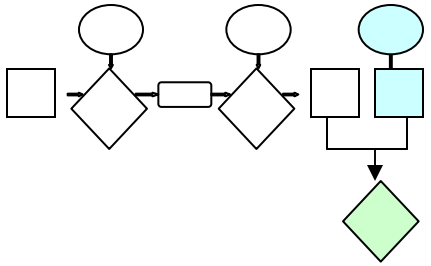
Mathematical Representation: Putting It All Together



By substituting (1) into (2), the ecological indicator I can be described in terms of ambient atmospheric NOx and SOx concentrations:

(3) $I = g(\cdot) - f_S(NO_x, SO_x \,|Z) - f_N(NO_x, SO_x \,|Z)$

The Role of Adversity



(4) $I^* = ANC_{limit} = g(\cdot)\text{-}DL(S)\text{-}DL(N)$

·When the Administrator selects a level of effect that is determined to be adverse to public welfare, that then determines the ANC_{limit} which defines the standard, I*

·ANC_{limit} is the limit for ANC necessary to provide a particular level of protections for biota in an ecosystem,

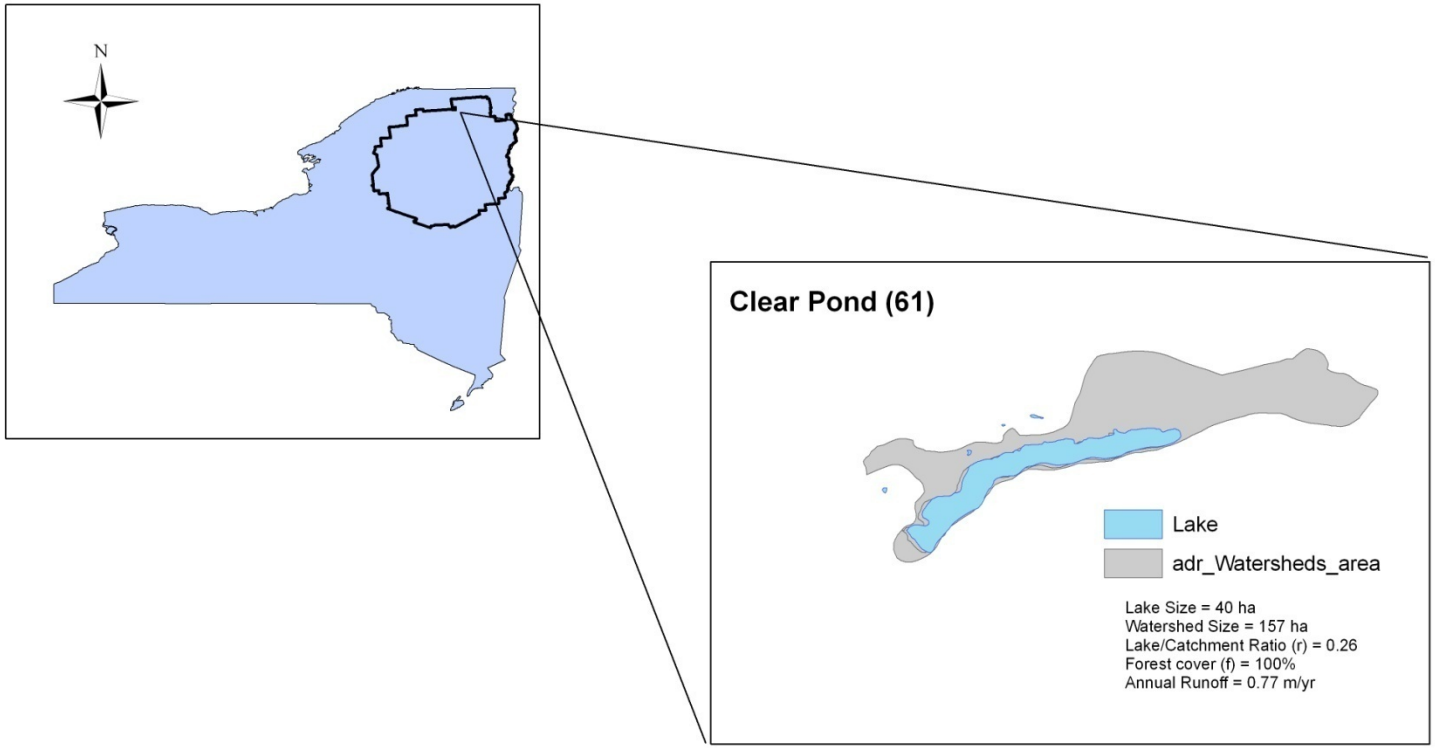
·DL(S) is the depositional load of S associated with ANC_{limit},

·DL(N) is the depositional load of N associated with ANC_{limit}

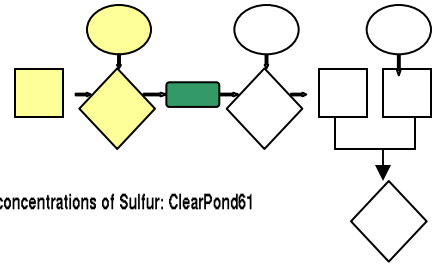
·Referring to equation 3, the point where adverse effects occur are when f_S and f_N are large enough to cause the ANC to fall below the ANC_{limit} value. This occurs when $f_S + f_N \geq DL(S) + DL(N)$ for a particular location.

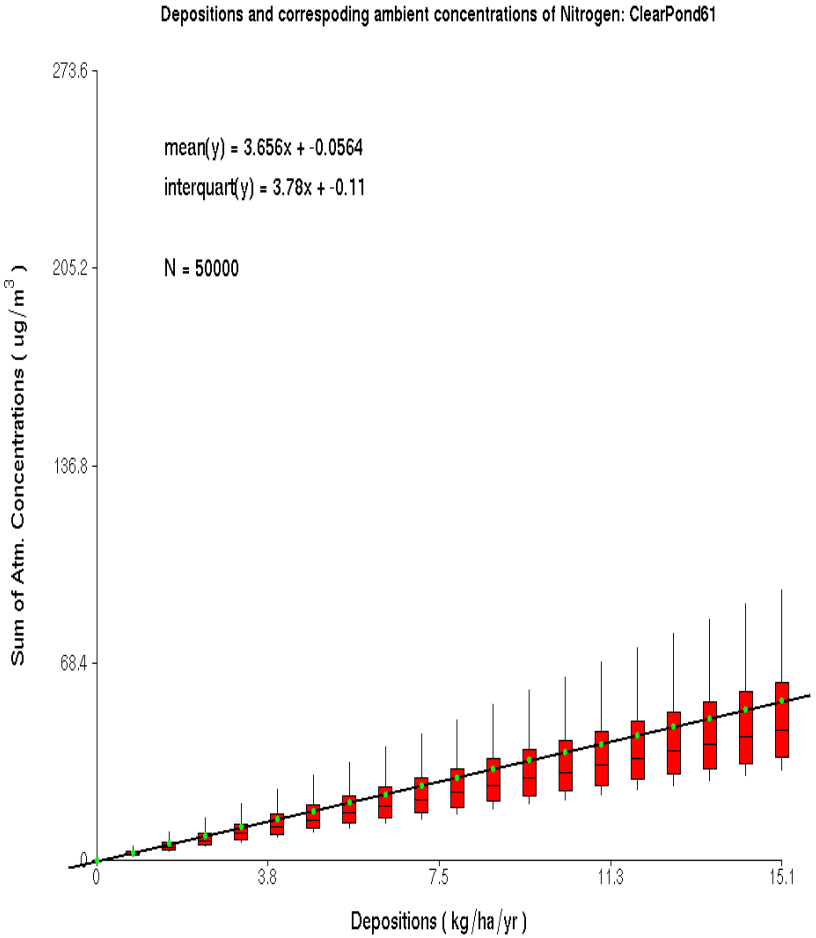
DL(S) and DL(N) are jointly determined by the equation $ANC_{limit} = g(\cdot)\text{-}DL(S)\text{-}DL(N)$, there is no unique solution

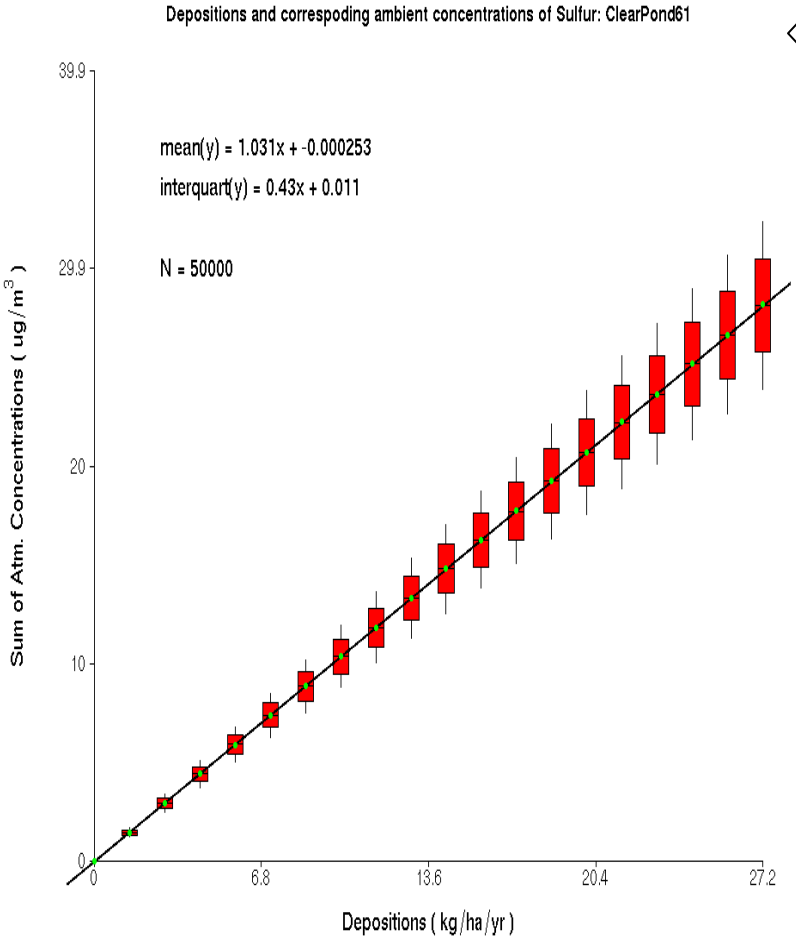
Calculating an Indicator Based Standard: Adirondacks Example



Concentration to Deposition Functions



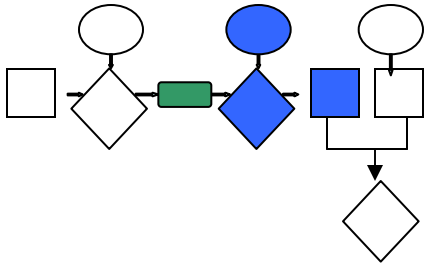




$$Dep_N = (v_{NO} \cdot C_{NO} \cdot m_{NO}) + (v_{NO_2} \cdot C_{NO_2} \cdot m_{NO_2}) + (v_{HNO_3} \cdot C_{HNO_3} \cdot m_{HNO_3}) + (v_{Nitr} \cdot C_{Nitr} \cdot m_{Nitr})$$

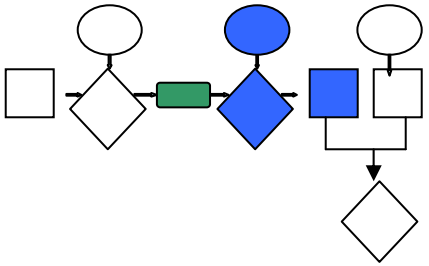
$$Dep_S = (v_{SO_2} \cdot C_{SO_2} \cdot m_{SO_2}) + (v_{Sulf} \cdot C_{Sulf} \cdot m_{Sulf})$$

Ecological Effect Function

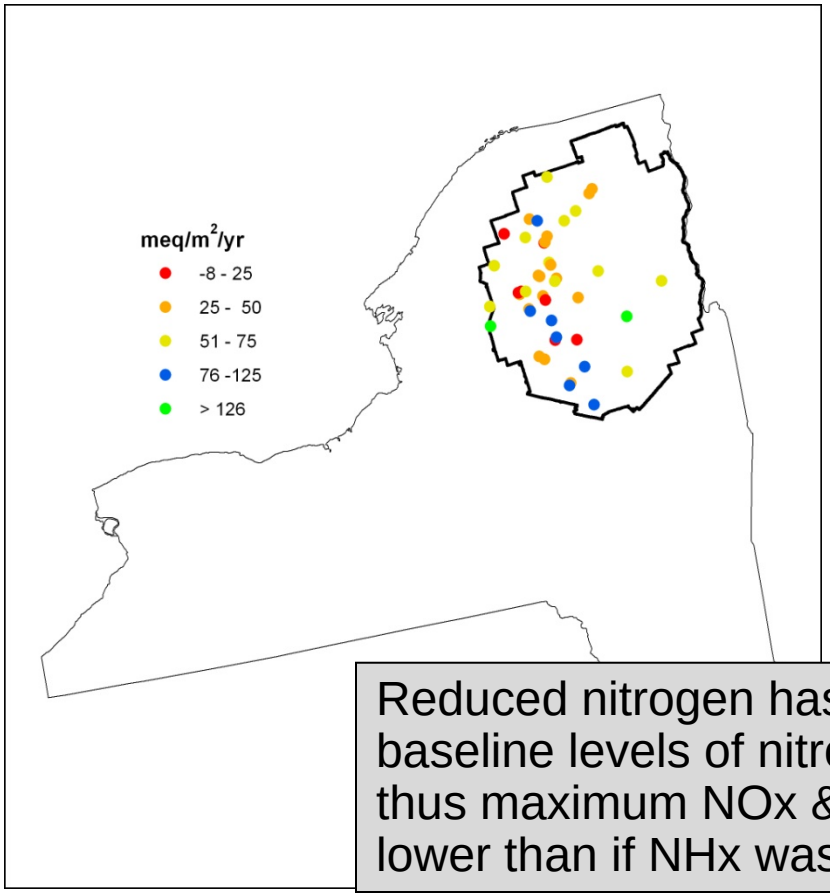


- Environmental parameters
  - lake area (ha)
  - catchment area (ha)
  - the amount of forest area in the catchment (*f*)
  - annual runoff (m/y)
- Catchment removal of N and S is calculated based on a combination of modeled and measured data
- Leaching export (NO_3 and SO_4) level will determine the ANC level
- Resulting charge balance gives the maximum deposition from ambient atmospheric NOx and SOx that will give a minimum level of ANC

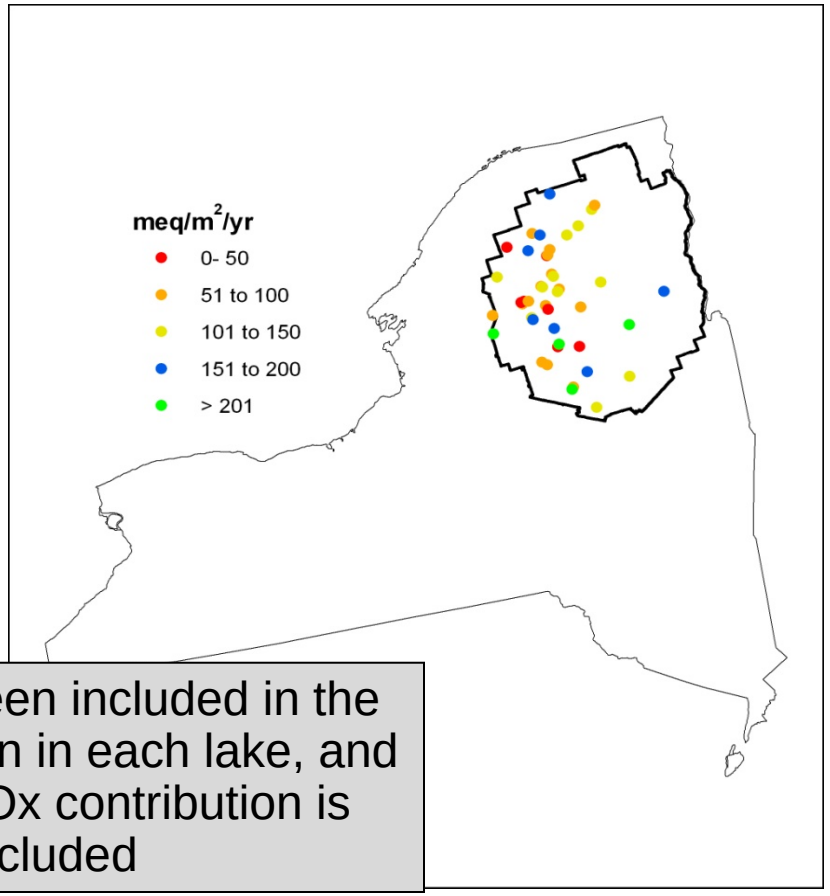
44 Adirondack Lakes



Maximum Deposition of Sulfur from Ambient Atmospheric SOx for an ANC of 50

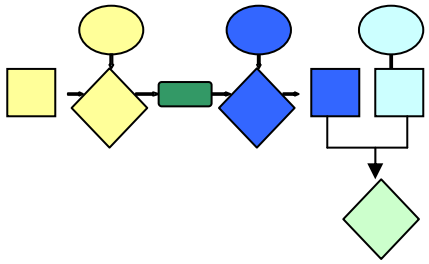


Maximum Deposition of Oxidized Nitrogen from Ambient Atmospheric NOx for an ANC of 50

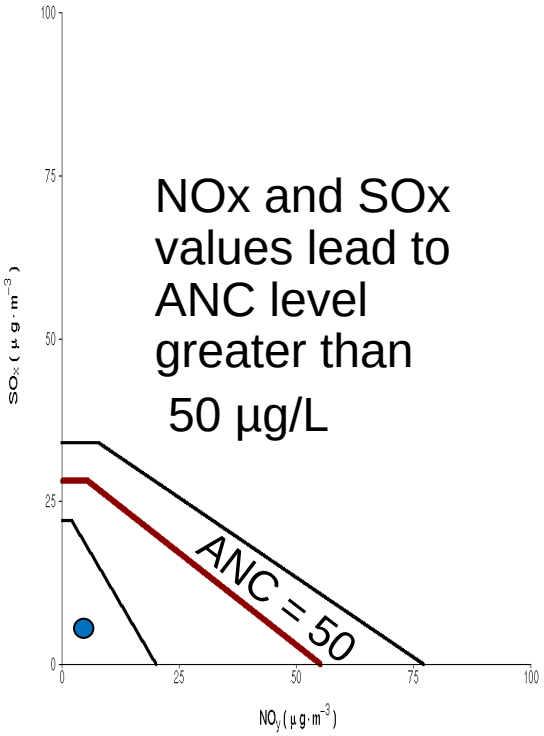


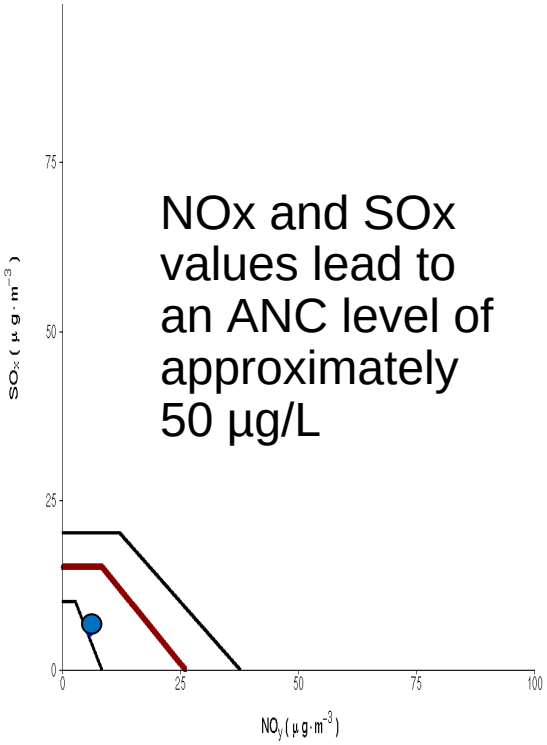
Reduced nitrogen has been included in the baseline levels of nitrogen in each lake, and thus maximum NOx & SOx contribution is lower than if NHx was excluded

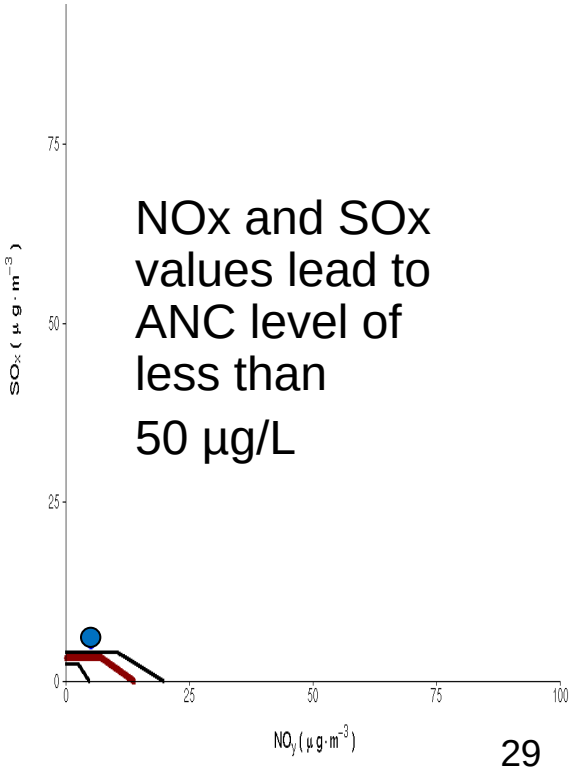
Putting It All Together: Comparing Atmospheric Concentrations of NOx and SOx and ANC levels



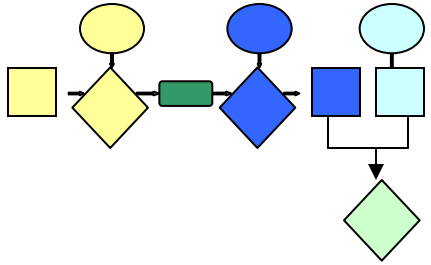
- Contours represent combinations of NOx and SOx that yield an ANC value of 50
- Black boundary lines indicate the range of possible combinations given variability in the atmospheric concentrations of different NOx and SOx species
- Blue dots show the current 2002 CMAQ modeled combinations of NOx and SOx







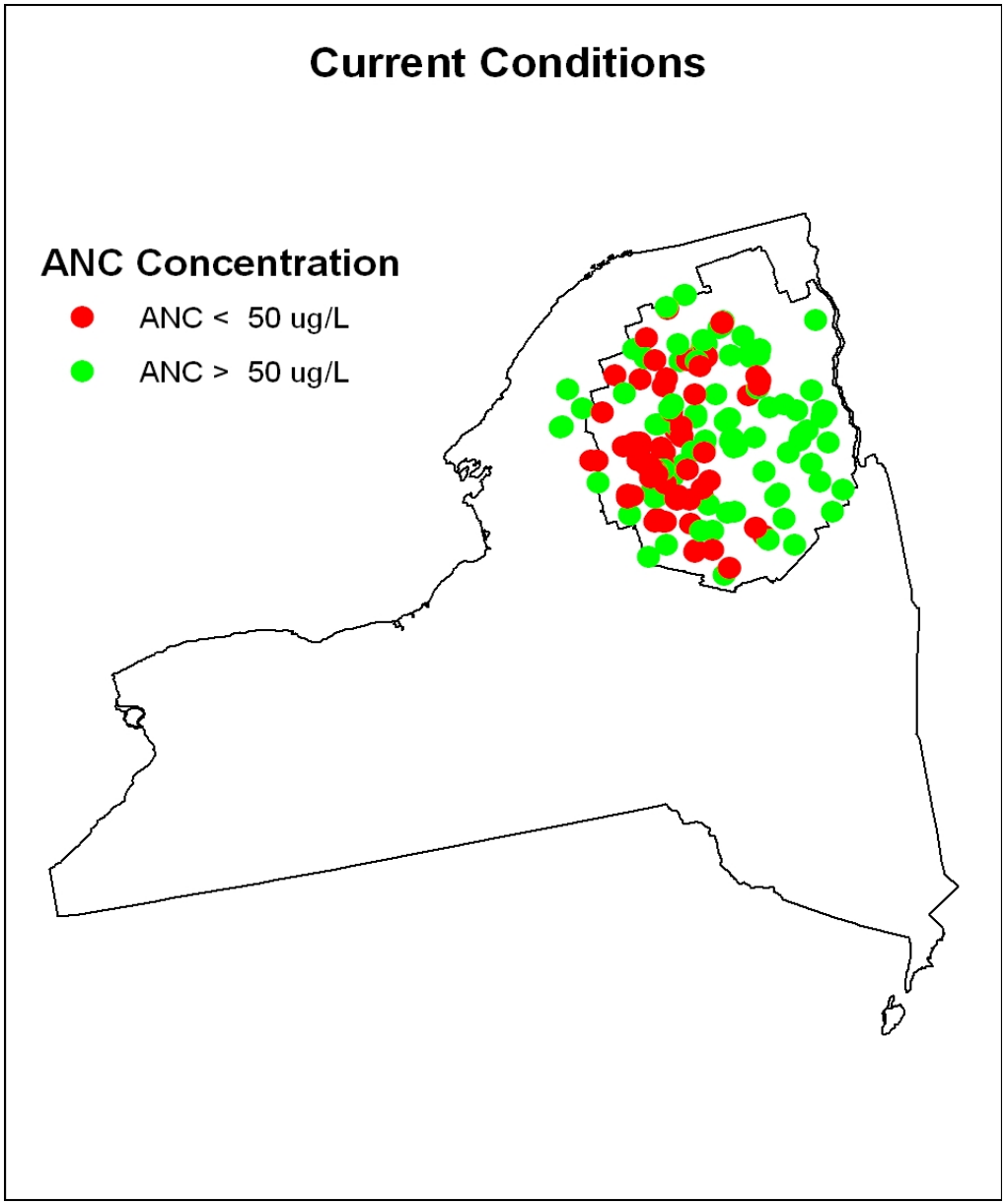
Next Steps



- Continue case study analyses
- Develop additional functions linking ambient NOx and SOx and ecological indicators for other endpoints (terrestrial acidification, aquatic and terrestrial nutrient enrichment)
- Examine how ecological indicators and ecosystem services can be used to define adversity
- Evaluate impacts and risks under alternative levels of standards

Appendix

Current Conditions



Attachment G

30 September 2008 Public Comments on the EPA's *Risk and Exposure Assessment for Review of the Secondary NAAQS for Oxides of Nitrogen and Oxides: First Draft*

Submitted by Ellen Porter, Air Resource Division, National Park Service

Dear CASAC panel members:

I'm Ellen Porter, a biologist from the Air Resources Division of the National Park Service. I appreciate this opportunity to address the CASAC NOx and SOx Secondary NAAQS Review Panel on behalf of the National Park Service. The National Park Service has been entrusted with the management of some of the most beautiful and unique areas in our country. National parks represent a legacy from Americans today to generations of Americans yet to come. As a nation, we have promised to leave these extraordinary places of discovery and power in a condition that is unimpaired so that they will continue to serve the needs of society to connect to authentic places for their educational, recreational, and restorative values. Yet in many parks, stresses from outside park boundaries have degraded resources. Deposition of air pollutants has acidified streams, reduced biodiversity, and altered nutrient cycling in soils. Some streams in Shenandoah and Great Smoky Mountains National Parks are acidified and brook trout populations have been lost. Throughout the National Park System, ecosystems are experiencing changes ranging from subtle to the extreme as a result of pollutant deposition. Alpine lakes and meadows in Rocky Mountain National Park, a park most people would consider pristine, are being significantly altered by nitrogen deposition. These effects are occurring despite the fact that these parks are in attainment of the Secondary NAAQS for nitrogen dioxide and sulfur dioxide, standards established to protect public welfare. And, as the Risk and Exposure Assessment details, these harmful effects extend well beyond national parks, including many sensitive ecosystems across the country. Current standards are clearly not providing the requisite level of protection required by the Clean Air Act.

EPA is now proposing an innovative approach to expressing the secondary standard in terms of ecological indicators and endpoints linked to atmospheric concentrations. Secondary standards based strictly on atmospheric concentrations of NOx and SOx have failed because there are no direct links between concentrations of these pollutants and ecosystem responses. Rather, it is the amount of nitrogen and sulfur compounds deposited into an ecosystem that affects response. The scientific literature has clearly defined relationships between deposition and many types of ecosystem responses. Ecosystem models are routinely used to predict the amount of deposition that will result in a given effect. EPA has relied on this extensive knowledge base to develop a well-reasoned conceptual model of the possible structure of a secondary standard based on an ecological indicator's response to deposition. The model illustrates the relationship between an ecosystem indicator, atmospheric and ecological variables, deposition, and atmospheric concentrations of nitrogen and sulfur compounds. In this model, the secondary standard would be based on a "standard level" established to protect an

ecological indicator. For example, for acid-neutralizing capacity, or ANC, a standard level of 100 microequivalents per liter would protect most streams and lakes from acidification. Ecosystem models can predict the amount of deposition that would maintain this ANC in an area, given bedrock and watershed characteristics, while atmospheric models can predict the concentrations of NOx and SOx that would result in that amount of deposition for a selected area. This approach provides a uniform level of protection to ecosystems while recognizing that deposition, meteorology, and other factors vary across regions, providing flexibility in implementation.

The National Park Service believes this approach to be reasonable and soundly based on ecosystem science, and in accord with the intent of the Clean Air Act to protect public welfare. We encourage EPA to further apply the conceptual model for the standard to ecological indicators for terrestrial acidification and nutrient nitrogen enrichment of aquatic and terrestrial ecosystems. We believe that this approach can result in a suite of secondary standards that are ecosystem-based, ecologically meaningful, and scientifically sound, eventually ensuring increased protection for national parks, and other areas, for the benefit of future generations.

Thank you.