NONPOINT SOURCE POLLUTION: ATMOSPHERIC DEPOSITION AND WATER QUALITY

(110–25)

HEARINGS

BEFORE THE

SUBCOMMITTEE ON
WATER RESOURCES AND ENVIRONMENT
OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

APRIL 17 AND 19, 2007

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SUBMISSIONS FOR THE RECORD

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U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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April 16, 2007

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Water Resources and Environment

FROM: Subcommittee on Water Resources and Environment Staff

SUBJECT: Hearing on Nonpoint Source Pollution: Atmospheric Deposition and Water Quality

PURPOSE OF HEARING

On Tuesday, April 17, 2007, at 2:00 p.m., in Room 2167 Rayburn House Office Building, the Subcommittee on Water Resources and Environment will receive testimony from representatives of the U.S. Environmental Protection Agency, the State of Massachusetts, the Leech Lake Band of Ojibwe, the Chesapeake Bay Foundation, and academia on the impact of atmospheric deposition on water quality.

BACKGROUND

This memorandum briefly summarizes nonpoint source pollution. It then focuses in more detail on atmospheric deposition. Atmospheric deposition is a form of nonpoint source pollution.

Nonpoint Source Water Pollution

Nonpoint source (NPS) pollution emanates from diffuse sources. It is pollution that enters waters through a pathway other than a discernible, confined and discrete conveyance such as a pipe, ditch or channel. NPS pollution occurs after rainwater or snowmelt moves across the ground and into a water body. As the runoff moves over the ground it may pick up natural and man-made pollutants. These pollutants are eventually deposited in water bodies.

NPS pollution encompasses a wide variety of pollutants and sources. These include:

- Excess fertilizers, herbicides, and pesticides from agricultural lands and residential areas;

- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Atmospheric deposition of particulates, toxic chemicals, and metals; (*see Atmospheric Deposition section below*)
- Oil, grease, heavy metals, and toxic chemicals from urban stormwater runoff, including runoff from roads, and energy production;
- Salt from irrigation practices and acid drainage from abandoned mines; and
- Bacteria, pathogens, and nutrients from livestock, pet wastes, wildlife, and faulty septic systems.

The successes of the Clean Water Act in improving water quality have primarily resulted from enforceable technology-based efforts to control point sources of pollution. Point sources are defined as discernable, confined and discrete conveyances, such as municipal or industrial sources. Since passage of the Clean Water Act (CWA, or the Act) in 1972, reliance on an enforceable permit program has resulted in decreased water pollution from point source conveyances.

For example, in 1968, sewage treatment facilities served approximately 140 million people in this country, many at a primary treatment level.[1] Today, after Federal investments of more than $82 billion in wastewater assistance since the passage of the Clean Water Act, 207.8 million people, representing more than 71 percent of the total population, are serviced by more than 16,000 publicly owned treatment works providing secondary or more advanced treatment.[2]

In 1968, about 39 percent (54.2 million) of the 140 million people served by publicly owned treatment works received less than secondary treatment (raw and primary). By 2000, the last year data are available, this percentage was reduced to just over two percent (6.4 million) of the 207.8 million people served by publicly owned treatment works.[3] In addition, the U.S. population served by publicly owned treatment works with secondary or greater treatment more than doubled between 1968 and 1996.[4]

However, unlike the enforceable requirements of the Act in controlling point sources, the Clean Water Act does not require the implementation or enforcement of any nonpoint source management plans, such as buffer strips or nutrient management plans, to reduce polluted runoff. The Act does authorize financial and technical assistance to states for the development and implementation of state nonpoint source management plans (section 319), which should include the identification of voluntary best management practices for reducing nonpoint sources of pollution. In addition, the Act provides for the implementation of the Total Maximum Daily Load (TMDL) program, which determines the maximum pollutant load a water body can handle without becoming

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[1] U.S. EPA. "Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment." June 2000.

[2] U.S. EPA. "Clean Watersheds Needs Survey 2000: Report to Congress." August 2003.

[3] Should all of the projects called for in the 2000 Needs Survey be constructed, the number of facilities that provide less-than secondary treatment is projected to decline from 47 facilities serving 6.4 million to 27 facilities serving 3.9 million, nearly all of whom (99.99 percent) will be served by facilities with special waivers allowing the discharge of less than secondary treated effluent to deep, well-mixed ocean waters. *See* U.S. EPA. "Clean Watersheds Needs Survey 2000: Report to Congress." August 2003, and U.S. EPA. "Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment." June 2000.

[4] U.S. EPA. "Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment." June 2000.

impaired, both from point and nonpoint sources of pollution. EPA has also recently advocated a watershed approach to holistically address all forms and sources of water pollution on a watershed basis. (*See Appendix for a more detailed description of these programs.*)

The United States Environmental Protection Agency (EPA), the Office of Management and Budget, and the states report that NPS pollution is now the leading remaining source of water quality problems.[5,6] While the effects may vary by specific water body, the EPA reports that NPS pollution has harmful effects on drinking water supplies, recreation, fisheries, and wildlife.[7]

In its 2006-2011 Strategic Plan, EPA has identified 39,798 'impaired' water bodies.[8,9] A water body is designated as impaired if one or more of the 'uses' designated in water quality standards is not being attained. Uses are identified by taking into consideration the use and value of the water body for a combination of public water supply, fish, shellfish, and wildlife protection, or for recreational, agricultural, industrial, or navigational purposes. According to the 1998 Clean Water Act Section 303(d) list, 43 percent of water quality impairments were attributed exclusively to nonpoint source pollution. The remaining 47 percent were attributed to both point and nonpoint source pollution. Regulation of discharges from point sources is still critical to maintaining water quality because point source pollution continues to play a part in water quality impairment. However, NPS pollution is now the leading cause of water quality impairment.

Atmospheric Deposition and Water Quality

Atmospheric deposition[10] is a process by which airborne pollutants settle directly onto the surface of a water body (direct deposition), or reach a water body indirectly through deposition onto land surfaces and subsequent run-off through wet weather events (indirect deposition). Atmospheric deposition is a multimedia pollution problem whereby airborne pollutants are emitted from a "source" and are eventually deposited in a water body, the "receptor". Many of these pollutants can be transported over both short and long distances through the atmosphere.

Atmospheric deposition is increasingly recognized as a significant cause of water quality impairments, acidification of water bodies, and toxic contamination of the fish and birds that eat them.[11] In its *National Water Quality Inventory – 2000 Report*, EPA's Office of Water identified atmospheric deposition as a leading source of water body impairment. The *National Water Quality Inventory – 2000 Report* does not include data on all of the nation's water bodies. Instead, it includes those waters that have been assessed by the states at the time of the report's release.[12] The following

[5] http://www.epa.gov/owow/nps/qa.html
[6] http://www.whitehouse.gov/omb/expectmore/detail/10000224.2004.html
[7] http://www.epa.gov/owow/nps/qa.html
[8] EPA 2006-11 Strategic Plan, p. 47
[9] This number is the 2002 baseline and is being used by the EPA for subsequent performance measurement and reporting.
[10] Also known as "aerial deposition".
[11] *See* EPA, *Frequently Asked Questions about Atmospheric Deposition*, at 2 (Sep. 2001).
[12] The states assessed 19% of the nation's total river and stream miles, 43% of the its lake, pond, and reservoir acres, 36% of its estuarine square miles, and 92% of Great Lakes shoreline miles for the *National Water Quality Inventory – 2000 Report*

table highlights the atmospheric deposition findings of those water bodies assessed in the 2000 *National Water Quality Inventory*.

Water Body Type	Area Impacted by Atmospheric Deposition	Assessed Impaired Waters: Impairment due to Atmospheric Deposition
Lakes[13]	1 million acres	13%
Coastal[14]	3,692 estuarine square miles	24%
Great Lakes Shoreline (shoreline miles)[15]	71 shoreline miles	<2%

The EPA highlights five categories of atmospheric deposition pollutants with the greatest potential to impact water quality: nitrogen; mercury; metals (excluding mercury); pesticides; combustion emissions.[16] The EPA also considers sulfates an important atmospheric deposition pollutant because of their constituent role in acid rain.[17]

➢ **Nitrogen:** Nitrogen compounds (NO_x (nitrogen oxides) and NH_3 (ammonia)) and organic nitrogen occur through both natural and manmade processes. Emissions from natural sources include forest fires, volcanic eruptions, and certain microbial processes, among others. Manmade sources that combust fossil fuels, including power plants, industrial facilities, and automobile emissions, contribute to the largest emissions of nitrogen to the atmosphere. The largest sources of NH_3 (ammonia) emissions are from fertilizers and domesticated animals. Most commonly, nitrogen pollution leads to eutrophication, or harmful increases in the growth of algae. "Dead" or hypoxia zones emerge in water bodies subject to excessive eutrophication because the dissolved oxygen necessary for life for other organisms has been depleted by organisms and decaying matter.

➢ **Mercury:** Mercury is a toxic metal that is released through both manmade and natural processes and passed along to humans through contaminated fish and shellfish. The EPA has found that manmade activities have greatly increased its concentration in the environment – accounting for 75 percent of worldwide mercury emissions.[18] Mercury emissions come from both foreign and domestic sources. A large majority of these emissions come from international sources. However, some regions of the U.S., such as the northeast, receive a greater proportion of mercury deposition from domestic sources. Manmade sources of mercury emissions include incinerators, coal-burning power plants, and household items, among others. Biological processes, potentially stimulated by the atmospheric deposition of sulfates,[19] convert mercury emanating from atmospheric deposition into the very toxic methylmercury. The primary health effects from mercury are on the development of the brain and nervous system. As of December 2000, 41 states had issued fish advisories for mercury.[20]

[13] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report.* p. 22
[14] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report.* pp. 30-31
[15] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report.* P. 35
[16] http://www.epa.gov/owow/oceans/airdep/air1.html
[17] http://www.epa.gov/ne/eco/acidrain/causes.html
[18] http://www.epa.gov/owow/oceans/airdep/air2.html
[19] http://pubs.acs.org/subscribe/journals/esthag-w/2006/may/science/nl_methylmercury.html
[20] http://www.epa.gov/waterscience/fishadvice/mercupd.pdf

- **Other Metals (excluding mercury):** Metals such as lead, cadmium, nickel, copper, and zinc are atmospheric deposition pollutants that can cause harm to both human health and the environment. These metals are emitted through various industrial processes such as smelting and incineration. Metals can bioaccumulate as contaminated species are eaten. Human health effects from these substances include impaired mental and physical development, kidney damage, high blood pressure, and bone and joint pain.

- **Pesticides:** Many thousands of pesticides are used across the United States and around the world. Whether a given pesticide will become an atmospheric deposition pollutant depends on factors such as its use and chemical characteristics. Pesticides and their byproducts can range in toxicity and persistence. The EPA has found that the toxic effects of some pesticides include damage to the liver, and digestive, nervous, and endocrine systems.[21]

- **Combustion Emissions:** Combustion emissions are pollutants that are produced by the incineration of wastes. They include dioxins, furans, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). These pollutants degrade very slowly and can build-up in the tissues of humans and other species and cause a variety of health problems.

- **Sulfates:** Sulfur dioxide (SO_2) and sulfates (SO_x) occur from both natural and manmade sources. Naturally they come from sea spray and volcanoes. Manmade sources include fossil fuel burning power plants, vehicles, and smaller emission sources such as small industrial facilities or residences. The EPA has found that manmade sources of SO_x make up a larger proportion of emissions than do natural sources. The primary environmental effect of SO_2 and SO_x atmospheric deposition is the acidification of water bodies, resulting in the impairment of water bodies and damage to aquatic ecosystems.

Tools for Dealing with Atmospheric Deposition: According to EPA documents, the EPA recognizes that the water quality impacts due to atmospheric deposition are an important problem.[22] In addition to the non-regulatory programs described in the previous section, EPA is attempting to coordinate some of its activities to curtail atmospheric deposition. However, some states and EPA's Office of Inspector General have criticized the efficacy of tools currently in use.

In 2001 the EPA developed an *Air-Water Interface Work Plan* to better coordinate atmospheric deposition reduction programs between EPA's Office of Water and Office of Air and Radiation.[23] Major activities included:

1. Continued reduction of national loadings of atmospheric deposition pollutants through implementation of existing Clean Air Act rules; as well as the promulgation of additional regulations;
2. Working with the states to continue developing and implementing TMDLs for impaired water bodies;
3. Improving and expanding monitoring networks for atmospheric deposition pollutants;

[21] http://www.epa.gov/owow/oceans/airdep/air2.html
[22] http://www.epa.gov/owow/oceans/airdep/grubbssig1.pdf
[23] http://www.epa.gov/owow/oceans/airdep/grubbssig1.pdf

4. Communication with stakeholders.[24]

EPA has not posted subsequent reports or performance evaluations of its *Air-Water Interface Work Plan* on its website. As a result, it is unclear as to whether the program has been effective.

As noted in the *Air-Water Interface Work* Plan, existing EPA air regulations can be used to decrease atmospheric deposition – even if they are not explicitly designed to do so. For example, EPA's Clean Air Interstate Rule is designed to reduce air pollution generally. However, as a side benefit, nitrogen atmospheric deposition to the Chesapeake Bay is anticipated to be reduced by eight million pounds per year. EPA's Chesapeake Bay Program Office anticipates that other Clean Air Act regulations will partially contribute to a reduction of 102 million pounds of nitrogen (from all sources) from 2000 levels into the Chesapeake Bay watershed by 2010. Acid rain precursors (NO_x and SO_x) also may be substantially reduced, thereby reducing acidification of waterbodies.

While some EPA activities are reducing atmospheric deposition into the Chesapeake, the EPA Office of Inspector General has found that EPA currently is not addressing a "potentially significant source of deposition", ammonia emissions from animal feeding operations.[25] Ammonia emissions are a nitrogen compound that can lead to atmospheric nitrogen deposition impacts, such as on the Chesapeake Bay. EPA currently does not regulate these emissions, and does not monitor their release.[26] EPA does plan to begin monitoring emissions from animal feeding operations (including ammonia) later in 2007 for a 24-month period.[27]

As stated earlier, EPA's policy towards reducing the impacts of atmospheric deposition relies, in part, on the TMDL program. The TMDL program calls for States to identify those waters or segments of waters that are not meeting the State's water quality standards even after the implementation of the technology-based controls required under the Act, to identify the pollutants that are causing the impairment, and to develop individualized plans to reduce the pollutants of concern so that water quality standards can be met. However, unlike point sources or distinct nonpoint sources of pollution, a challenge exists for individual States to identify and control pollution from atmospheric sources in the TMDL program. For example, when the source of the pollution emanates from outside the State's boundaries – as is the case with some types of atmospheric deposition NPS pollution – the state is inherently limited in its ability to reduce those loadings from sources outside its state boundaries. A TMDL does not provide any regulatory means for reducing those extra-state loadings. In response to this conundrum, EPA suggests that "A state will have to coordinate with other states and EPA to determine how best to address those sources."[28]

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[24] http://www.epa.gov/owow/oceans/airdep/airwater_plan16.pdf, p.2
[25] EPA OIG. 2007. *EPA Relying on Existing Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and its Watershed.* 2007-P-00009
[26] EPA OIG. 2007. *EPA Relying on Existing Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and its Watershed.* 2007-P-00009
[27] EPA OIG. 2007. *EPA Relying on Existing Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and its Watershed.* 2007-P-00009, p. 11
[28] EPA. 2001. *Frequently Asked Questions About Atmospheric Deposition: A Handbook for Watershed Managers.* pp. 65-66 (http://www.epa.gov/oar/oaqps/gr8water/handbook/airdep_sept_4.pdf)

Some states have urged EPA to reconsider TMDL guidance for waters impacted by atmospheric mercury deposition.[29] State regulators from a number of New England states have recently urged EPA to "focus its efforts on a national approach to reducing the water impacts of mercury pollution rather than among individual states, because airborne mercury that is deposited into state waters often originates from emissions sources in other states."[30] However, EPA continues to encourage the use of a mercury TMDL approach.[31]

[29] Inside EPA. 2007. "States Fault EPA Guide on Mercury Pollution in Impaired Waters." (March 16, 2007)
[30] Inside EPA. 2007. "States Fault EPA Guide on Mercury Pollution in Impaired Waters." (March 16, 2007)
[31] Inside EPA. 2007. "States Fault EPA Guide on Mercury Pollution in Impaired Waters." (March 16, 2007)

APPENDIX

The EPA has a number of programs and tools by which to reduce NPS pollution. This Appendix describes some of these in detail.

Section 319 Program: In 1987, the Congress amended the Clean Water Act to establish the Section 319 Nonpoint Source Management Program. The Section 319 Program requires that states must identify waters that are damaged or threatened by runoff sources, and then develop comprehensive NPS pollution reduction programs to reduce NPS pollution. Section 319 provides grant funding to states, territories, and tribes that goes toward activities such as technical and financial assistance, technology transfer, and monitoring of nonpoint source implementation projects, among other activities. Under the program, States are required to provide performance reports of their NPS programs' performance. Inadequate performance towards these goals may result in the withholding of grant funding. Section 319 is the only federal program to address all sources of NPS pollution. As opposed to United States Department of Agriculture (USDA) NPS pollution programs, Section 319 funds can be used for monitoring and watershed planning. The Section 319 program does not have enforceable policies or mechanisms (such as National Pollutant Discharge Elimination System (NPDES) permits for point source discharges) to implement water quality improvement management measures.

In its FY 2008 budget proposal the Administration proposes funding cuts for the Section 319 program of over $10 million, or five percent, from FY 2007 enacted levels, to $194 million.

Through their various water pollution programs, by the end of fiscal year 2006, the EPA and the states restored 12.1 percent of water bodies identified in 2000 as impaired.[32] Based on the 2000 figure of 21,632 impaired water bodies, this still leaves over 19,000 water bodies impaired. However, based off of EPA's most recent figures of 39,768 impaired water bodies (cited in its 2006-2011 Strategic Plan), it would still have to restore over 37,000 existing impaired water bodies. EPA itself states:

> "...[S]ome of the restorations to date represent waters where improved assessments have found that the waters were in fact already meeting water quality standards. Thus we anticipate that the numbers of these "easier" restorations will soon decline, as states and EPA begin tackling waters with such complex problems as nonpoint sources or issues related to increasing population growth and changing land use."[33]

To address these continued, impaired water bodies, EPA's current goal is to restore 2,250 of the 39,798, or six percent, of its impaired waters by 2012. EPA plans to address these continued water impairments through continued use and improvement of the watershed approach.

Total Maximum Daily Load Program: Under Section 303 of the Clean Water Act, states, territories, and tribes are required to develop lists of all impaired waters under their jurisdiction. The Clean Water Act requires that these jurisdictions establish priority rankings and Total Maximum

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[32] A water body is designated as impaired if one or more of the 'uses' designated in water quality standards is not being attained. Uses are identified by taking into consideration the use and value of the water body for a combination of public water supply, fish, shellfish, and wildlife protection, or for recreational, agricultural, industrial, or navigational purposes.
[33] US EPA Performance and Accountability Report, FY 2006, p.69

Daily Loads (TMDL) for these impaired water bodies. The TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The TMDL calculation is the sum of the contributions from both point and nonpoint sources. Once the TMDL for a given water body is determined, the appropriate jurisdiction (state, territory, or tribe) develops a plan for implementing point and nonpoint source pollutant reductions to achieve desired water quality standards. A given TMDL calculation is not, in and of itself, an enforceable regulatory standard. Instead, the primary implementation mechanism for the nonpoint source components of a TMDL on a given water body is the Section 319 nonpoint source management program. This program does not, as noted earlier, generally have enforceable mechanisms under the Clean Water Act.

TMDLs are a useful tool for allowing the EPA, the states and others to determine how much of a given pollutant is acceptable in a given water body, and to help to generate appropriate management plans as a result. However, while they were established in the 1972 Clean Water Act, it is only in recent years that EPA has required states to develop them. As a result of nearly 40 legal actions across 38 states, the EPA is under numerous consent decrees or court orders to ensure that TMDLs are established.[34] At the end of 2006, EPA and the states had approved 24,131 TMDLs for impaired water bodies.[35] Each TMDL is written per pollutant, therefore, a given waterbody may have multiple TMDLs 'assigned' to it. As a result, EPA has to approve many thousands more TMDLs to address all 39,798 impaired water bodies throughout the nation. EPA anticipates that approximately 3,500 TMDLs will be completed and approved per year in coming years.[36]

Watershed Approach: EPA's watershed[37] approach is not prescribed by the Clean Water Act, but has been adopted as a management tool to comprehensively address water pollution problems. While the EPA has supported the watershed approach since the early 1990s, it elevated the importance of the tool by designating it as an explicit subobjective in its 2003-2008 Strategic Plan. The watershed approach is a central mechanism in two of EPA's three key approaches to improving water quality: maintaining strong core programs that emphasize watershed protection; and restoring impaired waters on a watershed basis.[38] EPA's premise is that many water quality problems are best dealt with at the watershed level rather than by individual waterbody or discharger.[39] The watershed approach is designed to help focus existing, traditional water pollution control programs, such as the point source program, in a more comprehensive manner and address problems such as NPS pollution. According to EPA, the watershed approach is being integrated into its core water programs.

EPA's watershed approach offers the potential to address point and nonpoint source pollution in a holistic fashion by setting up comprehensive watershed management plans. However, because it is not prescribed through the Clean Water Act, it has not been fully integrated into EPA's core water programs. In its most recent *Accomplishments and Performance Report* (FY 2006), EPA did

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[34] http://www.epa.gov/owow/tmdl/overviewfs.html
[35] US EPA Performance and Accountability Report, FY 2006, p.69
[36] US EPA 2006-2011 Strategic Plan. p.47.
[37] A watershed refers to a geographic area in which water drains to a common outlet. The watershed includes not only the water resources, such as streams, rivers, and lakes, but also the land surrounding those resources.
[38] The other area or mechanism that EPA will use to improve water quality is the investment in water infrastructure and the strengthening of management practices to improve the sustainability of water systems. (US EPA 2006-2011 Strategic Plan. p.45)
[39] EPA OIG. 2005. Sustained Commitment Needed to Further Advance Watershed Approach. 2005-P-00025.

not meet one of two national outcome performance measures established to determine its success in implementing the watershed approach. In addition, EPA's Office of Inspector General found in 2005 that EPA had not developed other necessary measures to evaluate key programs and activities under its watershed approach program.[40]

[40] OIG. 2005. *Sustained Commitment Needed to Further Advance Watershed Approach*. 2005-P-00025. Executive Summary.

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April 16, 2007

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Water Resources and Environment

FROM: Subcommittee on Water Resources and Environment Staff

SUBJECT: Hearing on Nonpoint Source Pollution: The Impacts of Agriculture on Water Quality

PURPOSE OF HEARING

On Thursday, April 19, 2007, at 2:00 p.m., in Room 2167 Rayburn House Office Building, the Subcommittee on Water Resources and Environment will receive testimony from representatives from the United States Department of Agriculture's Natural Resources Conservation Service, the U.S. Environmental Protection Agency, the City of Waco, Texas, the American Water Works Association, academia, and environmental and agricultural organizations on the impact of agricultural run-off on water quality.

BACKGROUND

This memorandum briefly summarizes nonpoint source pollution. It then focuses in more detail on agricultural runoff. Agricultural runoff is a form of nonpoint source pollution.

Nonpoint Source Water Pollution

Nonpoint source (NPS) pollution emanates from diffuse sources. It is pollution that enters waters through a pathway other than a discernible, confined and discrete conveyance such as a pipe, ditch or channel. NPS pollution occurs after rainwater or snowmelt moves across the ground and into a water body. As the runoff moves over the ground it may pick up natural and man-made pollutants. These pollutants are eventually deposited in water bodies.

NPS pollution encompasses a wide variety of pollutants and sources. These include:

- Excess fertilizers, herbicides, and pesticides from agricultural lands and residential areas;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Atmospheric deposition of particulates, toxic chemicals, and metals;
- Oil, grease, heavy metals, and toxic chemicals from urban stormwater runoff, including runoff from roads, and energy production;
- Salt from irrigation practices and acid drainage from abandoned mines; and
- Bacteria, pathogens, and nutrients from livestock, pet wastes, wildlife, and faulty septic systems.

The successes of the Clean Water Act in improving water quality have primarily resulted from enforceable technology-based efforts to control point sources of pollution. Point sources are defined as discernable, confined and discrete conveyances, such as municipal or industrial sources. Since passage of the Clean Water Act (CWA, or the Act) in 1972, reliance on an enforceable permit program has resulted in decreased water pollution from point source conveyances.

For example, in 1968, sewage treatment facilities served approximately 140 million people in this country, many at a primary treatment level.[1] Today, after Federal investments of more than $82 billion in wastewater assistance since the passage of the Clean Water Act, 207.8 million people, representing more than 71 percent of the total population, are serviced by more than 16,000 publicly owned treatment works providing secondary or more advanced treatment.[2]

In 1968, about 39 percent (54.2 million) of the 140 million people served by publicly owned treatment works received less than secondary treatment (raw and primary). By 2000, the last year data are available, this percentage was reduced to just over two percent (6.4 million) of the 207.8 million people served by publicly owned treatment works.[3] In addition, the U.S. population served by publicly owned treatment works with secondary or greater treatment more than doubled between 1968 and 1996.[4]

However, unlike the enforceable requirements of the Act in controlling point sources, the Clean Water Act does not require the implementation or enforcement of any nonpoint source management plans, such as buffer strips or nutrient management plans, to reduce polluted runoff. The Act does authorize financial and technical assistance to states for the development and implementation of state nonpoint source management plans (section 319), which should include the identification of voluntary best management practices for reducing nonpoint sources of pollution.

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[1] U.S. EPA. "Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment." June 2000.

[2] U.S. EPA. "Clean Watersheds Needs Survey 2000: Report to Congress." August 2003.

[3] Should all of the projects called for in the 2000 Needs Survey be constructed, the number of facilities that provide less-than secondary treatment is projected to decline from 47 facilities serving 6.4 million to 27 facilities serving 3.9 million, nearly all of whom (99.99 percent) will be served by facilities with special waivers allowing the discharge of less than secondary treated effluent to deep, well-mixed ocean waters. *See* U.S. EPA. "Clean Watersheds Needs Survey 2000: Report to Congress." August 2003, and U.S. EPA. "Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment." June 2000.

[4] U.S. EPA. "Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment." June 2000.

In addition, the Act provides for the implementation of the Total Maximum Daily Load (TMDL) program, which determines the maximum pollutant load a water body can handle without becoming impaired, both from point and nonpoint sources of pollution. EPA has also recently advocated a watershed approach to holistically address all forms and sources of water pollution on a watershed basis. (*See Appendix for a more detailed description of these programs.*)

The United States Environmental Protection Agency (EPA), the Office of Management and Budget, and the states report that NPS pollution is now the leading remaining source of water quality problems.[5,6] While the effects may vary by specific water body, the EPA reports that NPS pollution has harmful effects on drinking water supplies, recreation, fisheries, and wildlife.[7]

In its 2006-2011 Strategic Plan, EPA has identified 39,798 "impaired" water bodies.[8,9] A water body is designated as impaired if one or more of the "uses" designated in water quality standards is not being attained. Uses are identified by taking into consideration the use and value of the water body for a combination of public water supply, fish, shellfish, and wildlife protection, or for recreational, agricultural, industrial, or navigational purposes. According to the 1998 Clean Water Act Section 303(d) list, 43 percent of water quality impairments were attributed exclusively to nonpoint source pollution. The remaining 47 percent were attributed to both point and nonpoint source pollution. Regulation of discharges from point sources is still critical to maintaining water quality because point source pollution continues to play a part in water quality impairment. However, NPS pollution is now the leading cause.

Agricultural Runoff and Water Quality

The Federal Government has long recognized the role of agricultural runoff in NPS pollution. The Senate report to the 1972 Clean Water Act amendments stated:

> Agricultural runoff, animal wastes, soil erosion, fertilizers, pesticides and other farm chemicals that are part of runoff...are major contributors to the Nation's water pollution problem.[10]

Today, agricultural runoff continues to impair many of the nation's water bodies. Agricultural runoff consists of pollutants from farming and ranching, including sediments, nutrients, pathogens, pesticides, metals, and salts that are picked up by rainfall and snowmelt and eventually deposited into water bodies. Various types of water bodies can be affected by agricultural runoff NPS pollution including lakes, rivers, wetlands, coastal waters and estuaries, as well as groundwater. Agricultural runoff NPS pollution can be transported over very long distances through watersheds. For example, some agricultural runoff NPS pollution that ends up in the Chesapeake Bay originated from the upper reaches of the

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[5] http://www.epa.gov/owow/nps/qa.html
[6] http://www.whitehouse.gov/omb/expectmore/detail/10000224.2004.html
[7] http://www.epa.gov/owow/nps/qa.html
[8] EPA 2006-11 Strategic Plan, p. 47
[9] This number is the 2002 baseline and is being used by the EPA for subsequent performance measurement and reporting.
[10] Congressional Research Service, *History of the Water Pollution Control Act Amendments of 1972*, ser. 1, 93d Cong., 1st sess. (1972), 1457

Susquehanna River in New York State. And the hypoxia, or "dead", zone in the Gulf of Mexico is caused, in part, by pollutants in agricultural runoff originating 1000 miles upstream along the Mississippi River.

The Federal Government currently has a number of programs across a variety of federal agencies dedicated to reducing agricultural runoff. However, according to the USDA and EPA Office of Inspector General, these programs are not adequately coordinated.

The United States has more than 947 million acres of agricultural lands, and over 2 million farms. When they are not managed in a way to minimize pollutants from running off into water bodies, activities on farms and ranches can negatively impact water quality. Agricultural practices that could cause agricultural NPS pollution include improper or excessive application of pesticides, fertilizer, and irrigation water, improperly located or managed animal feeding operations, and plowing too often or to close to a waterbody.

The 2000 *National Water Quality Inventory* reported that agricultural NPS pollution is the leading source of water quality problems on assessed rivers and lakes, the second largest source of impairment to wetlands, and a major contributor to the impairment of coastal estuaries and groundwater.[11] The *National Water Quality Inventory – 2000 Report* does not include data on all of the nation's water bodies. Instead, it includes those waters that have been assessed by the states at the time of the report's release.[12] The following table highlights the agricultural runoff findings of those water bodies assessed in the 2000 *National Water Quality Inventory*.

Water Body Type	**Area Impacted by Agricultural Runoff**	**Assessed Impaired Waters: Impairment due to Agricultutal Runoff**
Rivers and Streams[13]	128, 859 river and stream miles	48%
Lake[14]	3,158,393 million acres	41%
Coastal[15]	2,811 estuarine square miles	<20%
Great Lakes Shoreline (shoreline miles)[16]	75 shoreline miles	<2%

Typical pollutants contained in agricultural runoff NPS pollution include nutrients, pesticides, sediment, and animal waste, among others. These pollutants can lead to water body impairments that include ecosystem damage, as well as threats to human health.

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[11] EPA. 2005. "Protecting Water Quality from Agricultural Runoff." EPA 841-F-05-001. (http://www.epa.gov/owow/nps/Ag_Runoff_Fact_Sheet.pdf)

[12] The states assessed 19% of the nation's total river and stream miles, 43% of the its lake, pond, and reservoir acres, 36% of its estuarine square miles, and 92% of Great Lakes shoreline miles for the *National Water Quality Inventory – 2000 Report*

[13] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report*. pp. 13-14

[14] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report*. p. 22

[15] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report*. pp. 30-31

[16] EPA – Office of Water. 2000. *National Water Quality Inventory – 2000 Report*. p.35

- **Nutrients:** Farmers apply nutrients, or fertilizers, such as nitrogen, phosphorous, and potassium to fields to increase production. When nutrients are applied prior to rainfall, or in excess quantities, they can wash into aquatic ecosystems. The National Research Council has highlighted nitrogen as the major source of coastal water impairment leading to hypoxia: nutrient over-enrichment that eventually leads to depletion of necessary dissolved oxygen supplies in aquatic, estuarine, and marine ecosystems.[17] In addition to hypoxia, nutrients can cause algal blooms that can disrupt recreational activities such as swimming and boating, as well as cause foul taste and odor in drinking water. High concentrations of nitrates in drinking water can also cause "blue baby syndrome,[18] a potentially fatal disease in infants.[19]

- **Pesticides:** Pesticides include insecticides, herbicides, and fungicides and are used to kill agricultural pests. The EPA estimates that 20,000 pesticides are currently in use in agricultural operations across the country.[20] When improperly used, or used in incorrect quantities, pesticides can poison fish and wildlife, contaminate drinking water and food sources, and destroy habitat.

- **Sediments:** EPA states that the most prevalent source of agricultural water pollution is soil, or sediment, that is washed off fields. Too much sediment in water bodies can cloud the water, reducing necessary sunlight for aquatic plants, clog fish gills, and smother fish larvae. Other agricultural runoff pollutants can become attached to soil particles – facilitating entry into water bodies.

- **Animal Waste:** EPA estimates that 238,000 working farms and ranches are animal feeding operations.[21] These operations allow farmers and ranchers to efficiently feed and maintain livestock, but they also produce an estimated 500 million tons of animal waste each year. Runoff from improperly managed facilities can carry pathogens (bacteria and viruses), nutrients, and solids into water bodies. Water body impairments can ensue as a result of this runoff, and shell-fishing beds can also be negatively affected. Groundwater can be contaminated by waste seepage.

- **Other:** Other agricultural runoff NPS pollution problems are caused by overgrazing by livestock and excessive and inefficient use of irrigation water. Overgrazing can cause erosion that leads to sediment runoff. Overuse of irrigation water, especially in arid areas, can result in the concentration of minerals and salts due to evaporation, erosion, and the transportation of agricultural runoff pollutants.

Recent Areas of Concern for NPS Pollution Levels: Policy choices outside of Federal, State, and local efforts to control nonpoint sources of pollution can, in essence, have a significant impact on efforts to improve overall water quality. For example, partially as a result of rapidly increasing demand for fuel ethanol, corn production is anticipated to greatly expand in coming years. The

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[17] Nation Research Council. 2000. *Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution.*
[18] Officially referred to as methemoglobinemia.
[19] EPA. 2005. "Protecting Water Quality from Agricultural Runoff." EPA 841-F-05-001. (http://www.epa.gov/owow/nps/Ag_Runoff_Fact_Sheet.pdf)
[20] EPA OIG. 2005. *Limited Knowledge of the Universe of Regulated Entities Impedes EPA's Ability to Demonstrate Changes in Regulatory Compliance.* Report No. 2005-P-00024, p. 24
[21] EPA. 2005. "Protecting Water Quality from Agricultural Runoff." EPA 841-F-05-001. (http://www.epa.gov/owow/nps/Ag_Runoff_Fact_Sheet.pdf)

United States Department of Agriculture (USDA) recently announced that in 2007, the amount of cropland dedicated to growing corn will be the largest since 1944. While fuel ethanol is potentially an economically- and environmentally-attractive alternative fuel source, increased corn production may also mean an increased use of fertilizers. This could result in additional agricultural runoff NPS pollution.

In addition, the administration supports converting some of the land currently under the protection of the Conservation Reserve Program into biofuel cropland.[22] As noted below, the Conservation Reserve Program is one of the primary federal tools for limiting the extent and impacts of agricultural runoff.

Tools for Dealing with Agricultural Runoff: A variety of federal programs exist to provide opportunities for the agricultural community to receive funding and assistance to limit agricultural runoff NPS pollution. These programs are generally not regulatory in nature, and instead encourage landowners to adopt best management practices (BMPs) to reduce agricultural runoff NPS pollution. The effectiveness of these programs has been limited somewhat by coordination problems between federal agencies, and incomplete adoption of BMPs by the agricultural community to date.

Federal programs for decreasing agricultural runoff include:

- **US EPA Section 319 Nonpoint Source Grant Program:** Funding for BMPs through local Conservation Districts, government agencies, non-profits, and universities. Different from USDA Farm Bill funding, these funds may also support related activities such as water quality monitoring and watershed coordinators;

- **United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP):** Cost-share assistance for BMPs to improve water quality and conservation;

- **USDA Farm Service Agency (FSA) Conservation Reserve Program:** Assistance with converting cropland to less intensive use, as well as establishing and maintaining conservation practices;

- **USDA FSA Conservation Reserve Enhancement Program (CREP):** Incentive payments including annual rents and cost-share assistance for growing long-term, resource-conserving covers on eligible land.

These federal programs are intended to provide grant funding and technical assistance to states and the agricultural community to encourage the adoption of BMPs. BMPs can help not only to protect water quality but also make farms more efficient and economically productive. BMP activities such as vegetated buffer strips, integrated pest management programs, and the protection of riparian corridors can both help to keep agricultural production efficient as well as prevent the loss of valuable topsoil. Implementation of nutrient management plans can result in the efficient application of agricultural nutrients and cost savings for farmers.

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[22] Davenport, Coral. 2007. "Ethanol Sparks Corn Row." *CQ Weekly*. (April 9, 2007), p. 1017

Adoption of BMPs by the agricultural community is generally a voluntary process. In a review of federal nutrient reduction programs in the Chesapeake Bay watershed, EPA and USDA's Offices of Inspector General have found that only a limited subset of recommended BMPs in the Chesapeake Bay Program tributary strategies have been adopted by the agricultural community.[23] These recommended tributary strategies are part of the Chesapeake Bay Program and are intended to reduce nutrient and sediment runoff into the Chesapeake Bay watershed. These BMPs are viewed as either unprofitable or as requiring significant changes in farming techniques and have not been widely adopted as a result.[24] The EPA and USDA Offices of Inspector General found that increased coordination between these federal agencies would result in better adoption of these practices, and ultimately reduced agricultural runoff loadings to the Chesapeake Bay.[25] In addition to ineffective agency coordination,[26] agricultural runoff NPS pollution mitigation strategies are handicapped because USDA has not coordinated a Department-wide strategy or policy to address its commitment as a Chesapeake Bay partner.[27]

[23] EPA OIG and USDA OIG. 2006. *Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources*. EPA OIG Report No. 2007-P-00004/USDA OIG Report No. 50601-10-Hq. (Executive Summary)
[24] EPA OIG and USDA OIG. 2006. *Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources*. EPA OIG Report No. 2007-P-00004/USDA OIG Report No. 50601-10-Hq. (Executive Summary)
[25] EPA OIG and USDA OIG. 2006. *Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources*. EPA OIG Report No. 2007-P-00004/USDA OIG Report No. 50601-10-Hq. (Executive Summary)
[26] Boesch, Donald F. 2001. Testimony to the U.S. Commission on Ocean Policy, "Addressing Diffuse-Source Pollution of U.S. Coastal Waters." p.4
[27] EPA OIG and USDA OIG. 2006. *Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources*. EPA OIG Report No. 2007-P-00004/USDA OIG Report No. 50601-10-Hq. (Executive Summary)

APPENDIX

The EPA has a number of programs and tools by which to reduce NPS pollution. This Appendix describes some of these in detail.

Section 319 Program: In 1987, the Congress amended the Clean Water Act to establish the Section 319 Nonpoint Source Management Program. The Section 319 Program requires that states must identify waters that are damaged or threatened by runoff sources, and then develop comprehensive NPS pollution reduction programs to reduce NPS pollution. Section 319 provides grant funding to states, territories, and tribes that goes toward activities such as technical and financial assistance, technology transfer, and monitoring of nonpoint source implementation projects, among other activities. Under the program, States are required to provide performance reports of their NPS programs' performance. Inadequate performance towards these goals may result in the withholding of grant funding. Section 319 is the only federal program to address all sources of NPS pollution. As opposed to United States Department of Agriculture (USDA) NPS pollution programs, Section 319 funds can be used for monitoring and watershed planning. The Section 319 program does not have enforceable policies or mechanisms (such as National Pollutant Discharge Elimination System (NPDES) permits for point source discharges) to implement water quality improvement management measures.

In its FY 2008 budget proposal the Administration proposes funding cuts for the Section 319 program of over $10 million, or five percent, from FY 2007 enacted levels, to $194 million.

Through their various water pollution programs, by the end of fiscal year 2006, the EPA and the states restored 12.1 percent of water bodies identified in 2000 as impaired.[28] Based on the 2000 figure of 21,632 impaired water bodies, this still leaves over 19,000 water bodies impaired. However, based off of EPA's most recent figures of 39,768 impaired water bodies (cited in its 2006-2011 Strategic Plan), it would still have to restore over 37,000 existing impaired water bodies. EPA itself states:

> "...[S]ome of the restorations to date represent waters where improved assessments have found that the waters were in fact already meeting water quality standards. Thus we anticipate that the numbers of these "easier" restorations will soon decline, as states and EPA begin tackling waters with such complex problems as nonpoint sources or issues related to increasing population growth and changing land use."[29]

To address these continued, impaired water bodies, EPA's current goal is to restore 2,250 of the 39,798, or 6 percent, of its impaired waters by 2012. EPA plans to address these continued water impairments through continued use and improvement of the watershed approach.

Total Maximum Daily Load Program: Under Section 303 of the Clean Water Act, states, territories, and tribes are required to develop lists of all impaired waters under their jurisdiction. The

[28] A water body is designated as impaired if one or more of the "uses" designated in water quality standards is not being attained. Uses are identified by taking into consideration the use and value of the water body for a combination of public water supply, fish, shellfish, and wildlife protection, or for recreational, agricultural, industrial, or navigational purposes.
[29] US EPA Performance and Accountability Report, FY 2006, p.69

Clean Water Act requires that these jurisdictions establish priority rankings and Total Maximum Daily Loads (TMDL) for these impaired water bodies. The TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The TMDL calculation is the sum of the contributions from both point and nonpoint sources. Once the TMDL for a given water body is determined, the appropriate jurisdiction (state, territory, or tribe) develops a plan for implementing point and nonpoint source pollutant reductions to achieve desired water quality standards. A given TMDL calculation is not, in and of itself, an enforceable regulatory standard. Instead, the primary implementation mechanism for the nonpoint source components of a TMDL on a given water body is the Section 319 nonpoint source management program. This program does not, as noted earlier, generally have enforceable mechanisms under the Clean Water Act.

TMDLs are a useful tool for allowing the EPA, the states and others to determine how much of a given pollutant is acceptable in a given water body, and to help to generate appropriate management plans as a result. However, while they were established in the 1972 Clean Water Act, it is only in recent years that EPA has required states to develop them. As a result of nearly 40 legal actions across 38 states, the EPA is under numerous consent decrees or court orders to ensure that TMDLs are established.[30] At the end of 2006, EPA and the states had approved 24,131 TMDLs for impaired water bodies.[31] Each TMDL is written per pollutant, therefore, a given waterbody may have multiple TMDLs "assigned" to it. As a result, EPA has to approve many thousands more TMDLs to address all 39,798 impaired water bodies throughout the nation. EPA anticipates that approximately 3,500 TMDLs will be completed and approved per year in coming years.[32]

Watershed Approach: EPA's watershed[33] approach is not prescribed by the Clean Water Act, but has been adopted as a management tool to comprehensively address water pollution problems. While the EPA has supported the watershed approach since the early 1990s, it elevated the importance of the tool by designating it as an explicit subobjective in its 2003-2008 Strategic Plan. The watershed approach is a central mechanism in two of EPA's three key approaches to improving water quality: maintaining strong core programs that emphasize watershed protection; and restoring impaired waters on a watershed basis.[34] EPA's premise is that many water quality problems are best dealt with at the watershed level rather than by individual waterbody or discharger.[35] The watershed approach is designed to help focus existing, traditional water pollution control programs, such as the point source program, in a more comprehensive manner and address problems such as NPS pollution. According to EPA, the watershed approach is being integrated into its core water programs.

EPA's watershed approach offers the potential to address point and nonpoint source pollution in a holistic fashion by setting up comprehensive watershed management plans. However, because it is not prescribed through the Clean Water Act, it has not been fully integrated into EPA's

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[30] http://www.epa.gov/owow/tmdl/overviewfs.html
[31] US EPA Performance and Accountability Report, FY 2006, p.69
[32] US EPA 2006-2011 Strategic Plan, p.47.
[33] A watershed refers to a geographic area in which water drains to a common outlet. The watershed includes not only the water resources, such as streams, rivers, and lakes, but also the land surrounding those resources.
[34] The other area or mechanism that EPA will use to improve water quality is the investment in water infrastructure and the strengthening of management practices to improve the sustainability of water systems. (US EPA 2006-2011 Strategic Plan. p.45)
[35] EPA OIG. 2005. Sustained Commitment Needed to Further Advance Watershed Approach. 2005-P-00025.

core water programs. In its most recent *Accomplishments and Performance Report* (FY 2006), EPA did not meet one of two national outcome performance measures established to determine its success in implementing the watershed approach. In addition, EPA's Office of Inspector General found in 2005 that EPA had not developed other necessary measures to evaluate key programs and activities under its watershed approach program.[36]

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[36] OIG. 2005. *Sustained Commitment Needed to Further Advance Watershed Approach.* 2005-P-00025. Executive Summary.

HEARING ON NONPOINT SOURCE POLLUTION: ATMOSPHERIC DEPOSITION AND WATER QUALITY

Tuesday, April 17, 2007

HOUSE OF REPRESENTATIVES,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT,
Washington, DC.

The subcommittee met, pursuant to call, at 2:00 p.m., in Room 2167, Rayburn House Office Building, the Honorable Eddie Bernice Johnson [chairwoman of the subcommittee] presiding.

Ms. JOHNSON. I would like to welcome today's witnesses to our hearing on the Impact of Atmospheric Deposition and Water Quality.

Today we will hear from representatives from Federal, State and tribal governments and other interested stakeholders. These diverse perspectives will provide the Subcommittee with a much broader understanding on nonpoint source water pollution and how atmospheric deposition impacts water quality and what the Federal Government is currently doing about it.

To begin, let me extend a warm greeting to Dr. Michael Slattery. Dr. Slattery comes from my home State of Texas and one of my alma maters, who is an expert in environmental science.

As a former health care professional, I am very concerned about the impact that air pollution can have on human health especially on mothers and children.

Dr. Slattery has been instrumental in providing critical scientific findings on the impact of coal-fired plants, power plants, in the State of Texas. These plants, as Dr. Slattery will testify, are central contributors to mercury loading in water bodies throughout Texas, Louisiana, Oklahoma and Arkansas.

I thank you very much for being here today to discuss your research findings.

Nonpoint source water pollution is an area that has not been looked at in many years by this Subcommittee, and I am pleased to announce that this is the first in a series of hearings that will look at this major area of concern and the impairment of the Nation's water bodies. I hope that these hearings will provide the members of the Subcommittee with a firmer grasp of the nature of nonpoint source pollution as well as what the Federal Government is doing or not doing to deal with it.

Nonpoint water pollution might best be described by what it is not. It is pollution that enters water bodies through a pathway other than a discernible, confined and discrete conveyance such as a pipe or ditch. This pollution is captured by rainfall or snowmelt and carried into the waters, eventually causing these water bodies to become impaired.

The sources of nonpoint water pollution are varied. They can include runoff from farms, streets and construction sites. The sources can also include emissions from power plants, industrial facilities and car tailpipes. This form of nonpoint source pollution is referred to atmospheric deposition and what we are here today to discuss.

These types of substances begin as air emissions enter the atmosphere and eventually fall out or settle over the land and water bodies. In many cases, these substances are eventually washed into water bodies, causing considerable pollution. It is important to understand that atmospheric deposition nonpoint source pollution begins as an air pollution problem and ends up as a water pollution problem.

While I realize that the regulation of air pollution is outside the purview of this Subcommittee, the fact that a significant number of waters are impaired through the atmospheric sources makes this issue a concern of the Water Resources and Environment Subcommittee.

I, for one, am eager to find out if the Environmental Protection Agency is equipped to properly handle such multimedia pollution problems especially in the light of the interstate and international nature of air pollution and its impacts on State waters.

Atmospheric deposition is a major source of water body impairment. In EPA's most recent National Assessment Database, the States report that 26 percent of lakes, reservoirs and bays are impaired because of atmospheric deposition. In addition, in 2004, 44 States had fish consumption advisories for mercury. This means that nearly every State in the Union has fish that are contaminated and should not be eaten. The majority of fish consumption advisories focus on mercury contamination from atmospheric sources.

Although sources of mercury in the environment can be both natural and manmade, the United States Geographical Survey has found that human activities have doubled or even tripled the amount of mercury in the atmosphere. This mercury has come from power plants and other fossil fuel-burning sources.

Given what we know about health impacts of mercury, any mercury advisory in today's day and age is wrong. That more and more water bodies are subject to mercury advisories and nearly every State in the Country is subject to these mercury warnings is unbelievable and needs explaining. It is time for this Committee to start asking how this could be, and then it is time to ask what are we doing about it.

Water bodies throughout this Country have been negatively impacted, are being negatively impacted by harmful atmospheric deposition for far too long. Unchecked, this type of nonpoint source pollution will result in human health and economic costs that both localized regions as well as the Nation can ill afford.

I urge members of this Subcommittee not to forget these costs are not just the aesthetics of water bodies, not just the fish and aquatic plant life. Instead, the effects of mercury deposition and the effects of pesticide deposition, the effects of other toxic metals, all have demonstrated dramatic negative health impacts on young children, adults and the elderly. We need to ask ourselves if all of this harm can continue without any effective response.

I welcome the witnesses to today's hearing, and I look forward to their testimony. They will better inform the Subcommittee as to the nature of atmospheric deposition, how it relates to nonpoint source pollution and how it impacts human health and the environment.

The Chair recognizes Mr. Baker.

Mr. BAKER. I thank the gentlelady for convening this hearing and for her broad view and opening statement concerning water quality. I share many of her concerns in preserving the valuable asset that our nation relies on in a daily fashion.

I would also point out that nonpoint source water degradation is certainly something the Congress should better understand, receive scientific comment and learn better the effects or consequences of that anomaly.

With specific reference to atmospheric deposition, merely for establishing the scope of the problem we really face, there was actually a geologic period brought to an end by the result of a six mile meteor impact 65 million years ago that ended the Cretaceous and started the Tertiary period. Also, similarly, some believe ended the life of dinosaurs. Fortunately for humankind, no similar event has recently occurred although in 1883 the volcano, Krakatoa, erupted and volcanic ash surrounded the equator in 13 days, having significant adverse ecological effects.

I merely enter those observations into the record because atmospheric depositional conduct is an extremely complex phenomenon which can be affected by vehicle emissions in China or coal-burning gas-fired generators in other countries around the globe and, because of trade winds, result in depositional activities within the domestic United States, over which we obviously have very little control or ability to regulate.

It is for those reasons that I suggest we certainly should learn and better understand the forces at work, but prior to moving to any new regulatory constraint on domestic business activity, we need to fully understand the risks we face and the appropriate response that this Congress should generate without unnecessarily constraining responsible economic growth.

With that in mind, I look forward to the balance of the hearings that are now scheduled as I know the Committee will learn a great deal and resultingly take responsible action.

I yield back and thank the Chairlady.

Ms. JOHNSON. Thank you very much.

The Chair now recognizes Ms. Matsui.

Ms. MATSUI. Thank you very much, Madam Chair. Thank you for calling this very important hearing.

In my district of Sacramento, we are part of the greater Sacramento River Watershed which emanates from the Sacramento River. The Sacramento River is the largest and longest river in California. It stretches over 350 miles through the heart of Northern California, and it collects water from over a dozen counties between Sacramento and Oregon in an area of more than 27,000 square miles. This mighty river has 27 tributaries feeding into it, and 17 percent of California's land drains into the Sacramento River.

My priority since taking office has been flood protection, but the more I engage on the issue, the more it is apparent to me that flood protection is not just about levees and dams. It is also about the decisions we make within a watershed.

I am very interested in developing a comprehensive Sacramento Watershed approach. It is my intent that this approach will address the environmental, water quality, conservation, land use and, yes, flood protection components of a full and robust watershed approach.

I am particularly interested to hear about the EPA's Section 319 program and how it can work with other programs and agencies such as USDA. It is my belief that it will take more than one program, one agency and one approach to address the needs of our larger watersheds in this Country. Whether it is identifying nonpoint source pollution or managing land use, all of these issues are interrelated.

I look forward to hearing from today's witnesses, and I thank you once again, Madam Chair, for calling this hearing.

I yield back.

Ms. JOHNSON. Thank you very much.

Dr. Ehlers?

Mr. EHLERS. Thank you, Madam Chair. I just want to express my appreciation for this hearing.

I apologize. I won't be able to stay because the Aviation Subcommittee is having a classified briefing in 15 minutes, and I have to be at that, but I will try to stop by here after that.

This is an extremely important issue and, as a representative of the Great Lakes, I can assure you how important it is for all of us who live there. We have something on the order of 70 million people depend on the Great Lakes for their drinking water, and so it is a crucial issue for everyone in the Great Lakes Region.

We are very proud of our lakes. We are very proud of the purity of the water, but the atmosphere deposition is an increasing problem.

Just to give you one example, a number of years ago, the United States banned the use of the chemical, Toxaphene. Not too long ago, the Great Lakes' concentration of Toxaphene was still continuing to increase because it is not banned in other parts of the world. It is a volatile organic compound. It gets into the air, circulates in the atmosphere, comes down with the rain into the Great Lakes Watershed, and there we are.

So this is an extremely important topic, and I look forward to the comments on this.

Thank you.

Ms. JOHNSON. Thank you very much.

Mr. Bishop?

Mr. BISHOP. Thank you, Madam Chair. I just want to thank you for having this hearing as well as the hearing Thursday afternoon.

This is a very important issue, nationally, one that is particularly important to my district. I represent a district that is literally surrounded by water. And so, these are concerns of ours that are of long standing, and we look forward to the testimony both this afternoon and on Thursday afternoon.

Thank you very much.

Ms. JOHNSON. Mr. Gilchrest?

Mr. GILCHREST. Thank you, Madam Chairman.

Just briefly, I want to thank our witnesses on the first and second panels for coming. We look forward to a very productive working relationship with you over the next couple of years in this session of Congress, and we hope we can make progress.

I have some other things. I am going to try to stay for the hearing, but I may have to leave.

As we go through nonpoint source pollution and all the various aspects which is fundamentally human activity, everything we do from streetscapes to, as Mr. Ehlers mentioned, atmospheric deposition to herbicides, deforestation, agriculture, sewage treatment plants, the list is seemingly endless. Except that we match that list up with human activity, we now that it is not compatible with nature's design. Nature gets degraded. Pretty soon, we are the ones that are going to be degraded or our great grandchildren.

But as we go through all of the nonpoint source pollution contributions to this degradation, into this mix I really think we have risen to the level of understanding to put climate change and what that does to acidification of our estuaries to the draw-down potentially of the Great Lakes because of changing weather patterns and what that reduction of the volume of water will do to the concentration of all of these activities from herbicides to toxic chemicals to sewage to more people, et cetera.

So I just ask you to take into consideration, climate change, as you run through the various aspects of your responsibility.

Thank you, Madam Chairman.

Ms. JOHNSON. Thank you very much.

Mrs. Napolitano?

Mrs. NAPOLITANO. Thank you, Madam Chair.

The Honorable Ben Grumbles, we have met before and we talked water extensively.

I thank you, Madam Chairwoman, for the hearing because the Subcommittee on Water and Power, in my particular Subcommittee, we have a great interest in this, and this dovetails the efforts that we are trying to put in. The nonpoint sources of pollution have become a major problem, and I am sure the studies are going to show that it is at least in 50 percent of water.

How do we work to be able to ensure that our residents or citizens are protected from that pollution which we know is identifiable, is filterable and will make our youngsters or elderly who may be prone to picking up that pollution in the water that is not filtered out?

How do we work with all of the effects on water and be able to ensure that we do it in a way that is not going to be protracted in addressing who is responsible, what responsibilities the Federal Government may have if it is Federal Government land? There are all kinds of things that come to mind.

The adding of Section 319 in Congress in 1987 to the Clean Water Act, I think, needs to be more vibrant, visible, effective, and we should work with the States to ensure that that runoff is managed properly so that we can then work with them to be able to ensure the delivery of potable water and clean water in our rivers and our dams and into the aquifers that we draw from.

Those are all areas, Madam Chairwoman, that I am hoping that we will be addressing or at least identifying the plans that will address the nonpoint pollution problems, the funding, whether it is public access from the cities, the States, the Federal Government through implementing State management plans, and if those Section 319 funds are being used adequately to address agriculture and nonpoint pollution.

Those are all issues that I am hoping that we will be able to address, and thank again for being here and to the Chairwoman for calling this hearing.

I yield back.

Ms. JOHNSON. Thank you very much.

Dr. Kagen?

Mr. KAGEN. Thank you, Madam Chairman.

It is a great honor for me to able to serve the people of Wisconsin. I have gone through some of the math, and I represent more shoreline than any of the Congressional seats. It is a matter of great importance to my district and my people.

I am also very sensitive to the political nature of how we preserve our environment and nonpoint source pollution.

My father was a volunteer health commissioner when I was growing up in the early 1960s in Appleton, Wisconsin, and he was very irritated when I came home with my baseball suit on and I smelled like the DDT fogger. We had been riding our bicycles in the fog. The very next day, he went down to city hall, and he banned DDT spraying, and he lost his job because of it. He was protecting the health of his children and his neighborhood.

I certainly hope that the actions of this Congress, the 110th, will be different than the results that he had as we seek to protect our environment, not just our surface water but our ground water as well.

I look forward to working with everyone here and listening to the greatest extent possible to the testimony before I, like Vern Ehlers, have to go to a different meeting.

Thank you very much.

I yield back my time.

Ms. JOHNSON. Thank you very much.

I think that ends our opening statements.

We are very pleased to have very distinguished panels of witnesses.

For our first panel here this afternoon, we have the Honorable Benjamin Grumbles who we are going to give an honorary chair at that table. He is the Assistant Administrator for the Office of Water, the United States Environmental Protection Agency.

Next, we have the Honorable Arleen O'Donnell, Acting Commissioner for the Massachusetts Department of Environmental Protection.

Finally, we have Mr. Lenny Fineday, Director of the Administration and Governmental Affairs Department of the Leech Lake Band of Ojibwe. He is here on behalf of the Honorable George Goggleye, Jr., Chairman of the Leech Lake Band Board. Unfortunately, the

Chairman is unable to attend this afternoon's hearing, but we are happy to have Mr. Fineday to deliver that testimony.

We are pleased that you were able to make it this afternoon. Your full statements will be placed in the record.

We ask that witnesses try to limit their testimony to five minutes of oral summary of their written statements as a courtesy to other witnesses. We will continue to proceed in the order in which the witnesses are listed in the call of the hearing.

Mr. Grumbles, you may proceed.

TESTIMONY OF THE HONORABLE BENJAMIN H. GRUMBLES, ASSISTANT ADMINISTRATOR FOR THE OFFICE OF WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY; THE HONORABLE ARLEEN O'DONNELL, ACTING COMMISSIONER, STATE OF MASSACHUSETTS, DEPARTMENT OF ENVIRONMENTAL PROTECTION; LENNY FINEDAY, DIRECTOR, ADMINISTRATION AND GOVERNMENTAL AFFAIRS DEPARTMENT, LEECH LAKE BAND OF OJIBWE

Mr. GRUMBLES. Thank you, Madam Chair. It is always an honor and an education to appear before the Subcommittee and listen to your thoughtful statements. On behalf of EPA, I just want to commend you and the Subcommittee for holding this series of hearings this week, today on atmospheric deposition and Thursday on nonpoint source pollution.

We all live downstream and downwind. I think over the course of several years the country is connecting the dots or I should say connecting the drops. The fact that acid rain, SO2 deposition, has a significant impact on lakes and water bodies, the fact that deposition of mercury which then becomes methylmercury has significant ramifications for water quality and fish consumption and human health and the health of water bodies.

So this series of hearings, this focus on the diffuse sources of pollution is critically important. We fully agree with you, and the data tells us that atmospheric deposition is a significant contributor to water pollution.

EPA's recent data, the data that we get from the States under the Clean Water Act, Section 305(b) reports, cite atmospheric deposition as the source of impairment in 26 percent of the lakes and bays and 5 percent of the rivers and streams. Over 8,500 water bodies in 43 states and Puerto Rico have been listed as impaired by mercury on the State TMDL lists, and most of these are believed to be caused by atmospheric deposition.

Acid rain is also a challenge for the Country particularly in the Northeast and New England States, and acid rain causes a cascade of effects ranging from fish kills to reduced fish populations and decreased biodiversity.

Nitrogen is a significant problem, a significant water quality problem, and people often focus appropriately on the runoff from the land, but it is also the deposition from the air that can be a major contributor to eutrophication and hypoxic zones through atmospheric deposition of nitrogen. In the Chesapeake Bay, air deposition of nitrogen accounts for an estimated 28 percent of the nitrogen inputs to the bay.

Congressman Baker, in the Gulf of Mexico, that number is about 20 percent.

So it is not just about the nitrogen from sewage treatment plants or from farms or from the land. It is also from the air. We are also aware of other toxic metals and polycyclic aromatic hydrocarbons, constituents that can be part of the atmospheric deposition that present challenges to the water.

Most importantly, though, from an EPA perspective, I am focusing on the solutions, and I want to emphasize that one of the key steps we have taken over the last couple of years has been to use the Clean Air Act tools to control atmospheric deposition of mercury. In 2005, the Clean Air Interstate Rule and the Clean Air Mercury Rule which were signed in 2005, we have concluded that they will reduce air deposition of electric utility mercury emissions by nearly 70 percent from 1999 levels when fully implemented. That is a significant step forward in controlling mercury, the atmospheric deposition of mercury.

Under the Clean Water Act, we have recently taken important steps working with our State partners to provide guidance, voluntary guidance to encourage a focus on early action, on implementing, using various State and regional tools and authorities to control and reduce mercury deposition and mercury discharges into water bodies through a voluntary approach coupled with our Clean Water Act tools that we will continue to use, the TMDL program as appropriate, and other tools under that statute.

I also want to emphasize that one of the greatest success stories when it comes to environmental law and environmental statutes, from my perspective, is the acid rain trading program under the Clean Air Act amendments of 1990. This program set up a cap and trade approach, and we believe the data show that there are excellent environmental results from that cap and trade.

Lastly, under the Clean Air Act rules, the Clean Air Interstate Rule, we believe, will be a major step forward in reducing NOx and SOx emissions and helping to protect and restore waters across the U.S. We estimate that the 2005 Clean Air Interstate Rule will reduce nitrogen loads to the Chesapeake Bay by 8 million pounds per year, a reduction of 8.8 percent by 2010.

So, in conclusion, Madam Chair, we have a lot of work ahead of us. We, EPA, have made a significant investment under the air and water authorities that we have, relying on technology and innovation and perhaps, most importantly, collaboration, recognizing that State and local authorities, when it comes to nonpoint source or diffuse pollution, are key, critical to solving the problem. We think working with you, we will continue to make success on this important effort.

Thank you. I would be happy to answer questions if you have any.

Ms. JOHNSON. Thank you very much, Mr. Grumbles.

I would like to welcome Commissioner O'Donnell from the Massachusetts Department of Environmental Protection. We welcome your testimony.

Ms. O'DONNELL. Thank you, Madam Chairman. It is an honor to be here today to testify before this Subcommittee.

I just want to make a few points, starting with the problem. Mercury is a serious problem for the residents of Massachusetts. We have a Statewide advisory for consumption of all freshwater fish across the State. Over 8,000 babies are born each year with elevated mercury levels in their blood. The problem with this is that mercury is a neurotoxin, and it causes brain damage.

We also have over 100 lakes that we have tested specifically for mercury in fish, and they are all posted individually. Our motto is basically where you test for it, you are going to find it.

The vast majority of mercury comes from air emissions. We have done a lot of work throughout the New England area and with the Eastern Canadian Provinces, and the amount coming from water discharges is really negligible. The vast majority of mercury that enters our water bodies and our fish comes from the air.

In 1998, the New England Governors and the Eastern Canadian Premiers adopted a zero mercury strategy. We set very specific numeric goals. The goal is to control mercury by 50 percent by 2003 and 75 percent by 2010 and virtual elimination after that. As a region, we are on target, and Massachusetts is ahead of schedule. Massachusetts has currently reduced 70 percent of its in-State mercury resources.

I am going to mention six sectors that we specifically controlled. Number one, trash incinerators, all of our trash incinerators control 90 percent of mercury emissions. That is three times the national standard.

Coal-fired power plants, by 2008, all will have 85 percent mercury emission controls. By 2012, that will be up to 95 percent mercury emission controls.

We had 150 medical waste incinerators. We work closely with the hospital industry in Massachusetts which is obviously a big industry in Massachusetts. All of those hospitals have found alternative ways of dealing with their mercury products, mostly replacing them with non-mercury sources. All 150 medical waste incinerators have been decommissioned.

We also have 3,600 dentists in our State, and now 80 percent of them have amalgam separators on their discharge which goes to our wastewater treatment plants. We started with a voluntary program. We now have a mandatory program. You might not think dentists contribute a lot of mercury, but in Massachusetts alone 400 pounds of mercury came from dental offices directly into our rivers and streams.

All of our industrial wastewater dischargers must control mercury down to one part per billion by 2009. We have that standard on some wastewater treatment plants. We are putting it on the industrial wastewater dischargers themselves.

Then finally, last year we passed mercury product legislation, the last State in New England to pass it. We are very proud of that legislation. It will involve phaseouts of mercury products where there are less hazardous substitutes, recycling for mercury products for which there is no acceptable substitute and a labeling program.

Okay, so what results have we seen to date? We have been doing this now since 1998. We are sampling our fish Statewide from the time we put the controls on incinerators, five years out, to see if the environment showed any improvement whatsoever. Surprising results, you wouldn't expect to see that rapid a response in fish tissue over five years, but Statewide we saw mercury levels come down between 15 and 20 percent.

Interestingly, in the vicinity of the mercury sources themselves where the incinerators had controls put on them—there is one part of Massachusetts that has a lot of incinerators—up to 32 percent mercury reductions in fish tissue there, just over a period of five years. But that is still not enough.

What else do we need to do? Well, the New England States all banded together with New York State and last week submitted to EPA, a regional TMDL. A TMDL is a Total Maximum Daily Load under the Clean Water Act, and it basically is a calculation of how much mercury reduction has to come from various sources in order to meet water quality standards.

Our calculation in Massachusetts alone is 70 percent of all of the mercury coming into Massachusetts comes from upwind sources. So we have done our best to control our own sources, but 70 percent is still coming in from out of State, and we will not meet water quality standards unless more controls are put on upwind sources. Our calculations show that the incoming mercury sources need to be reduced by 86 to 98 percent in order for our fish to be safe to eat.

Minnesota has also submitted a TMDL which I believe has been approved by EPA, and their figures show 93 percent out of State sources need to be controlled in order for their fish to be safe to eat.

So, in summary, the States have done a lot, New England in particular. With westerly prevailing winds, we are at the end of the pipeline, and so we have seen some dramatic impacts associated with mercury deposition. We are doing our part to control it, and we believe that more controls ought to be put on upwind sources or else we will not be able to reach our goals in New England.

Thank you.

Ms. JOHNSON. Thank you very much.

Welcome, Mr. Fineday, for testimony from the Leech Lake Board.

Mr. FINEDAY. Good afternoon, Madam Chairwoman and Subcommittee members.

I am here today representing the Honorable George Goggleye, Jr., the Chairman of the Leech Lake Band of Ojibwe. He sends his gratitude to the Subcommittee for holding this hearing and allowing us to offer testimony, but he also sends his regrets that a scheduling conflict prevented him from being here.

There are several toxic pollutants or contaminants that are known to be capable of adversely impacting our watersheds and waters via atmospheric deposition. Mercury, dioxins and PCBs quickly come to mind. Of these, mercury is the most ubiquitous because it comes from any fossil fuel combustion source and is deposited through atmospheric deposition both into watersheds and directly into lakes.

The fish in all of our tribal lakes and in all Minnesota lakes contain mercury from atmospheric deposition. Because of the widespread adverse impacts of mercury, I will direct my remarks today to this atmospherically deposited nonpoint source pollutant.

Briefly, what do we know about mercury and its adverse impacts? Mercury is a potent neurotoxin, and human developmental impacts are well described. Mercury falling out of the air into a lake or watershed becomes methylated usually through natural bacteriologic processes.

Once methylated, the mercury enters a terrestrial or aquatic food chain. All forms of mercury may be transformed biologically to methylmercury. Once methylmercury is incorporated into a food chain, it may be bioaccumulated and biomagnified as one organism eats another. Human exposure to mercury occurs primarily through consumption of fish and seafood.

Because mercury is a potent neurotoxin, exposure to small amounts in the womb and during childhood can cause permanent neurological damage. In addition to IQ reduction, mercury toxicity has been associated with childhood diseases and disorders including mental retardation, cerebral palsy-like symptoms and hyperactivity as well as heart disease in men.

An additional sobering fact regarding the toxic impacts of mercury is that the slope of the dose response curve appears to be steeper at lower doses, a term known as supralinear. This means that even at very low doses, mercury can cause significant adverse impacts to children, and impacts to fetuses may occur with minimal or no apparent symptoms in the mother.

The following quote by the physician, Dr. Ian Donald, must be in the foreground of our thoughts as we deliberate mercury issues: "The first 38 weeks of life spent in the allegedly protected environment of the amniotic sac are medically more eventful and more fraught with danger than the next 38 years in the life span of most human individuals."

Tribes using their fishery resources are disproportionately impacted by mercury contamination because of their generally higher fish consumption as compared to the overall U.S. population. Based on human blood mercury research by Schober, the U.S. Centers for Disease Control and Prevention estimates that 8 percent of American women of childbearing age have blood mercury levels above EPA safe levels. This percentage increases by four times to 31.5 percent for Native American women with blood mercury levels above the safe limit established by the EPA.

The ability of mercury to cause IQ deficits in children is perhaps the most widely recognized quantifiable mercury impact.

The following calculations are derived from the findings of the three major studies that have been done regarding mercury impacts to children, the EPA and our ongoing tribal research of mercury in fish. The three major studies are named for their geographic locations: Faroe Islands, New Zealand and Seychelles. The range of potential IQ deficit for children in the above studies is quite large, spanning from-.53 to-0.024 IQ point for each part per million of maternal hair mercury.

Our assessment of potential IQ impacts to Leech Lake children incorporates the above referenced study data, tribal specific fish mercury data and tribal seasonal fish consumption data. All of this data translates to potential IQ losses of up to 14 IQ points per Leech Lake child. Then, as distasteful as this may be, using the EPA's economic valuation per IQ point of $11,871, a child losing 14

IQ points to mercury would also be at an economic disadvantage of $166,194.

We as Indian people cannot afford to relinquish the fish that have sustained us for centuries. Fish are an integral part of our culture. They are who we are.

Thank you again for allowing me to speak here today. Megwitch.

Ms. JOHNSON. Thank you very much.

We will begin the first round of questions now.

Let me start by asking Mr. Grumbles. What is EPA actively doing at this time to coordinate EPA's Office of Air and Radiation and the Office of Water to reduce atmospheric deposition?

Mr. GRUMBLES. Thank you, Congresswoman.

Several things, one of them is the two offices work together in the implementation of the water program, sharing observations and ideas in coordination with our State partners as the Air Office works with its States to implement the Clean Air Interstate Rule and the Clean Air Mercury Rule.

We are also working together on several fronts to advance energy efficiency and water efficiency to reduce and to mitigate the emissions of greenhouse gases. The two offices have been working together for years on the Energy Star Program, and now we are also working on a Water Star. It is called Water Sense Labeling Program to help use voluntary measures.

But, frankly, the focus is on using the tools we have to provide to the Air Office, added incentives and insights from the water programs across the Country and the tribal programs across the Country to help connect the dots or the drops between atmospheric deposition and water.

Ms. JOHNSON. Thank you.

Now what is EPA doing to reduce the mercury emissions from foreign sources?

Mr. GRUMBLES. One of the highest priorities in the Agency is to work with our global partners to reduce air pollution that does have an impact on U.S. citizens. There are several initiatives that are underway. There is the Methane to Markets Partnership that the Administration has been advancing, not just EPA but the Department of Energy and others.

I, myself, as well as the Administrator on several occasions have been to China to meet with environmental officials to learn what they are doing and to also provide insights from the EPA programs and statutes that your Committee and other committees have passed to control atmospheric deposition including mercury.

The Agency has a mercury road map which involves many different offices and programs reducing the sources of pollution. Arleen O'Donnell mentioned an effort with dentists to have amalgam separators. Our Prevention, Pesticides and Toxic Substances Office as well as our Air Office have been working to advance measures with States and with the regulative community to reduce mercury emissions and discharges into the air and into the water because we recognize that what you put on the land or what you put in the air is ultimately written on the water.

So it is a priority for the Agency including continuing to work with the FDA on joint fish consumption advisories to reduce the risk and also recognize that eating fish is part of a healthy, balanced diet.

Ms. JOHNSON. Do you have a copy of the results? Are you documenting results?

Mr. GRUMBLES. Under which?

Ms. JOHNSON. On the international influence or impact.

Mr. GRUMBLES. We have an extensive amount of information that we would be happy to provide the Committee with in terms of our discussions and comparisons with Chinese officials, Air and Water.

I just recently entered a memorandum agreement with the Ministry of Water Resources to focus on a watershed approach and in particular to provide technical assistance to them on integrated river basin management and ways to address nonpoint source pollution because that is one of the major challenges facing China when it comes to water.

Ms. JOHNSON. Thank you.

Mr. GRUMBLES. Thank you.

Ms. JOHNSON. Ms. O'Donnell, do you have any comments?

Ms. O'DONNELL. I am also Chairman of the Quicksilver Caucus which is a national affiliation of State associations, and we have been working closely with EPA on the mercury road map. We provided comments along the way, and I think the bulk of our comments, at least from me, are that the road map ought to have more specific numerical targets, the same way the New England Governors and Eastern Canadian Premiers mercury strategy did.

We have done a lot of work with vehicle switches, with electric arc furnaces. I think that is a great success story, having an agreement with the Automobile Manufacturers of America. That will reduce about 10 tons of mercury emissions a year just coming from that one source alone. But I think we have got to take a sector approach and look at all the other sectors that need to be controlled and figure out what numeric targets are achievable.

On the coal-fired power plants, we can do in 95 percent in Massachusetts. Other States are requiring 95 percent. We think 70 percent under the Clean Air Mercury Rule is not sufficient.

Ms. JOHNSON. Thank you.

Mr. Fineday, did you want to comment?

Thank you.

Mr. Baker?

Mr. BAKER. Secretary Grumbles, what is the database on which the atmospheric depositional estimates are based? Is there, for example, a Canadian-U.S. monitoring system that is run for some continuous period of time to generate a database from which assumptions can be made?

Mr. GRUMBLES. Congressman, I am going to ask to get back to you with specifics on that. I want to coordinate with the Air Office in terms of the precise databases.

I am not sure if it is. It probably is the Clean Air Act permitting programs, one of the most reliable databases for atmospheric deposition. They may also be using in part some of the TRI data, air emissions.

Mr. BAKER. Permitting data would be a one time instance where you are required to report certain data upon your applications filing. That would not be a continual monitoring responsibility, would it?

Mr. GRUMBLES. I can speak to the Clean Water Act on continual monitoring responsibilities which it is the case for all facilities under the Clean Water Act on monthly monitoring.

Mr. BAKER. But not for air.

Mr. GRUMBLES. I don't know the time frame for the monitoring on air, and I commit to get that to you.

Mr. BAKER. Well, it is my understanding that there are various governmental agencies like the NOAA, for example, and various states which may have their own aggregating data points, but it is not a formalized EPA-driven monitoring system which generates an annual data set from which conclusions about atmospheric deposition rates, on a statistically significant basis—let me clarify—those conclusions.

My point is A, we need to know more, but B, if we were to find out that the coal-fired generators of Canada are a significant contributor to Massachusetts and Minnesota's numbers, what do we do about that? Do you have a recommendation?

Mr. GRUMBLES. Well, I know one thing that the Agency is doing is that the Administrator is in discussions with the Environment Minister for Canada, talking about issues that we share, and one of them is atmospheric deposition and air pollution, trans-boundary air pollution.

Mr. BAKER. Would there be any data available to us that shows the U.S. atmospheric depositional rates to other nations?

Mr. GRUMBLES. I think we do have some data that I would be happy to provide to you. I want to check the facts on this, but as I was going through some of the background material that we will provide to you and other members, the figure of 1 percent jumps out in my mind.

Mr. BAKER. That is 1 percent of what? I am sorry.

Mr. GRUMBLES. The global emissions, that the U.S. contributes 1 percent of the global emissions, atmospheric deposition emissions with respect to mercury.

Mr. BAKER. Sure, and so what we need then is a substantive material database by element and by amount. I think it is important for us to see what we are doing to others as well as what others are doing to us.

I am very concerned about the rate of industrialization in China and the lack of air quality restrictions that they do not appear to be anxious to impose on their burgeoning economic development and the consequences of that to us, not necessarily mercury but nitrogen particularly. Is there any study of those international relationships that might be available to us or is that an area where significant work needs to be done?

Mr. GRUMBLES. We need to continue to do work, and I will also coordinate with the Assistant Administrator for International Affairs to coordinate a response to you.

I would also say, Congressman, that the Administration's emphasis on the strategic economic dialogue is precisely to engage with our partners, China and other Asia Pacific partners, on energy efficiency, energy production and environmental responsibility. Part of the purpose for that emphasis that the Administrator and other cabinet level officials have is to have sincere discussions with China and other countries about the concerns we have about global air pollution.

Mr. BAKER. To wrap up for me, you mentioned a 20 percent contribution to the Gulf waters from atmospheric deposition. On what basis was that 20 percent calculation made? Is there some study that you might make available?

Mr. GRUMBLES. I can certainly make available the study, the data that we have. The Air Office and their programs in Research Triangle, they have similar data on the Chesapeake Bay where I got the 28 percent figure.

Mr. BAKER. I will only point out this observation about our circumstance in my immediate market, that we are under an EPA restricted economic environment because of our non-attainment standards.

I have been advised by academics that if you were to take all mankind, all vehicles, all industry and everybody that breathes, including cows, off the face of the state in the area in which the current non-attainment requirements exist, given the number of trees and hours of daylight, there are days in July and August when God can't meet the standard without any contribution from human involvement.

We just need some reasonableness here, and I think that that is the thing that concerns many of us who want clean water, clean air and our kids to be healthy. How do we get there in a manner which makes taxpayer sense and environmental sense?

Without this data, it seems very hard to develop a meaningful policy that can be publicly defended. The 20 percent figure should be something that ought to be very clearly delineated so that we can understand and then try to proceed and do something about it, having identified the source.

I thank the gentleman and yield back.

Mr. GRUMBLES. Thank you.

Ms. JOHNSON. Thank you, Mr. Baker.

I have a couple more questions before I move on.

Mr. Fineday, thank you very much for being here. What I would like you to tell me about is the unique situation faced by the Native American neighbors especially with regard to contaminated fish.

Mr. FINEDAY. I guess all I can really say on that is that fish has been an integral part of our culture for centuries, and it has been a staple of our diet for many, many centuries. From my testimony, I think you can see that we have concluded the potential negative impacts as far as the impacts on IQ is an economic disadvantage. Outside of that, I guess I would ask for something maybe more specific.

I would also just like to say that the Chairman had instructed me that any technical questions, if they could please be submitted in writing, and we will respond to those as expeditiously as possible.

Ms. JOHNSON. Thank you very much.

Mr. Grumbles, just one more question, you have a web site that has been up. When we started to look in order to do some research on this hearing, it disappeared. Who manages that web site?

Mr. GRUMBLES. Is this the Office of Water home page?

Ms. JOHNSON. Yes.

Mr. GRUMBLES. Well, it is within my office. We have a technical official, a technical person within the resource management staff, who operates it. I would love to know for how long it was not available. It must have just been a technical bleep or something.

Was it after the storm?

Ms. JOHNSON. It disappeared last Thursday.

Mr. GRUMBLES. I would love to know more. We embrace transparency and providing as much information as we can that is credible and reliable, putting it on the web site. So I would be very interested to find out more.

Our web site does have, just for the benefit of others who haven't visited it, we do have specific focus and emphasis on mercury, the mercury road map which is in the Office of Water. It is an Agency-wide web site.

Then also within the Office of Water, we have something in particular. You were just asking a question about fish advisories. We have an annual listing of fish advisories and through the Office of Water web site, EPA.gov/water, you can locate the different types of fish advisories, most of which are mercury-related, throughout the Country, and we can track the trends, the status and trends of that.

Ms. JOHNSON. Is it updated periodically?

Mr. GRUMBLES. Yes. Yes, it is.

Ms. JOHNSON. Is that the reason it is down?

Mr. GRUMBLES. Yes.

Ms. JOHNSON. Okay. I wonder. We have complimented you for the transparency, but I wonder whether or not anything outdated or whatever that is not that far outdated, that warrants removing it completely from public view.

Mr. GRUMBLES. I think that the credibility of the Agency and other agencies depends on having accurate, reliable information. I think particularly in this day and age having a web site that shares as much information as we know is a good thing, and we fully embrace that. Also updating is the key as some of these issues are so complex. As we gather information and benefit from peer review, it is important to get the scientific information up there.

So I am happy to look further into that and find out more specifics with your staff as what problem you might have run into.

Ms. JOHNSON. Thank you very much.

Mr. GRUMBLES. Thank you.

Ms. JOHNSON. We were a little curious because of this hearing come up, that it suddenly disappeared. Thank you.

Mr. GRUMBLES. Thank you.

Ms. JOHNSON. Are there questions from other members?

Mr. Taylor?

Mr. TAYLOR. Thank you, Madam Chairman.

Mr. Grumbles, I happen to represent the coastal area of Mississippi that was clobbered by hurricane Katrina a year and a half ago. A fairly large portion of the coast went underwater at different times. So that would have subjected the Mississippi Sound to urban runoff, in some instances maybe even industrial waste.

I am curious since the consumption of shellfish in that area is very high—crab, shrimp—and we are trying to revive the oyster industry. To what extent, if any, has your Agency been involved in testing of those coastal water, in particular testing of shellfish like crab and shrimp to see if there have been any adverse effects?

I would take the attitude of I just think people need to know. Let them decide whether or not they want to eat it, but they at least need to know if there is something that they should be concerned about in that source of food.

Mr. GRUMBLES. Thank you, Congressman. I recognize your involvement and leadership after the storms.

The Agency was very quick to enter into a partnership with FDA and with NOAA and with the Mississippi DEQ precisely on that subject of coastal water quality and the potential for contamination of fish and shellfish. I would not say we were the lead, but we offered expertise and technical assistance both within my office and, probably more importantly, within the regional office for that EPA region.

So we have been involved. We continued to be involved. I don't know. I haven't gotten an update in the last few months on that concern, but we did work with the State and with the public health agencies on the water quality monitoring.

We also took extensive samples in coastal water quality and also used our relatively new ocean research and survey vessel, the Bold. We diverted it from other missions and brought it into the Gulf of Mexico for additional reconnaissance work and testing in coastal waters.

Mr. TAYLOR. If there is a compilation of results of what you have done, as things start to get a little better, these kinds of questions are coming up in my town meetings, and I would very much welcome whatever information you could provide along those lines.

Mr. GRUMBLES. Definitely, and also on the Agency's web site, there is an extensive amount of information on hurricanes Katrina and Rita and all the different types of environmental monitoring that we did.

So I will also go back and mention your ongoing interest and need for data on that.

Mr. TAYLOR. The consumption of seafood really tends to spike during the summer, shrimp season, crab season. In the fall, they are expecting the first oyster harvest since the storm. So I think a timely response from you would be greatly appreciated.

Mr. GRUMBLES. Okay.

Mr. TAYLOR. Thank you, sir.

Mr. GRUMBLES. Thank you.

Mr. TAYLOR. Thank you, Madam Chairman.

Ms. JOHNSON. Thank you very much, Mr. Taylor.

Mr. Gilchrest?

Mr. GILCHREST. Thank you, Madam Chairman.

The issue of mercury and air deposition, to some extent it seems to me, is a design flaw in our engineering technology. Nature has a particular design. Now you could say it is random. You could say there is an infinite number of variables. But there is a particular design to hydrology, to air deposition, to everything on the planet.

We reach in, and we disrupt that with our designing technology which doesn't take mercury out, which for a long time didn't take lead out of gasoline. It didn't take CFCs out of the atmosphere. We saw what all of those things did.

So what we did with lead, we took it out of gasoline and designed engines to run without it. We took CFCs out of the atmosphere and had an international arrangement to do that.

Ben, you mentioned acid rain and all of those things and how they were created. Acid rain, or example, is a cap and trade program, so we are reducing that by fairly significant numbers, and it is beginning to work. We were able to engineer new technology to become not only as efficient but even more efficient and improve the economy at the same time.

If in the Clean Air Interstate Rule and the Clean Air Mercury Rule, we are going to reduce mercury levels by 70 percent, if I heard you right, Ben, what is the date that we are going to achieve that 70 percent reduction by the target date?

Mr. GRUMBLES. I am going to make sure that I provide accurate information in follow-up.

But some of the materials I have that I am looking at, there are a couple of different phases. The first phase for the Clean Air Mercury Rule, what I have got.

Mr. GILCHREST. You can approximate, Ben. Is it somewhere around 2015, 2017?

Mr. GRUMBLES. I think it is around that. I have got the second phase under the Clean Air Mercury Rule is due in 2018.

Mr. GILCHREST. Okay, so that is a reduction of 70 percent by 2018 of mercury.

Mr. GRUMBLES. Right.

Mr. GILCHREST. Ms. O'Donnell, does that reduction by 70 percent by 2018 enhance or help anything that you are doing in your reduction of mercury in Massachusetts, New England and New York, and what is your goal by 2018?

Ms. O'DONNELL. Our goal is 95 percent by 2012.

Mr. GILCHREST. By 2012.

Ms. O'DONNELL. Correct.

Mr. GILCHREST. How are you achieving that?

Ms. O'DONNELL. Actually, because we were already controlling for NOx and SOx, so we have already got air pollution controls on our coal-fired power plants for that, those controls alone got us to 80 percent mercury reduction. So with some additional control technologies, it wasn't far fetched to get to 85 and eventually 95 percent by 2012.

Mr. GILCHREST. Is there some discussion with New England and New York?

First of all, I would like to have Maryland associated with that. We will see what we can do to connect with that prospect.

Is there a discussion with people in EPA about how you are achieving more dramatic results a lot sooner and apparently, I am assuming, successfully and sharing your system with them?

Ms. O'DONNELL. Yes, we submitted voluminous comments on the Clean Air Mercury Rule when it was proposed. So we do have extensive comments in the public record, and several States have actually sued EPA under the Clean Air Mercury Rule because we believe that further controls are needed.

Mr. GILCHREST. Do you feel that what you are doing with mercury is hampering or stifling your economy in New England?

Ms. O'DONNELL. No. We do cost-benefit analyses for all regulations that are submitted, and our analyses show that the benefits far exceed the costs and the costs were fairly minimal.

Mr. GILCHREST. You wanted to achieve one part per billion in Massachusetts for mercury?

Ms. O'DONNELL. That is for the discharges, wastewater discharges.

Mr. GILCHREST. Wastewater discharges.

Ms. O'DONNELL. Right, and we are already achieving that for the Mass Water Resources Authority which basically treats sewage for half the State's population. They are already meet the one part per billion mercury limit set by us and EPA Region 1, by the way, and Region 1 EPA played a very lead role in that.

Mr. GILCHREST. In the TMDL program, is mercury a part of your TMDL?

Ms. O'DONNELL. Yes. We specifically submitted a TMDL for mercury. That was all six New England States plus New York.

We previously submitted a proposal under 4(b), which is another listing category under the Clean Water Act, basically claiming that because the source of mercury came from the air and not the water a TMDL was not required, was not appropriate. EPA denied that request, so we are coming back now with a TMDL.

Mr. GRUMBLES. Congressman, Madam Chair, I just wanted to mention in your very good questions that with respect to the Clean Air Mercury Rule, the Agency also has extensive records on how it made its decisions in setting a national standard, not a standard for Massachusetts but a national standard. Also with embracing the notion of federalism, that in particular instances if States are going to show additional leadership or specificity tailored to their conditions, they could do so.

With respect to the TMDL, the program with which you are very familiar, we look very much forward to working with States on innovative approaches and regional approaches.

The reason we did not accept the proposal from the State of Massachusetts was that based on our lawyer's views, the most legally defensible approach was to keep the Clean Water Act tools, not to create an off ramp from the TMDL program, to keep the TMDL program relevant and applicable but also to provide incentives for States that are showing leadership to take additional approaches and use additional tools. That is why we have come up with the March memorandum suggesting additional approaches towards early implementation using the various programs and activities that Arleen has articulated.

Mr. GILCHREST. Thank you very much, Ben.

Thank you very much, Madam Chair.

Ms. JOHNSON. Thank you very much.

The Chair now recognizes Mr. McNerney.

Mr. MCNERNEY. Thank you, Madam Chairman.

Mr. Grumbles, new reports indicate that oil refining in the San Francisco Bay Area is responsible for approximately 4,000 pounds of mercury from atmospheric deposits into the San Francisco Bay per year. What guidance can you give me on how that would be dealt with, how long it might take, how much it might cost and so on?

Mr. GRUMBLES. Congressman, thanks for mentioning that. You are underscoring the importance of looking at what goes up in the air and not just off the land if you are serious about water quality, and we are serious about water quality in the Bay. Various things come to mind.

One, through the Clean Air programs, we would want to look very carefully at that to see what controls there are to reduce that percentage. Under the programs that I am focused on, the Clean Water programs, a very useful tool, one which we want to continue to use, is the TMDL, the Total Maximum Daily Load program which creates a pollution budget and which can help us working with our State and local partners to identify significant and not significant sources for pollutant loadings to bays and other estuaries.

We also have the National Estuary Program, and the Bay is part of that. That is a forum for collaboration at the local and State level to bring in the private sector and to demonstrate to them and show them that we have enforcement tools. We also have tools for collaboration to make further progress in reducing mercury and other harmful pollutant loadings to the Bay.

Mr. MCNERNEY. Is this problem local to the Bay Area or do other refineries around the Country cause similar problems?

Mr. GRUMBLES. There are other refineries. That is not a particular or uniquely local problem. Personally, I don't have with me statistics on how many other areas are experiencing that. I can say that sector, like other sectors that have air emissions, can lead to water quality problems.

Mr. MCNERNEY. Thank you.

I yield back.

Ms. JOHNSON. Thank you very much, Mr. McNerney.

Mr. Duncan?

Mr. DUNCAN. Well, thank you, Madam Chairwoman. I don't have many questions. I am a little curious, though.

Ms. O'Donnell, have you ever done a study of whether or how much some of your pollution is coming from outside of Massachusetts or even outside the Country? Do you have any kind of estimate on that at all?

Ms. O'DONNELL. Our estimate now is 70 percent comes from upwind States.

Mr. DUNCAN. Seventy percent comes from neighboring States?

Ms. O'DONNELL. Seventy percent, yes. We don't know what percentage of that comes from international sources.

Mr. DUNCAN. I don't really have any questions, Madam Chairwoman. I was interested in the Ranking Member's statement that even God would be at non-attainment at some point. You know I have never heard a regulator any place who ever said that the cost-benefit analysis didn't come out in favor of more regulation.

The problem is this: We could bring in people from small business who have been run out of business all over this Country in every industry because of so much regulation. I will give you an example. In East Tennessee, in 1978, there were 157 small coal companies. Then we opened up an Office of Surface Mining, and now there are none.

You know 157 was probably too many, but in all these industries, all these energy-related industries, the little guys go out first, then the medium size, and things end up in the hands of the big giants and costs go way up. People's utility bills go way up and all their energy costs go way up. Who you end up hurting are the poor and the lower income and the working people.

I have noticed that almost all the environmental extremists come from very wealthy or very upper income families, and perhaps they don't realize how much they hurt the lower income and working people by destroying jobs and driving up prices, but that is what they do. And so, you have got to have some balance and common sense in some of these things.

There are all these groups that are always telling us how bad everything is even though great improvements have been made. Great progress has been made in regard to clean air and clean water over the last 30 years, and that is a good thing. But we have these groups that keep telling us it is getting worse, getting worse, getting worse, and really what it amounts to is they are just trying to get more contributions. They don't want their contributions from their members to dry up.

But what we need is some balance and common sense, and we need to keep in mind that every new regulation increases the costs that really can't afford it.

When President Clinton locked up the largest natural gas deposits in the Country along the face of the Rocky Mountains and the Grand Staircase Escalante Region of Utah, it drove up people's utility bills all over the Country. We do that in regard to all these things.

Anyway, I yield back.

Ms. JOHNSON. Thank you very much.

The Chair now recognizes Mrs. Napolitano.

Mrs. NAPOLITANO. Thank you.

Mr. Duncan, I agree with you to a certain effect, and I am sorry, but you just brought up a point. What is it worth in human effect because we have had an increase in, and I was making a note, attention deficit disorder in children and hyperactivity and mental health issues like bipolar disorder and cerebral palsy. If the findings from the tribe are focused and true, that human effect alone is worth the ability for us to continue to look at because our future generations will be affected. That, to me, whether it is mercury or perchlorates or any of those issues in water, we need to ensure that our future generations are protected in that manner.

So while, yes, there may be some areas, but possibly we are right in being able to control them so that we don't have future generations affected as badly as some of our generations currently are. I am talking about the grandchildren and great grandchildren of our future.

Commissioner O'Donnell, in testimony, Administrator Grumbles described EPA's new voluntary program for identifying and listing waters impaired by mercury placed on the TMDL category, the Total Maximum Daily Load. Could you explain how this new program is a useful program for the States like Massachusetts and what are the alternatives?

Ms. O'DONNELL. Well, Ben is probably in a better position to look at that. We did look. You are talking about the 5m?

Mrs. NAPOLITANO. Yes.

Ms. O'DONNELL. We thought about 5m, and we decided not to do it because we felt that we needed to take action sooner. The way we read 5m was it basically offered a delay in attacking the problem. So we wanted instead to do a traditional TMDL to make the case that further controls are needed and to get the discussion about how best to achieve those controls.

Maybe Ben can talk a little bit about 5m. Our read of that was it was the slow path.

Mrs. NAPOLITANO. Well, I kind of agree.

I was looking in the testimony from Mr. Grumbles where they are indicating, and this just really brings to focus. Fifteen years ago, EPA started the program, and we are just now asking for voluntary participation?

Mr. GRUMBLES. Congresswoman, thanks for getting into this because it is important to clarify. The TMDL program, there are probably 23,000 or more. I know it is over 20,000 TMDLs that we and our State partners have done across the Country. We have a lot more to do.

Mercury presents a unique challenge when it comes to TMDLs given the atmospheric deposition and the challenges outside of the jurisdiction and the science surrounding it.

So what we were doing in response to concerns from various States, some of the States had concerns that if we go through a costly or lengthy TMDL process, that might not be the most efficient use of our resources. We could be moving ahead and implementing other programs that get at the atmospheric source that aren't under the Clean Water Act TMDL program.

What our guidance says, it doesn't require or mandate anything. What it is saying to States is if that is an area where it has been a problem to you, we want to encourage you to move forward more quickly and use those other tools, and we will defer. We will allow you to defer some time on the Clean Water Act TMDL. But the bottom line is that as a matter of law we are still charged with enforcing the Clean Water Act, and if a State is going that other route and they are violating water quality standards, ultimately they will still be required by us to do a TMDL and to take other specific steps.

We view it as it is not required. It is not a regulation, and that is why we are calling it voluntary. It is guidance saying, look, if a State, and States vary across the map as to what their priorities and challenges are, but we put this forward as a constructive way. Some States might choose to use it.

We are very encouraged by the State of Minnesota which just a few weeks ago, we approved a first time Statewide mercury TMDL that we think may be a national model. Again, it wasn't based on the guidance that we provided in terms of that 5m memo, but we think that is a constructive and innovative approach.

Mrs. NAPOLITANO. But that just doesn't get the problem solved or at least the pollution addressed faster than we need to.

In reading your testimony, you focused on mercury reduction efforts 15 years ago, and we are just still talking about helping people realize they have a problem. Now how are they going to deal with it?

Ms. O'Donnell, what does the EPA need to do to help States achieve the goals of the Clean Water Act regarding atmospheric deposition?

In other words, do we need to address it faster? Do we need to have them up their time frames? Is there another different approach that is more current?

What about could EPA do it through regulatory promulgation?

What can we do to help be able to work at a faster rate to address the issues and protect our waters and address the health factor of our populace?

Ms. O'DONNELL. Well, TMDLs aren't going to solve the problem. I can tell you that. They can point to where the problem is coming from, but until controls are placed on the sources of mercury, we are not going to get cleaner water. Right now, the major sources of mercury are coming from air emissions.

So, electric arc furnaces, again I point to that as a great success. Ten to twelve pounds a year taken out of deposition, through application of the MACT Rule, and the electric arc furnaces saw it coming and did the right thing. They stepped up, and they said we have got to do something with the vehicle switches. So that is a good example.

I think looking at every sector and figuring out how can we control it in a cost effective way. There are a lot of substitutes available. There are a lot of different control strategies available. But I think that is the type of approach that is needed.

Mrs. NAPOLITANO. Mr. Grumbles?

Mr. GRUMBLES. I think Arleen has hit it on the head in terms of using a variety of tools and sources. I think it is important to keep in mind that the Clean Air Mercury Rule that the Agency issued in 2005 is the first mercury control rule for coal-fired power plants in the world, and it is going to lead to significant progress, but that alone isn't enough.

We need to do more. Under the Clean Water Act, we need to continue to work with States on innovative approaches, not just in the TMDL program but others.

Mrs. NAPOLITANO. Can I go back very quickly? It is just a statement? Why have we not enforced stricter standards on the automobile industry to provide alternative fuel vehicles or to provide a higher mileage?

We took out lead. What we have not done, and that is a lot of the source of the pollution, is emissions, car emissions, besides manufacturing.

Mr. GRUMBLES. Yes. I appreciate your question. I think the Administration is looking forward to working with Congress on a variety of approaches. I know the department of Transportation as well as EPA and Energy are committed to making progress while maintaining this Country's economic competitiveness.

I know you know, as you have described before, the importance of addressing various sectors, the transportation sector, cars. From a water standpoint, we know that this is one of the challenges of the future where we need to continue to use innovative approaches through the TMDL program and combine forces with the various air authorities and also focus on recycling and also minimizing the use of certain types of products. Arleen mentioned the mercury switches, getting those out of cars and having proper disposal and turning to other things is key. So it is a variety of different tools.

Because it is a unique type of challenge, it is causing water quality impairments, but it is coming primarily from atmospheric deposition. It requires more collaboration and technology innovations.

Mrs. NAPOLITANO. Thank you.

Ms. JOHNSON. Thank you very much.

The Chair now recognizes Ms. Norton.

Ms. NORTON. Thank you very much, Madam Chair.

First, just let me express my distress at hearing kind of circular arguments, particularly after what we have learned about global warming, about costs on the one hand, campaign contributions, jobs, over-regulation, regulation for its own sake.

I just want to say enormous benefits of living in a society which uses all kinds of artificial chemicals, various kinds, enormous benefits. One thing that the Country, in part because of so little leadership from the Congress, has not understood and accepted is with those benefits come great risks and therefore some additional costs. If you look at young women who get cancer, I don't remember anybody getting cancer when I was young woman, breast cancer, for example, children.

You have to say we want to keep the benefits coming. I mean we are wearing these chemicals. We are eating them. We are sitting on them, hey. But we don't even want to do any regulation. We have got to grow up.

I would have thought that the global warming notion which, frankly, I think we may be too late for. We haven't figured out, maybe somebody will, a way to refreeze the glaciers. We may be smart. I just don't think we are that smart.

Mr. Grumbles, you and I have become good friends over the years. I have got to ask you a question about the Clean Water Act, the provisions and lead in the water. We know that there was a terrible, embarrassing and dangerous crisis in, of all places, the Nation's Capital when it was discovered a few years ago there was lead in the water.

Where? In the Nation's Capital—not in some developing country—and that people hadn't been told of it. You got to work, and the District of Columbia got to work. Then people panicked all over the Country because they thought they might be in the same kind of danger. We have had a new chemical added and the rest.

We had another scare recently because we learned what apparently had been suppressed. The District of Columbia had found lead in water fountains of school all across the District of Columbia. I tell you one thing. I don't believe that is a contained District of Columbia problem.

You argued when the lead in the water crisis came that we didn't need updated provisions of the Clean Water Act. What we needed was to let the Agency do its work. What have you done to assure that water fountains in our Nation's schools do not contain lead in them?

Why wasn't the District subject to something you had done since the crisis of, what is it, five years ago, four or five years ago, so that that could not have occurred?

Mr. GRUMBLES. What I said was that we were not supporting comprehensive revisions to the Safe Drinking Water Act. I didn't get into the Clean Water Act.

Ms. NORTON. I am sorry, yes.

Mr. GRUMBLES. I will tell you where we are, Congresswoman, and I really appreciate this because there are two things.

One is finalizing the revisions to the Lead and Copper Drinking Water Rule that I am estimating that we will finish and finalize by the end of this year. We have gone through the public comment period. We are committed. I am committed to seeing those revisions made, and the revisions are based in many respects on lessons that we have learned from the hearings and from the outbreak, the incidents that you are describing in the District of Columbia.

With respect to schools and day care centers and facilities, there is most definitely a statutory issue in terms of the scope of the Safe Drinking Water Act as it is written in terms of how you define some of these public water systems. Schools, most schools are not public water systems.

We have been spending quite a bit of time working.

Ms. NORTON. It is something you don't think you have regulatory authority with respect to?

Mr. GRUMBLES. The way the statute is currently written, we don't.

We have been working on technical guidance and voluntary measures. We provided to schools and public health authorities, what I call the three Ts—testing, training and telling—information for school administrators and custodians and parent teacher associations to understand more about the plumbing systems in their schools and to work with their local and State authorities and, as appropriate, EPA on proper monitoring for potential lead in drinking water problems at schools and day care facilities.

We provided that guidance. We are working with other agencies on that front.

Ms. NORTON. Mr. Grumbles, I appreciate your response. It does seem that the ball is in our court.

Our concern about lead in water, frankly, was not about old deteriorated brains like mine. I don't think lead can do a thing to me yet or now. But the concern in the District of Columbia was nursing mothers and young children who certainly could be affected. My colleague has talked about the effect on IQ, for example. They were told nothing and that, of course, was not your problem. It was the District's problem because it withheld the information.

We are about to introduce a new version of the Safe Drinking Water Act, and I wanted you to know that because of our concern.

I will take a look, however, if you tell me when. You say the comment period is about to close. God, you have had a long time since that occurred. If you tell me when it is about to close, I would hold off putting the bill in until I at least took at look at it to see what was needed, if anything.

Ms. JOHNSON. Thank you very much, Ms. Norton.

Ms. NORTON. Could he just respond to when the comment period is over?

Mr. GRUMBLES. The comment period closed. The regular process that we follow through the Administrative Procedure Act is that we need to review all the comments, and we have done that. We are making the decisions within the Agency on what the final rule will look like.

What I am saying is that our goal and my expectation is that that rule, those revisions would be finalized. The final rule will be issued later this year.

Ms. NORTON. When?

Mr. GRUMBLES. I am guessing in the next four to five months.

Ms. NORTON. I don't intend to let this first session end without putting in a bill. So either you regard this as a matter of some priority or I am just going to put the bill in, Mr. Grumbles.

Mr. GRUMBLES. It is a priority for us. Also, we can brief you on the direction we are heading.

Ms. NORTON. I would appreciate such a briefing.

Ms. JOHNSON. Thank you very much.

Let me thank the witnesses from panel one and suggest that members of the Subcommittee may have some follow-up questions for the record, and we would expect a timely response if they do, if the questions are forwarded to you.

Thank you so very much. I appreciate all of you coming today and for your testimony.

The second panel of witnesses consists of Dr. Michael Slattery, Director of Texas Christian University's Institute for Environmental Studies; Mr. Jon Mueller, the Director of Litigation for the Chesapeake Bay Foundation; and Dr. Charles Driscoll, University Professor of Environmental Systems and Engineering, Syracuse University.

As I noted to the first panel, your full statements will be placed in the record. We ask that you try to limit your testimony to about five minutes, and that little light will blink when your time is up as a courtesy to other witnesses.

Again, we will proceed in the order in which the witnesses are listed in the call of the hearing.

Dr. Slattery?

TESTIMONY OF MICHAEL C. SLATTERY, DIRECTOR, INSTITUTE FOR ENVIRONMENTAL STUDIES, TEXAS CHRISTIAN UNIVERSITY; JON MUELLER, DIRECTOR OF LITIGATION, CHESAPEAKE BAY FOUNDATION; CHARLES T. DRISCOLL, UNIVERSITY PROFESSOR OF ENVIRONMENTAL SYSTEMS ENGINEERING, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, SYRACUSE UNIVERSITY

Mr. SLATTERY. Thank you, Madam Chair.

If we can have the slides.

I am proud to be from the great State of Texas although the accent may be a little misleading as to where I am from.

Could I have the next slide, please?

I would like to start with a simple statement, and this is going to be my take home message. This is the bottom line, and that is that if you live in Paris, France, mercury emissions from Texas power plants will have no immediate impact. If you live in Paris, Texas, however, the impacts are likely to be considerable and perhaps even widespread. If you could just remember that, I think that would be a useful take home message.

Next slide, please.

The mercury cycle is certainly complex, widely recognized. It is an environmental pollutant that biomagnifies in aquatic food webs to levels that threaten the health of wildlife and humans that consume contaminated fish. My colleague, Dr. Driscoll, will talk more about that, I am sure.

Next slide, please.

In Texas, we currently have 11 reservoirs, or 10 reservoirs and our only natural lake, and the entire coastline under a mercury advisory for at least one species of fish.

Next slide, please.

If we take a step back and look at States on a more regional picture, there are currently 20 advisories for the State of Arkansas, 38 in Louisiana and the State Oklahoma is under a Statewide advisory.

Next slide, please.

I think at a very simple visual or graphical level, there appears to be a correlation between the mercury advisories and emissions from coal-fired electricity-generating units or power plants. As you can see in this slide, the larger the circle, the greater the emission, and you can see this axis that is sometimes referred to as the wall of fire that stretches from South Central Texas up to East Texas, these coal-fired power plants.

I am not using the term, correlation, in a statistical sense. This just is a graphical look.

Next slide, please.

We focus on Texas and regionally here because I am sure many of you are aware that Texas has been in the news through utility companies wanting to build 17 new coal-fired power plants, and five of the top ten emitters in the United States are in this great State that I live in.

Next slide, please.

Now the modeling of atmospheric deposition or transport of deposition is a complicated task. No one would deny that. Any kind of model involves assumptions and complications.

But we are able to do this using several approaches, and the one I have been involved in, in terms of modeling the patterns of deposition of mercury, involve a model that has been widely tested and used and developed at NOAA's Air Resources Laboratory. It is called the HYSPLIT model.

Next slide, please.

I have used that to model the dispersion patterns of mercury deposition regionally.

What is really important to stress is that when you are looking at the deposition of mercury or any pollutant, that you look at the long term statistical dominant transport winds. What that means is that essentially any scientist can make a computer model do anything to foot his or her desired outcome. What we have to be aware of here is that there is a background transport long term wind pattern. That is what the input to these models have to be.

This is a wind rose from Waco in Texas. What you can see here is that the dominant transport directions in Central Texas are out of the South, South-Southeast and South-Southwest. Forty-three percent of the time, the winds are from that direction.

Next slide, please.

This is the graphical output for a run of mercury deposition from all current coal-fired power plants in Texas. There are 17 of them. The yellow plumes are of greatest concerns. The yellow plumes in this model, this is for a wind scenario that is reflective of the dominant transport winds. This happens to be the 5th of November, 2005, my birthday. I am not quite sure whether that is meaningful, probably not.

The plumes here represent an area or cover an area of about 15,000 square miles. That is just the yellow plumes, and these are the plumes in which the deposition would be most significant because these plumes are reflective of what is known as divalent gaseous mercury. This is Hg2. This is the mercury that falls out closest to the power plants.

The blue plumes show a less intense deposition, and those plumes actually reached as far north as the Great Lakes themselves.

The rates of deposition within the yellow plumes are on the order of four micrograms per square meter per year. Now that may not be meaningful if you haven't done any kind of mercury modeling, but just in those yellow plumes themselves, those rates without any synergy between the plumes represent the equivalent to the background deposition rate across the United States.

Next slide, please.

Two more runs just to show you that these plumes under less dispersive atmospheric conditions on the left would impact places like Louisiana quite dramatically and Caddo Lake in particular, and on the right of that diagram is a model deposition run where the winds are out of the north.

Next slide, please.

Now one thing that has concerned me and has got a lot of attention is this issue of foreign sources of mercury. Congressman Baker mentioned this at the outset of this afternoon's hearing. We hear very frequently that mercury deposition in the United States is not a U.S. issue; it is a Chinese issue. I, frankly, flat out disagree with that.

This is a map that shows from the EPA web site, and I quote from the EPA web site, and this may well be the missing web page that Congresswoman Johnson was referring to. The U.S. EPA has stated that "Regional transport of mercury from coal-fired EGUs in the U.S. is responsible for very little of the total mercury in U.S. waters."

What this map shows is that any part of the United States that is in gray, 85 percent or more of that mercury is from non-U.S. sources. Now for the Western U.S., that makes sense. But look at Arkansas, Louisiana and Texas. I simply don't buy the fact that even when you are in the greens and the yellows, that more than half of that mercury is coming from outside sources.

Next slide, please.

This is particularly acute from a watershed perspective, and the Honorable Grumbles mentioned this in his oral testimony. The red watersheds here in this diagram, especially the darker reds, show watersheds that are currently not in attainment of the EPA standards of .300 parts per million, 300 nanograms per wet weight of fish tissue.

When you look at the next slide, these watersheds, in particular, I draw your attention to the reds, the oranges and the reds. These are watersheds that are going to acquire up to a 75 percent reduction in atmospheric deposition with no new sources.

This is EPA data. This is not my data. This is from the mercury mapping tool.

Next slide, please.

So, in conclusion, and I have just three, one, mercury deposition rates that we have found in these plumes of 4 megagrams per square meter per year would be adding new mercury to the environment. I haven't gotten into the new plants and the whole TXU debate, and I would gladly field questions on those.

But any new plant would be adding new mercury to the environment especially in these areas that are already stressed.

Mercury deposition from the coal-fired plants is significant at the regional scale. Bear that opening statement, as simple as it seems, in mind.

I take this from the EPA web site, and then I will quickly close. "Regional transport of mercury emission from coal-fired power plants in the U.S. is responsible for very little mercury in U.S. waters." I think that is very important and quite telling.

Finally, next slide, please.

Requiring utilities, in my opinion, to meet a national cap will really have very little effect in areas such as North and East Texas that are already, for lack of a better way of putting it, under the gun when it comes to mercury deposition.

I thank you for the opportunity to testify and would welcome your questions.

Ms. JOHNSON. Thank you very much, Dr. Slattery.

I would like to welcome Jon Mueller from the Chesapeake Bay Foundation. Please proceed with your testimony.

Mr. MUELLER. Thank you. Thank you for the honor to appear here today.

I would like to start with the first slide if we could, please.

This is a map of the Chesapeake Bay Watershed. I am sure Mr. Gilchrest has seen this a few times and probably can memorize it by heart here.

But the point is, as we go to the second slide, that is 64,000 square miles and this is a map of what we call the NOx or nitrogen oxide airshed. So sources within that outer circle contribute to nitrogen deposition to the Chesapeake Bay region and the watershed. That is also true, and when I discuss mercury, you will also see that the airshed is a little bit bigger than, in fact, the size of the watershed. So we do have sources from outside of the Bay States, traditional Bay States of Pennsylvania, Maryland and Virginia that are contributing to problems within the Chesapeake Bay Region.

One of those problems is acidification. Mr. Grumbles talked about the successes of the acid rain amendments, Title IV of the

Clean Air Act. With all due respect, while that is a successful cap and trade program, it has not been successful for all regions in the United States. I am sure Mr. Driscoll will address the Northeast and New York State, my home State and the impacts to the Adirondacks which have been quite severe.

If we go to the third slide, we can see there is one in there that is the map of Virginia, if you could. There you go. Thank you. That was it.

You will see the shaded areas there, Shenandoah National Park, St. Mary's Wilderness area, Dolly Sods and the Otter Creek Wilderness areas, these are all areas that are continued to be impacted by acidification which is lowering the ph in the waters due to nonpoint source air pollution from power plants and other NOx and SO2 sources. So, again, while we do have acid rain amendments and they have done a lot to reduce SO2 and NOx emissions in the United States, they don't address all of the problem and more needs to be done.

The other problem area, and you have heard a lot of that today, is mercury and how mercury is a harmful neurotoxin. One of the things I would like to respond to is one of the comments discussed about how the poor and the working families are impacted by regulation.

Well, my suggestion is that, in fact, in the Chesapeake Bay Region and this is probably true throughout the United States, that those same people are impacted by our failure to regulate especially when we have impacts to water quality like Chesapeake Bay where there is a mercury health advisory for rockfish in all Maryland waters, a very prominent recreational and commercial fishery. When you have watermen that their livelihoods depend on their ability to sell fish or crabs or other aquatic organisms that are impacted by mercury or by nitrogen deposition.

The problem with nitrogen is that whether it comes off the land or through the air and directly deposits to the Bay, it causes algae blooms. Those excessive algae blooms either block the sunlight and inhibit the ability of these organisms to grow or it deprives of them of oxygen. When you have crabs and oysters that can't move, they are severely impacted by what is called hypoxy or apoxy. In the Bay, that has become a significant problem.

In 2003, the Chesapeake Bay program studied dissulved oxygen in the Bay—if we could go to the next slide back—that large red area is the main stem of the Bay and is the largest area of the Bay to report anoxic or hypoxic conditions which basically means death for all aquatic organisms that live down below that area. So, again, there are direct impacts to the livelihood of people that are either recreational fishermen or commercial fishermen who depend on good water quality.

One of the other things about mercury that is a big problem is health advisories. Well, there was some research done by students and graduate folks from Virginia Tech that looked at the impact of fish advisories in Baltimore, Washington, D.C. and the Tidewater, Virginia areas.

What they discovered was that people who live at the subsistence level are not greatly impacted by fish advisories. They read them. They are aware of them. But because of their life conditions, they have to subsistence fish or they pass the fish on to friends, and they eat the fish. So they are consuming the contaminants that we are all warning them not to eat, but because of their economic situation, they have to eat.

If we could go to the bar chart, one of the things I think that astounded me in doing research for this is that mercury was the top cause for impairments on the 303(d) list throughout the Nation.

Mr. Grumbles spoke a lot about the Clean Air Mercury Rule. Ms. O'Donnell stated that some States have sued EPA over that rule. The Chesapeake Bay Foundation and a number of other citizens groups have also sued EPA over that rule because it does not address hot spots which are localized areas around the plants which EPA's own research has showed is actually the problem. We are not dealing with international sources. We are dealing with in-State or local sources that are impacting water quality.

Until that rule is amended, we are not going to be able to address those problems inherent in water quality today.

Thank you.

Ms. JOHNSON. Thank you very much, Mr. Mueller.

Dr. Charlie Driscoll from Syracuse University, we look forward to hearing your testimony at this time.

Mr. DRISCOLL. Madam Chair and the Subcommittee members, thanks for hearing me.

I am an academic researcher.

I am going to try to talk about three things. First of all, I would like to talk to you a little bit about two components of air pollution on surface waters, firstly, acid rain and, secondly, a little bit on mercury. I will try to streamline my mercury comments because we have heard so much about it. But, third, I would like to seek your input in terms of a critical component of evaluating air pollution effects, and that is monitoring programs, and I will close with those comments.

Next slide. On this slide, I have two figures and a map. The map is the Eastern part of the Country. You can see that it is color-coded. Those areas that are reddish and orangish represent those areas of the Eastern part of the Country that have been impacted by acid rain.

The resources that are impacted are soil—that is why I show this figure of soil—as well as surface waters. You may wonder why I am mentioning soil in a Subcommittee on Water, and that is because soil influences water quality. These soils have lost their base content and therefore are less able to neutralize inputs of acid rain, and that is going to delay recovery.

Next slide, whole ecosystems are impacted as Mr. Grumbles said. This is sort of a snapshot of where we stand in terms of the current situation. The items on the left represent what are the status of various water bodies in the Eastern part of the U.S. in terms of recovery.

Mr. Grumbles is correct that given the fact that there have been reductions, that areas in New England and New York and in the northern Appalachians are showing some limited improvement. Streams in Virginia are not showing any trends, and this is because the soils are very sensitive southern soils.

The bottom line, though, is that for these areas, soils are continuing to acidify and that will impair the long term recovery of these systems. If we look to the future with the Title IV of the Clean Air Act, we would expect to see much of the same, but under the Clean Air Interstate Rule, we would expect to see some curtailment of soil acidification and additional improvement. But the recovery of these systems will be extremely slow.

Next slide, even though my research focuses on the East, I would be remiss if I didn't mention the West. The West also is sensitive in terms of air pollution, particularly lakes, and the contaminant of interest here is nitrogen. Nitrogen will impact surface water quality in the West because many lakes are nitrogen growth limited.

Next slide, then on to mercury very briefly. As people have said, mercury is really derived from atmospheric contaminants. The critical step in this is the conversion of inorganic mercury from the atmosphere to methylmercury in certain environments, and that is the form of mercury that accumulates in fish by a factor of a million to ten million times.

Next slide, so human exposure to mercury is largely through fish consumption. People have mentioned this, but I think maps are very effective. Madam Chair, as you indicated, virtually every State in the Country has some sort of mercury advisory.

Next slide, one thing that I wanted to point your attention to is we recently completed a study for the Northeastern part of the U.S. and portions of Canada where we have identified a series of what we call biological mercury hot spots, and these are areas in the landscape where we have particularly high concentrations of mercury. So, as we move forward with the Clean Air Mercury rule, it is really critical that these very high mercury areas are identified for other parts of the Country and also we track the recovery of these systems as we try to control mercury emissions in the future.

Next slide, I would like to close by talking a little bit about monitoring, and I can't emphasize this enough. I think monitoring is a critical tool to track how effective we are at managing these air pollution programs. Some of these are extremely expensive.

I want to bring your attention to two programs in particular that are under jeopardy in the current budget. The first is the Dry Deposition Program through CASTNet, that in the current budget is experiencing major cutbacks. The second is the Surface Water Monitoring Program which has direct implications with this Subcommittee.

The current President's budget has proposed to zero out those programs. So if you ask me a year from now whether or not I can give you an assessment of surface water quality, I will not be able to do that because these monitoring programs will have been terminated if the current plan goes forward.

Last slide, then with respect to mercury, there were questions about what is the current mercury monitoring program. There is a network of precipitation programs across the U.S., but that only measures wet deposition of mercury. EPA is taking leadership in developing a dry deposition program which hopefully will get at total deposition efforts.

I also wanted to call your attention to this House bill here, the Comprehensive National Mercury Monitoring Program, which was recently introduced in both the House and the Senate to establish a national comprehensive mercury monitoring program.

Thank you very much.

Ms. JOHNSON. Thank you very much, Dr. Driscoll.

We will now begin the questioning. Let me say that I have a question for Dr. Slattery, and then I have got to run to another meeting, but you will not be left alone.

Dr. Slattery, in your view, had the TXU proposal to erect the 13 new coal-fired power plants in the State of Texas gone through, what impact would that have had on the atmosphere or water quality within the State or atmospheric deposition?

Mr. SLATTERY. Thank you, Madam Chair.

The impact, well, there are 17 in total and 11 TXU new units, I believe. If that deal goes through to still construct those units, our work has shown, I think, very clearly that the impact would certainly be profound in terms of regional deposition. When I say regional deposition, the plumes themselves were all within about 100 to 150 miles of the plants themselves.

There would certainly be impacts beyond that and beyond the State just depending on how those plumes interact and the synergy between the plumes themselves. Those plants, I think we have shown confidently and clearly that the impact would be significant from a regional perspective. I guess when I say regional, I should point out that it is not just Texas, that it is Texas and the immediate surrounding States. The implications will be widespread for the region in terms of water quality.

Ms. JOHNSON. Thank you.

Now, in your view, what needs to happen to avert a crisis of mercury exposure in our Nation's waterways?

Mr. SLATTERY. Well, I mean that is a great question and a very difficult one. In a sense if you are thinking about the national picture, a lot has been made of the Clean Air Mercury Rule and my colleague, Dr. Driscoll, has referred to that. Whilst there is certainly a good deal to be positive about in terms of that rule in a national reduction of 70 percent of mercury by, I believe, 2018 or 2025 when it becomes fully into effect, the real issue is deposition at this regional scale.

A national cap and trade program like the Clean Air Mercury Rule, whilst it may produce a national reduction of some percentage, that rule will do essentially nothing to regions where you are putting in new old technology coal-fired power plants. I guess that is the bottom line.

Ms. JOHNSON. Thank you very much.

The Chair recognizes Mr. Baker.

Mr. BAKER. Thank you, Madam Chair.

Dr. Slattery, what is the mechanism that results in the mercury being deposited on the Earth's surface out of the atmospheric suspension? What causes the mercury to come out of that very fine particle that is blown in the prevailing winds?

Mr. SLATTERY. My understanding of it is that it is one of two mechanisms. We talk about a dry deposition which is a straight-forward settling out of the mercury itself but also a wet deposition in rainfall.

Mr. BAKER. Of the two mechanisms, the wet form would be the more prevalent because what does it require to have a dry deposition, very still winds, at the upper altitude?

Mr. SLATTERY. The settling velocities of the particulates are very small as you would imagine.

Mr. BAKER. Very fine particle.

Mr. SLATTERY. They are very fine particles, and there is no question. You raised a very important point early on, Mr. Congressman, about the fact that these pollutants do not obey State or even international boundaries. They get transported around the globe.

Mr. BAKER. Yes. They don't have a voter registration. They just go where they want.

Mr. SLATTERY. Oh, absolutely. They go around the globe merely depending on the winds.

Mr. BAKER. Which gets me to my sort of observation about some of the PowerPoint presentation. There were some very significant yellow plumes outlined. Fifty thousand square miles, I think you said.

Mr. SLATTERY. Fifteen thousand.

Mr. BAKER. Fifteen thousand.

Mr. SLATTERY. Yes, 15,000.

Mr. BAKER. In scope, and based on the modeling through which the formula output that type of distribution. My question goes to what kind of data points were initially put into the formula to generate that pattern?

It was, as I believe you outlined it, historical observations of prevailing winds, perhaps other information, but it was not necessarily air monitoring at the various coal-burning facilities that led to actual observational data being then cranked into the formula which then generated the chart. It was basically historical observations that if we use this generalized data, put it into the formula, this is what it would look like.

Mr. SLATTERY. Now let me clarify that because that raises a very important point when it comes to atmospheric modeling because, as I said earlier, there is a catch phrase with any kind of modeling and that is garbage in, garbage out. We can produce anything really that we want.

With an atmospheric model like this, the input data, we use the actual observed meteorologic data that is stored on the NOAA web site which is stored at a resolution of 40 square kilometers.

Mr. BAKER. But that is meteorologic data.

Mr. SLATTERY. That is meteorologic data.

Mr. BAKER. It doesn't tell you wind direction, speed and so forth.

Mr. SLATTERY. Absolutely. Sorry.

Mr. BAKER. That doesn't necessarily tell you about air quality or the discharge from the facility itself that is the source, in your view, of the mercury that then is transported. You are looking at the piping mechanism through which it moves. You are not looking at how much water is going into the pipe.

Mr. SLATTERY. No. You are. You are looking at both because you have got to have input. You have got to have as realistic as possible or even a real emission rate. You have got to have a rate of emission.

Mr. BAKER. Right, that was my point, but is there air emission data that is available to you?

Mr. SLATTERY. Absolutely. Now there is a caveat there in that the mercury air emission data is relatively sparse. There are five power plants in Texas that have widely available data on the NEI, the National Emissions Inventory on the EPA web site, and that was the data that was put in for the five power plants under the TXU recent coal issue.

But, no, the mercury emission data is available on the National Emissions Inventory and the TRI. I actually spoke with the guys at the Air Resources Lab to get that data to put in.

You have to put in full velocities for that particular type of mercury. That gets built into the model.

Mr. BAKER. There are some assumptions built into the modeling as a result because, for example, at the outset I asked about the mechanisms by which the mercury would come out of suspension and be deposited. Rain would be a big factor. That would be why on those dry East Texas summers, stuff would leave Texas and likely come to Louisiana and get rained on, and that is why we would be the downstream beneficiary of that activity.

Are those weather patterns part of this data?

Mr. SLATTERY. Yes, they are. But, again, you are correct; they are assumptions. They are built in. They are built into the model. Like, for example, the 5th of November plumes, the input data are the emission data. The meteorologic data are the meteorologic data. But there is no one up there in an air balloon actually telling you what percentage of that is falling out as dry deposition versus wet deposition.

Mr. BAKER. Well, that is one of the problems for us in the Baton Rouge area. A lot of our non-attainment problems with ozone, we believe come from the Houston automobile market, but we don't have real data to prove it.

My point is don't we need some significant scientific expenditure? I can't imagine you saying no.

Mr. SLATTERY. No. Yes, we do. No.

Mr. BAKER. To determine with some degree, some higher degree. I don't wish to cast aspersion on your presentation but a significant amount of data on which to act to determine where things are coming from. For example, the lady who testified earlier from Maine or Massachusetts was saying they had done great work in reducing their own emissions, but about 70 percent of their problem now seemed to come from either out of state or out of country.

We have got to find out where it is coming from if we are going to fix it, and that is my only point.

Mr. SLATTERY. Can I respond to that? I mean absolutely.

Mr. BAKER. Oh, certainly, yes.

Mr. SLATTERY. Yes, I agree, and that goes to Dr. Driscoll's monitoring. I mean when you look at the mercury deposition network and that really is, as far as I am aware, the only real hard monitoring data that is out there in terms of a national picture. I think Louisiana may only have three, maybe four sites. Texas has two. Oklahoma has one on the eastern border.

It is important to be able to calibrate and test these kinds of models that you are producing. They have to be validated with hard data on the ground, and that data on the ground is extremely sparse. The contour maps that you see, that are produced, showing the deposition patterns, it is very easy to look at those contour maps and think that they are absolutely real, but they are lines from a computer. They are interpolated from actual data measurements, yes, but Louisiana has three points throughout a very large State.

So you are absolutely right; we need good monitoring. I would agree with you completely that you need to be looking significantly west of your State boundary to where a lot of that mercury is coming from. There is no question about that.

Mr. BAKER. It is sort of the difference between polling prognosis and election night returns. We need a few more election night returns to find out where we really are.

I yield back.

Mrs. NAPOLITANO. [Presiding] Thank you very much.

I can't help but think about California's EPA. Cal EPA, for years, brought up the issue of pollution in California, whether it was automobiles, which we have the largest concentration of automobiles there, I believe, and the pollution was causing the health problems it was causing. So we have done a lot of the actual research to be able to identify and bring down emissions from manufacturing and others.

But when I think of the Eastern Seaboard, I think of the trade winds bringing a lot of the pollution not only from California, I would say—I mean it is stretching it a little bit—but all the pollution that is swept into the Eastern area. It is just reaching, and I am not sure whether any research has been done to determine where else. If in Massachusetts, 70 percent is coming from outside sources, where?

He is right. Where is it coming from?

Is anybody looking at that research to identify and stop it at source rather than after it gets there?

Mr. SLATTERY. Yes. I mean there is a lot of work being done on where this material is coming from, but the difficulty is tying down the specific percentages. I mean we cannot say with any certainty that 58 percent of the mercury deposition in pick your State is coming from a particular region. I mean that is just not how the atmosphere behaves. That very fine elemental mercury stays suspended for a very long time, and that becomes part of the global pool of mercury.

When you look at the contribution from U.S. power plants or U.S. anthropogenic emissions or the U.S. as a whole to the global pool of mercury, it is small. It is less than 10 percent. In fact, it is probably considerably less than 5 percent to that background global pool, and that is what is being transported around and will fall out over long periods of time to add to this background rate.

My concern is the mercury that is falling out approximately to these plants, in plants that are deposition in an immediate area to these coal-fired power plants. That is my concern, and that is the mercury, this gaseous mercury that has a much higher fall velocity and falls out much more quickly. That is why those plumes are 100 to 150 miles around these plants.

Our modeling is certainly not suggesting that deposition from coal-fired power plants is stretching thousands of miles and depositing over that kind of geographic span. We know that that is not the case. It is a very regional issue, and that is why I like the term. I certainly didn't coin it, but I like this term of a mercury hot spot.

Mrs. NAPOLITANO. In the deletion of the two programs that Mr. Driscoll alluded to, what implications do these have to continue to identify and monitor them?

Mr. SLATTERY. The programs, could you say that again?

Mrs. NAPOLITANO. The clean air status, the CASTNet, and the extramural monitoring.

Mr. SLATTERY. To be honest, I am really not qualified to answer that question of those two programs. I would defer to Mr. Driscoll.

Mrs. NAPOLITANO. Mr. Driscoll?

Mr. DRISCOLL. Well, concerning the mercury, those two programs are directed for and looking at sulfur dioxide and nitrogen oxide, so those contaminants in air and also in water. They specifically don't look at mercury.

The only mercury program that is in place now is called the Mercury Deposition Network which only targets precipitation mercury, and that represents actually, in our neck of the woods, probably only about 30 percent to 25 percent of the total inputs. So there really needs to be a better program to track mercury as was suggested by the questions.

Mrs. NAPOLITANO. But why are the two programs you are talking about, valuable?

Mr. DRISCOLL. They are valuable because by 2010, industry is going to be spending about $3 billion per year in expenditures to control these contaminants, and I think that it is only good management to track what the effectiveness is. What you are talking about is, in terms of CASTNet, you are talking about a million dollars a year. In terms of the Surface Water Monitoring, you are talking about $800,000 a year. So you are talking very modest programs to track the effectiveness of these very, very expensive programs.

Without these programs in place, you won't have a good idea how effective those programs are and whether we need more controls or less controls in the future.

Mrs. NAPOLITANO. Well, is the current monitoring network adequate? Is it enough to be able to do what you are asking?

Mr. DRISCOLL. It is bare bones. It is a very sparse network. Many of the areas that I talked about aren't included. The program in the Upper Midwest was eliminated. The program in the West was eliminated. So you are only talking a few sites in the East that the Surface Water Program currently targets. It is certainly not adequate, but it is better than nothing.

Some of these areas that we are talking about are among the hardest hit in terms of acid rain impacts.

Mrs. NAPOLITANO. What would you say would be needed, an increase in being able to do other areas that should be targeted?

Mr. DRISCOLL. If they had a million dollars a year or two million dollars a year, that would be a tremendous boost to this operation. They could do a lot with that amount of funding.

Mrs. NAPOLITANO. Thank you.

Mr. Gilchrest?

Mr. GILCHREST. Thank you, Madam Chairman.

I have some questions about a cap and trade program for various sources of toxins with air deposition. What areas of the Country have benefitted from the cap and trade for sulfur dioxide or acid rain?

The map you had up there didn't look like the Northeast benefitted very much. Can anybody say what areas benefitted from this?

Mr. DRISCOLL. Well, I think that the cap and trade program for sulfur dioxide has been beneficial. I think it has allowed industry to have flexibility to control the emissions. In contrast, there is also a proposal for cap and trade on mercury. Sulfur dioxide is less toxic. So I think it has been successful.

I think there are still problems, and there will be additional controls that will be needed to basically allow these systems to fully recover.

Mr. GILCHREST. Do you have a percentage of reduction of sulfur dioxide with this cap and trade for acid rain?

Mr. DRISCOLL. Since we started the Clean Air Act, there has been about a 50 percent reduction. When the Title IV completes itself in about 2010, that will be a 50 percent reduction from 1980 values. So you are talking about substantial reductions in sulfur dioxide.

Mr. GILCHREST. So the cap and trade with the acid rain problem has been relatively successful.

Mr. DRISCOLL. It has allowed us to turn the corner, and the systems are starting to recover, yes.

Mr. GILCHREST. It seems from my perspective that a cap and trade with CO2 would be pretty successful too.

But a cap and trade with mercury, given the term, hot spot, and given what the gentlelady from Massachusetts was talking about, would you recommend a cap and trade with mercury or to mitigate the problem of mercury, a standard regulatory policy would be better?

Mr. DRISCOLL. As you indicate, Congressman, mercury is a very toxic substance. I am just a research scientist. I am not a manager. But a lot of people have expressed concern about the trading option of the Clean Air Mercury Rule. I think that the identification of hot spots are reason for concern in the mercury monitoring program.

I would say my advice to EPA is if there is going to be unconstrained trading of mercury, there should be a rigorous monitoring program, first of all, to identify other areas of the Country where there are hot spots and, second, to track how they recover from this trading program because as we have heard, mercury will fall out very close to the source. So there may be very, very severe local effects.

One of the hot spots is in Massachusetts, and following those very aggressive controls, we saw approximately 50 percent reduction of mercury in loons over a period of five years, really very rapid recovery. I think local emissions—we can't emphasize that enough—we think are very important.

Mr. GILCHREST. Could I ask how long does mercury, an element, stay in the ecosystem from where it falls?

It is a problem with fish, and we all know it is a problem with IQ as the first panel stated. If you have bigger fish eating smaller fish, I am not sure if we need to worry about the brain power of striped bass versus man? But how about bald eagles or ospreys or blue herons?

Mr. DRISCOLL. You are correct. Those organisms that consume other fish such as loons, eagles, otter, mink, all those things are impacted. There is increasing evidence to show that mercury cycles through the terrestrial food chain. So birds that eat insects, bats, are showing very high concentrations of mercury. Now this is an understudied area, so the more we study the problem, the more widespread we find the contamination.

As you mentioned, mercury, it is an element. It cannot be created or destroyed. Once we release it, it is there. It can only be sequestered and hopefully reduced, removed slowly from the ecosystem.

Mr. GILCHREST. Thank you very much and, welcome, the Chesapeake Bay Program.

Mr. MUELLER. Foundation.

Mr. GILCHREST. Chesapeake Bay Foundation.

Mr. MUELLER. Thank you.

Mr. GILCHREST. Thank you, Madam Chair.

Mrs. NAPOLITANO. Thank you, Mr. Gilchrest.

If I remember correctly, California did some studies on the effect it had on the bald eagle and osprey, and they found that it was reducing the reproduction of those species. This was 10 years ago if I remember correctly.

Mr. Hall?

Mr. HALL. Thank you, Madam Chair.

Dr. Driscoll, I am sorry. I apologize to everybody for being late. I was triple booked with the Aviation Subcommittee, my Subcommittee that I chair, and Veterans Disabilities and this extremely important hearing.

Just picking up on what you said, how does one sequester mercury once it is in the environment? Is that being done?

Mr. DRISCOLL. It is being done. Mercury falls to the Earth's surface, and it can go one of three ways. It can be actually converted and go back to the atmosphere so it can be re-emitted. It can be transported in soil, and then it will get into potentially the aquatic food chain and contaminate humans and wildlife, but it can be incorporated in soil and removed from the system. This will occur over a period of years.

One of the critical questions that we are researching is how will ecosystems respond if we control mercury emissions? Will they respond slowly or will they respond quickly? The few areas where we have data points suggest that surprisingly many of these ecosystems respond very quickly.

I should point out that we also have a lot of data from sediment records where we collect material through the depths of sediment cores in lakes and bogs, and we can determine the age of the material and how that mercury has changed over time. What we see over the whole eastern half of the U.S. is that we have seen about a 30 percent decrease in mercury deposition since about the 1970s or 1980s presumably due to controls on incinerators and power plants and things like this. I think this is strong evidence that we can remove mercury.

Mr. HALL. That is good news. I am glad to hear that.

Dr. Slattery, I guess first to you and also to Dr. Driscoll because being from Syracuse, he would probably have a good idea about this.

If the range of the plume, from coal-fired plants particularly, that is depositing mercury is thought to be relatively short, 100 to 150 miles I think I just heard. We are looking at some hot spots in the mid-Hudson Valley and also in the Adirondacks. We are also looking, of course, at the continuing acid rain problem in the Adirondacks. Where should we be looking for those sources?

I mean are the coal-fired power plants that are in the Hudson Valley, more to the south than to the west of the county, Dutchess County where I come from, are they the likely source of the mercury that we are seeing in Dutchess County or would it be traveling from, let us say, the Ohio Valley?

Mr. SLATTERY. Again, I don't want to just simply defer to Dr. Driscoll on this, but I haven't worked and I am not familiar with that region at all. I have just worked solely in Texas and the surrounding regions in terms of where to look for these sources. I will ask Charles to answer that in a moment.

But I would make one comment in response to that, and that is that the plumes we were seeing emitted from the Texas power plants, this 100 to 150 mile stretch of immediate fallout, that was based on the assumption that there was no synergy between the plumes. We were doing this on an event type basis, a 24 to 48 hour type basis just to get a picture of where these plumes were going and what the geographic extent of them would be. And so, what that means is when you have several power plants like this overlapping with one another, there will be synergy and mixing and an increase in the travel distances and the deposition fallout.

But I can't actually answer specifically your regional question.

Mr. HALL. Dr. Driscoll?

Mr. DRISCOLL. Yes. So if there is a particular area, I can try to address that, but in general you will see both local, regional and global impacts. In Dutchess County, I am not aware of any large sources that are in the immediate area such as incinerators or power plants or industrial facilities although I could look that up for you if you were interested. But, clearly, it will be impacted by regional sources and some global sources as well.

I mentioned the sediment cores that we have collected all over the Northeast, and they track very, very well with the regional historical emission estimates for the whole Upper Great Lakes area, explaining a large percentage of the historical mercury. So we think that the regional and local contribution is much higher than some have suggested. There is a global contribution, but I think the regional and local can be very important.

Mr. HALL. Two more quick questions for anybody: How much of a problem is batteries, all kinds of batteries from little AAs up to camp light batteries that are disposed of by the average citizen, unfortunately?

Unless there are household hazardous waste collection points which a lot of counties have or do collection days which many counties have, but a lot of them get into the incinerators and into the waste treatment in general.

The second point is have you looked at tidal drying?

I know in the Hudson River Valley, for instance, that there has been measurement done of PCB-contaminated dust that has blown between high tide and low tide. The water comes up and deposits sediment on the banks. Then it drops to low tide, and the sediment dries and is carried in the wind. There is measurable PCBs in the body fat of everybody who has lived for any period of time close to the Hudson River as a result. I am just curious if that sort of tidal re-introduction into the air is something that you have experienced elsewhere.

Mr. DRISCOLL. Do you want me to answer?

In terms of batteries, I think just briefly incinerators have been aggressively controlled and there is an effort to try to remove mercury from batteries. I think that progress has been made on that score.

In terms of the intertidal zone, you are correct. It is a critical area probably not for the mechanism you are talking about, but in those environments where there is wetting and drying, that action can stimulate the methylation of mercury and, of course, that is the bioavailable form. That is a critical process particularly in estuaries and coastal waters for the production of methylmercury and the contamination of those water bodies.

Mr. HALL. Thank you.

Thank you, Madam Chair.

Mrs. NAPOLITANO. Thank you.

There is such a great interest in what you are talking about. I am the Chair of the Subcommittee on Water and Power in the Natural Resources Committee, and we are discussing perchlorates and the VOCs in our rivers and aquifers.

What we don't know is hurting us, and unfortunately we need to be able to get more information from the research community to find out what you have done because we need to translate it into how we address the future of not just legislation because that is not all but partnership, partnering with those that can make the changes. That is the general public in many instances.

Batteries, when they go into the landfill, if they go into the landfill, which in California we have very strict standards. They have to be recycled. Many things are recycled. Back in the 1990s, California banned burning of trash. I remember. So that was some of the pollution that was hitting the atmosphere. There are many things that the general public began to understand was contributing and adding to the atmosphere.

Now I am not sure. I am not on the Eastern Seaboard. I am on the other side. But I would hope that together, this Committee and the research community,—and thank you for coming and sharing your testimony—that we can be more forthcoming in addressing how we protect our environment for future generations.

So, with that, gentlemen, thank you very much.

This hearing is now adjourned.

[Whereupon, at 4:25 p.m., the subcommittee was adjourned.]

STATEMENT OF HON. RICHARD BAKER

HEARING ON
"NONPOINT SOURCE POLLUTION:
ATMOSPHERIC DEPOSITION AND WATER QUALITY"

WATER RESOURCES & ENVIRONMENT
SUBCOMMITTEE

April 17, 2007

- Welcome to our hearing on Atmospheric Deposition and Water Quality.

  Atmospheric deposition is a different, and more indirect, sort of nonpoint source.

  Unlike most nonpoint sources that we may think of that run off directly into a body of water from a source, atmospheric deposition has an intermediate medium between potential sources and a receiving water body-- namely, the air-- that makes the prediction of atmospheric deposition very complicated and difficult.

  The transport of pollutants in the air is very location-specific, and highly variable over time and by place.

- There are many potential sources that may contribute to atmospheric deposition.

They may be located nearby or far away, originate from inside the U.S. or from outside our borders, and come from natural sources or from a variety of human activities.

If a pollutant eventually makes it into a waterbody, then its fate is also very ecosystem-specific.

All of this suggests that we need to recognize the different and complex nature of atmospheric deposition, gain a better understanding of the processes influencing it, and come up with solutions that recognize and are tailored to the location-specific nature of this phenomenon.

- There are numerous regulatory and other programs currently or soon to be in place that will lead to major reductions in air emissions and atmospheric deposition. We also need to take into account how these programs are helping to address the issue.

I look forward to hearing from the witnesses about what the scientific community has learned about atmospheric deposition, what further research is needed to better understand the issue, and how other programs are helping to address atmospheric deposition.

Statement by Congressman Jerry F. Costello
Committee on Transportation and Infrastructure
Subcommittee on Water Resources
Hearing on Nonpoint Source Pollution: Atmospheric Deposition and Water Quality
April 17, 2007

Thank you, Madame Chairwoman for calling this hearing on nonpoint source pollution.

Nonpoint source pollution affects all states. Much of the pollution ends up on our land and in our water, producing troubling levels of mercury in our air, in our lakes and rivers and in our fish.

The federal government has implemented new, stricter laws on mercury contamination. While there is not one answer to nonpoint pollution, I am interested in hearing from our witnesses on the federal government's current policies and other ways of addressing the problem.

I welcome the witnesses and I look forward to their testimony.

STEVE KAGEN, M.D.
WISCONSIN
8TH DISTRICT

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Steve Kagen

OPENING STATEMENT

HONORABLE STEVE KAGEN, M.D.

WATER RESOURCES AND THE ENVIRONMENT
TUESDAY APRIL 17, 2007

"NONPOINT SOURCE POLLUTION: ATMOSHERIC DEPOSITION AND WATER QUALITY"

Madam Chairwoman, I am pleased to take part in this subcommittee's first hearing on nonpoint source (NPS) pollution. The Environmental Protection Agency, the Office of Management and Budget, and the states all report that NPS pollution is the leading remaining source of continued water quality programs. Atmospheric NPS pollution creates a particular challenge for individual states, since many times origins of the pollutants and toxins coming in are from other states.

The Clean Water Act does not provide for enforceable requirements for nonpoint source pollution. While the voluntary best management practices have shown success, I believe that we must to more to regulate and reduce the impact of NPS pollution.

The impact of NPS pollution is of great concern to my district and all of Wisconsin, as a strong base of our economic well being is dependent on healthy lakes and rivers for sport fishing, water skiing, aquatic activities, and tourism. According to a 2002 Report by the EPA, 46% of Wisconsin's river miles are considered "impaired" and 57% of our lake acreage is "impaired". This pollution has serious consequences for the health of our ecosystem and our human health, as Wisconsin relies on it's groundwater supply for nearly 70% of its drinking water.

It is my goal that we, working closely with the EPA, will be able to create some kind of mechanism that will aid not only individual states, but regions, to identify and address atmospheric NPS pollution. While I believe that Section 319 Programs have been well utilized, I believe that it is time for Congress to put stronger language to create enforceable policies, which are both realistic and cost-effective in their implementation.

I look forward to hearing from today's panel, and would like to once again welcome Mr. Grumbles back to our Subcommittee. I look forward to working with all of you. Thank you.

1

Statement of Rep. Harry Mitchell
House Transportation and Infrastructure Committee
Subcommittee on Water Resources and Environment
4/17/07

--Thank you Madame Chairwoman.

--Since 1972, the Clean Water Act has gone a long way toward helping us improve our nation's water quality. It has helped us identify countless "point sources" of pollution, such as drainage from municipal and industrial facilities, and helped us take important steps to improve them.

2

--But point sources are only part of the problem, and today's challenges are more complex.

--The sources are less obvious.

--Today's water pollution results from the combined effect of multiple pollution sources, as well natural processes like snowmelt and rain runoff.

3

--According to the U.S. Environmental Protection Agency, this kind of nonpoint source pollution ("NPS") is now the single largest cause of water pollution.

--And it impacts Arizona.

--According to the Arizona Department of Environmental Quality, numerous waterways across our state are under fish consumption advisories for mercury and pesticides.

--State officials believe that a key source behind this mercury is the deposition of airborne emission from coal-fired power plants.

--Today we will hear from several witnesses about these complex interactions between airborne pollutants and our nation's water resources. I look forward to learning about them, as well as what steps we can take to address them.

--I yield back the balance of my time.

STATEMENT
THE HONORABLE JAMES L. OBERSTAR
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
HEARING ON
NONPOINT SOURCE POLLUTION: ATMOSPHERIC DEPOSITION AND WATER QUALITY
TUESDAY, APRIL 17, 2007 AT 2:00 P.M.

Chairwoman Johnson, thank-you for holding today's hearing on atmospheric deposition and water quality. The role played by air pollutants in harming the nation's waters is grave. I look forward to learning more about this important topic, as well as about the wider issue of nonpoint source pollution.

First, however, let me extend a greeting to Lenny Fineday of the Leech Lake Band of Ojibwe. Please pass along my respects to Chairman Goggleye; who I understand was unable to attend today's hearing. The Leech Lake Band of Ojibwe is located in Cass Lake, Minnesota – which falls within my congressional district. Being neighbors, I am very aware of the threat that mercury deposition plays on communities that rely on fish for a large part of their diets. The EPA reports that the average American consumes approximately 14 pounds of fish per year. Members of the Leech Lake tribe consume, on average, 180 pounds of fish per year – over twelve times the national average! As a result, members of my district have blood mercury levels that are significantly higher than the rest of the population. And subsequently, they are subject to a variety of symptoms of mercury poisoning: lower IQs, mental and physical developmental disorders, and heart disease.

Given the potential for mercury hotspots to develop as a result of the Administration's new Clean Air Mercury Rule, I am very interested to learn of what new steps the Environmental Protection Agency plans to identify potential mercury hotspots, and to take to continue reducing mercury deposition – as well as other types of harmful atmospheric deposition. Communities like the Leech Lake Band of Ojibwe cannot afford continued high levels of mercury contamination.

Atmospheric deposition is a process by which airborne pollutants settle directly onto the surface of a water body, or which reach a water body indirectly by falling onto land surfaces before being swept into water bodies by rain or melting snow. It is important to emphasize that atmospheric deposition is a pollution issue that is more complex than many of the pollution problems we generally face: what starts as an air pollution problem, ends as a water pollution issue.

I am concerned that the Environmental Protection Agency is approaching this special type of problem using tools unsuited for the task. Not only might EPA not be using the best tools for this far-reaching problem, they seem to be applying them reactively. In other words, they are not crafting new approaches or new policies to proactively address this multi-media problem.

In my view, a patchwork approach to a multi-media problem will result in holes that invariably require darning. Why? Because, I believe that pollution problems that involve multiple media – air *and* water, for example – cannot be properly fixed by applying policies and tools that were designed for a single media. EPA's current approach is the proverbial application of the square peg in the circular hole.

To use an example, let me quote from a recent EPA Office of Inspector General report: "EPA's Chesapeake Bay Program Office is relying on anticipated nitrogen deposition reductions from Clean Air Act regulations *already issued by EPA* to meet water quality goals for the Bay watershed." The EPA also knows that ammonia emissions from animal feeding operations are a significant source of nitrogen deposition into the Bay – and yet it has done little to control them.

Not only is EPA not proactively developing new policies to known air *and* water problems, not only is it reactively applying single media tools to multi-media problems, it is not actively addressing known sources of pollution. It is not so surprising, then, to learn that EPA recently announced that EPA's Chesapeake Bay Program will be unable to meet its longstanding bay clean-up goals.

Assistant Administrator Grumbles will describe a new approach that my home state, Minnesota, is taking to control mercury-impaired waters. Instead of approaching mercury deposition on a waterbody-by-waterbody basis, Minnesota is using – with EPA approval – a statewide approach. While this may be an important development in addressing waters impaired by nonpoint source pollution, it is still unclear how this new approach – one that has been approved by EPA – will reduce mercury deposition that originates *outside* of the state of Minnesota, or how it will *expedite* the timeline for addressing waters that are currently impaired by mercury.

Both interstate and international air pollution that results in atmospheric deposition are areas of profound concern for the states. These sources are also those the states are least equipped to handle. Conversely, interstate and international air emissions are the very types of pollution that EPA was created to deal with. I look forward to hearing from Assistant Administrator Grumbles as to how the EPA is coordinating the Office of Air and Radiation and the Office of Water to *actively* and *directly* reduce that mercury deposition – along with other forms of atmospheric deposition - which originates from outside of state boundaries.

I am pleased that we have such a diverse range of experts on today's panel. I welcome each of the invited witnesses, and look forward to hearing their testimony.

Effects of Atmospheric Deposition of Acidity and Mercury on Freshwaters and Other Sensitive Natural Resources in the Eastern U.S.

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Testimony to the House Subcommittee on Water Resources and Environment
"Nonpoint Source Pollution: Atmospheric Deposition and Water Quality"
17 April 2007

Effects of Atmospheric Deposition of Acidity and Mercury on Freshwaters and Other Sensitive Natural Resources in the Eastern U.S.

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EXECUTIVE SUMMARY

In this testimony, the ecological effects of atmospheric sulfur, nitrogen and mercury deposition to sensitive resources in the eastern U.S. are summarized. Acidic deposition is comprised of sulfuric and nitric acids, and ammonium derived from atmospheric emissions of sulfur dioxide, nitrogen oxides, and ammonia, respectively. These compounds are released to the atmosphere largely by the burning of fossil fuels and agricultural activities. Mercury emissions in the U.S. are largely the result of electric utilities, incinerators and industrial processes. Atmospheric deposition delivers acids and acidifying compounds and mercury to the Earth's surface. The adverse ecological effects of acidic and mercury deposition on forests, streams and lakes are summarized and the need for adequate monitoring to track the effectiveness of emission control programs on water resources is emphasized.

Forest Ecosystems

Acidic deposition has altered, and continues to alter, forest soil by accelerating the leaching of calcium and magnesium and increasing concentrations of dissolved inorganic aluminum in soil waters. At high concentrations, dissolved inorganic aluminum can hinder the uptake of water and essential nutrients by tree roots.

The alteration of soils by acid deposition has serious consequences for acid-sensitive forest ecosystems. Soils that are compromised by acidic deposition are less able to neutralize additional inputs of strong acids, and provide poorer growing conditions for plants and delay the recovery of surface waters.

Freshwater Aquatic Ecosystems

Acidic deposition has impaired, and continues to impair, the water quality of lakes and streams in the eastern U.S. in three important ways: lowering pH levels (i.e., increasing the acidity); decreasing acid-neutralizing capacity (ANC); and increasing aluminum concentrations. Many surface waters in New England, the Adirondack region of New York, and the Northern, Central and Southern Appalachian Mountain regions exhibit chronic and/or episodic (i.e., short-term) acidification. Moreover, elevated concentrations of dissolved inorganic aluminum have been measured in acid-impacted surface waters throughout the East.

High concentrations of aluminum and increased acidity have reduced the species diversity and abundance of aquatic life in many lakes and streams draining acid-sensitive regions in the East. Fish have received the most attention to date, but entire food webs are often negatively affected. For example, in a survey of lakes in the Adirondacks, 346 lakes (24% of the total) did not contain fish. These fishless lakes had significantly lower pH and higher concentrations of dissolved inorganic aluminum when compared to those lakes with fish.

There are important linkages between acidic deposition and other water quality problems. For example, mercury contamination of fish is coupled to surface water acidification through a pattern of increases in fish mercury concentration with decreases in surface water pH. Studies across the eastern U.S. have shown that many surface waters have elevated concentrations of mercury in fish tissue as a result of atmospheric emissions and deposition of mercury. "Biological mercury hotspots" have been identified at five areas in eastern North America.

Monitoring Ecosystem Response to Emission Controls

Environmental monitoring is a critical tool to help track the effectiveness of past controls of emissions of air pollutants and to guide future air quality management in the U.S. There are several national programs which are widely used by the research and policy communities to evaluate the extent and change in atmospheric deposition and to assess changes in surface water chemistry in response to changes in emissions of air pollutants. Unfortunately, there are two items in the President's 2008 budget that will substantially jeopardize these programs. This budget shows a $1 million cut to the Clean Air Status and Trends Network (CASTNet) program (which includes measurements of air chemistry and dry deposition of acidic substances) and a cut of $5.75 million (effectively zeroing out the program) to the extramural programs through which the status of acid-sensitive surface waters are monitored by the U.S. Environmental Protection Agency. Without these two critical monitoring programs it will be difficult if not impossible to track the response of atmospheric chemistry and acid-sensitive surface waters to current and future controls on emissions of air pollutants.

There is also a critical need to develop a national program for monitoring ecosystem response to controls on emissions of mercury to the atmosphere. This need was recently emphasized by the introduction of bills in both the House of Representatives and the Senate to establish such a program through a multi-agency initiative (House - H.R. 1533 "Comprehensive National Mercury Monitoring Establishment Act" Sponsor: Tom Allen (D-ME). Cosponsors: James Walsh (R-NY), John McHugh (NY), Michael Michaud (ME), Mark Steven Kirk (IL), Raul Grijavla (AZ); Senate - S. 843 "Comprehensive National Mercury Monitoring Act" Sponsor: Susan Collins (R-ME), Joseph Lieberman (R-CT), Hillary Clinton (D-NY)).

1.0 Introduction

Detailed studies by a large community of scientists for more than three decades have provided considerable insight into the ways in which atmospheric deposition alters ecosystems. When it was first identified (e.g. Gorham 1989), atmospheric deposition was viewed as a simple problem that was limited in scope. Scientists now know that acids and acidifying compounds and mercury largely enter ecosystems from atmospheric deposition and are transported through soil, vegetation, and surface waters, resulting in a range of adverse ecological effects.

In this testimony, I present information on patterns of acidic and mercury deposition, and the effects of atmospheric deposition of sulfur, nitrogen and mercury on sensitive forest, and freshwater resources. I also make recommendations to strengthen the national monitoring programs to track ecosystem response to air quality management.

2.0 Acidic Deposition

Acidic deposition is largely comprised of sulfuric and nitric acid derived from sulfur dioxide and nitrogen oxides, respectively, and ammonium resulting from emissions of ammonia. Sulfur dioxide and nitrogen oxides, originating from human activities, are largely emitted to the atmosphere by the burning of fossil fuels, while ammonia is largely the result of agricultural activities. Once these compounds enter an ecosystem, they can acidify soil and surface waters, bringing about a series of ecological changes. The term acidic deposition encompasses all of the forms of these compounds that are transported from the atmosphere to the Earth, including gases, particles, rain, snow, clouds, and fog. Acidic deposition occurs as wet deposition: as rain, snow, sleet or hail; as dry deposition, as particles or vapor; or as cloud or fog deposition, which is more common at high elevations and in coastal areas. Wet deposition is fairly well characterized by monitoring at more than 200 National Atmospheric Deposition Programs (NADP) in the U.S. In contrast dry deposition is highly dependent on meteorological conditions and vegetation characteristics, which can vary markedly over short distances in complex terrains. As a result dry deposition is poorly characterized and highly uncertain. Dry deposition is characterized through the Clean Air Status and Trends Network (CASTNet), which include 97 sites in the U.S.

Sulfuric and nitric acids lower the pH of rain, snow, soil, lakes, and streams. In 2002-2004, wet deposition (i.e., deposition from forms of precipitation such as rain, snow, sleet, and hail) in acid-sensitive regions of the eastern U.S. had average pH values of 4.3 to 4.5, which is about three to five times more acidic than background conditions. Wet deposition of sulfate and nitrate are elevated in the eastern U.S. (Figure 1, 2).

Acidic deposition trends in the eastern U.S. mirror emission trends in the atmospheric source area, which extends to the Midwest (Lynch et al. 2000; Butler et al. 2001; Likens et al. 2000; Driscoll et al. 2001; Driscoll et al. 2003). Long-term data from across the eastern U.S. show declining concentrations of sulfate in wet deposition since the mid-1970s, coincident with decreases in sulfur dioxide emissions (Lynch et al. 2000; Driscoll et al. 2001; Driscoll et al. 2003). Based on these long-term data, a strong positive correlation exists between sulfur dioxide emissions in the source area and sulfate concentrations in wet deposition (Figure 3; Butler et al. 2001; Driscoll et al. 2001). It is now expected that the sulfate concentration of wet deposition in the eastern U.S. will increase or decrease in a direct linear response to the increase or decrease of sulfur dioxide emissions in the atmospheric source area. These observations strongly suggest a cause and effect relationship between emissions of sulfur dioxide and deposition of sulfate in sensitive regions in the eastern U.S. A similar relationship is starting to become evident between emissions of nitrogen oxides and wet deposition of nitrate. This relationship for nitrate is not as strong as the relationship for sulfur because emissions of nitrogen oxides have been relatively constant over the last 20 years. However, it appears that recent decreases in emissions of nitrogen oxides from electric utilities are starting to drive reductions in atmospheric deposition of nitrate (Butler et al. 2003).

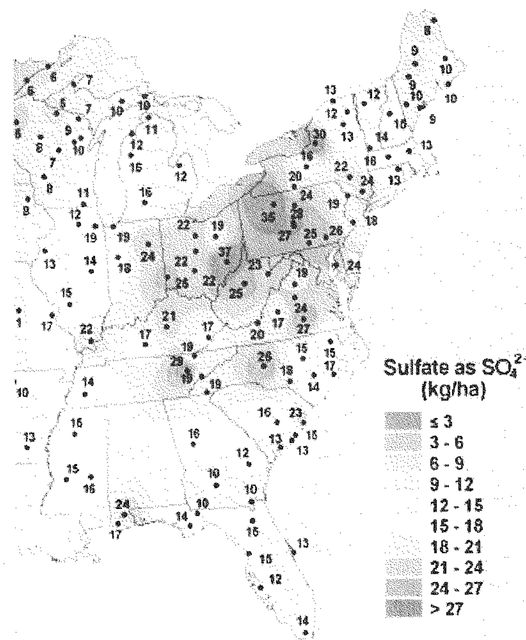

Figure 1. Map of wet sulfate deposition for the eastern U.S. for 2003. Data are from the NADP network.

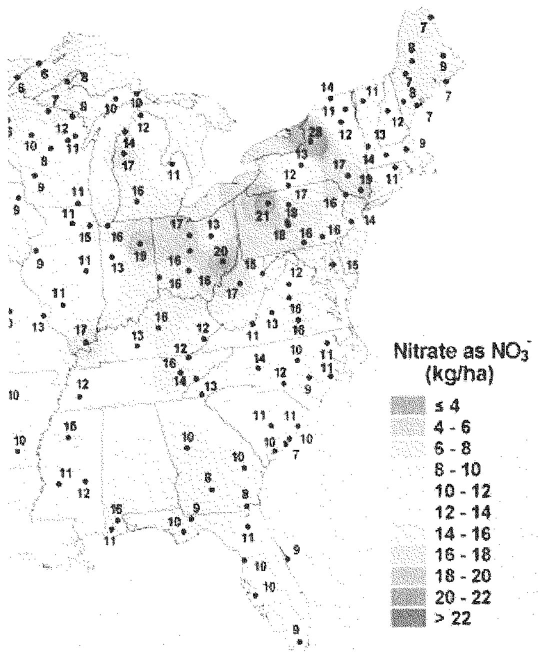

Figure 2. Map of wet nitrate deposition for the eastern U.S. for 2003. Data are from the NADP network.

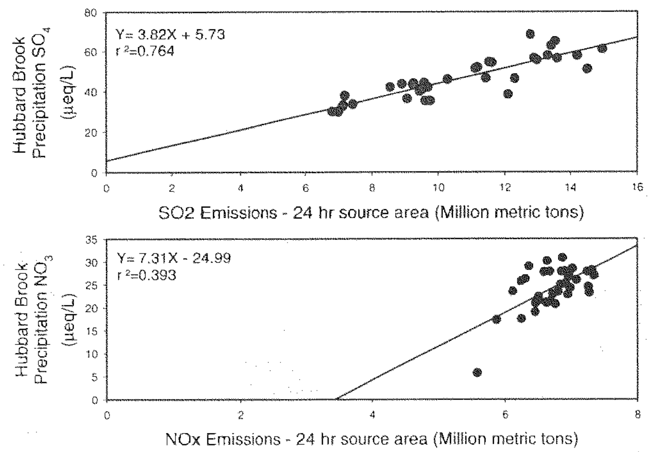

Figure 3. Volume-weighted annual concentrations of sulfate and nitrate in bulk precipitation at the Hubbard Brook Experimental Forest, New Hampshire as a function of annual emissions of sulfur dioxide and nitrogen oxides for the source area based on 21-hr back trajectory analysis.

3.0 EFFECTS OF ACIDIC DEPOSITION ON FOREST AND AQUATIC ECOSYSTEMS OF THE EASTERN U.S.

In acid-sensitive regions across the eastern U.S., acidic deposition alters soils, stresses forest vegetation, acidifies lakes and streams, and harms fish and other aquatic life (Figure 4; Driscoll et al. 2001). These effects can interfere with important ecosystem functions and services such as forest diversity and productivity and water quality. Years of acidic deposition have also made many ecosystems more sensitive to continuing pollution. Moreover, the same pollutants that cause acidic deposition contribute to a wide array of other important environmental issues at local, regional, and global scales (see Table 1).

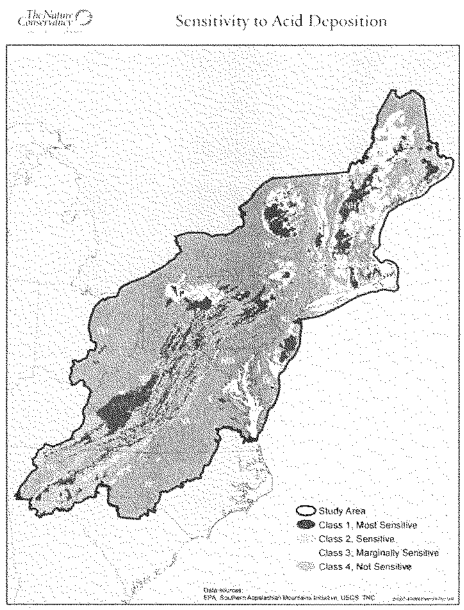

Figure 4. Map showing sensitivity of the eastern U.S. to acidic deposition. Four sensitivity classes are shown. Sensitivity class 1 represents waters with ANC values < 50 μeq/L. Sensitivity class 2 represents waters with ANC values 50-100 μeq/L. Sensitivity class 3 represents waters with ANC values 100-200 μeq/L. Sensitivity class 2 represents waters with ANC values >200 μeq/L.

Table 1. The links between sulfur dioxide and nitrogen oxide emissions, acidic deposition, and other important environmental issues.

Problem	Linkage to Acid Deposition	Reference
Coastal eutrophication	Atmospheric deposition adds nitrogen to coastal waters.	Jaworski et al. 1997; Paerl et al. 2000; Castro and Driscoll 2002
Mercury	Surface water acidification increases mercury accumulation in fish.	Grieb et al. 1990; Driscoll et al. 1994; Weiner et al. 2003
Visibility	Sulfate aerosols diminish visibility and views.	Malm et al. 1994
Tropospheric ozone	Emissions of nitrogen oxides contribute to the formation of ozone.	NAPAP 1998; Gunthardt-Goerg et al. 2000

3.1 Effects of Acidic Deposition on Forest Soils

Research has shown that acidic deposition has chemically altered soils with serious consequences for acid-sensitive ecosystems. Soils compromised by acidic deposition lose their ability to neutralize continuing inputs of strong acids, provide poorer growing conditions for plants, and extend the time needed for aquatic ecosystems to recover from acidic deposition.

Acidic deposition has altered and continues to alter soils in sensitive regions of the Eastern U.S. in three important ways. Acidic deposition depletes available calcium and other nutrient cations from exchange sites in soil; facilitates the mobilization of dissolved inorganic aluminum into soil water; and increases the accumulation of sulfur and nitrogen in soil.

Loss of calcium and other nutrient cations

The cycling of calcium and other nutrient cations in forest ecosystems involves the inputs and losses of these materials. For most forest ecosystems the supply of calcium and other nutrient cations largely occurs by weathering (i.e., the breakdown of rocks and minerals in soil). Calcium and other nutrient cations may also enter forests by atmospheric deposition, although this pathway is generally much smaller than weathering. Losses largely occur by vegetation uptake and drainage waters. An important pool of ecosystem calcium and nutrient cations is the soil available pool or the soil cation exchange complex. Plants are generally able to utilize this source of nutrients. Forest ecosystems that are naturally sensitive to acidic deposition are generally characterized by low rates of weathering and generally low quantities of available nutrient cations. Under conditions of elevated inputs of acidic deposition and subsequent transport of sulfate and nitrate in drainage waters, nutrient cations will be displaced from available pools and leached from soil (Reuss and Johnson 1986). This condition is not problematic for areas with high weathering rates and high pools of available nutrient cations. However, in acid-sensitive areas with shallow soil which contain minerals that are resistant to weathering, the enhanced loss of calcium and other nutrient cations can result in a depletion of soil available pools.

Over the last century, acidic deposition has accelerated the loss of large amounts of available calcium from acid-sensitive soil in acid-sensitive areas in the Northeast (Likens et al. 1996; 1998; Bailey et al. 1996; Lawrence et al. 1999). This conclusion is based on more than 20 studies throughout the eastern U.S. Depletion occurs when nutrient cations are displaced from the soil by acidic deposition at a rate faster than they can be replenished by the slow breakdown of rocks or the deposition of nutrient cations from the atmosphere. This depletion of nutrient cations fundamentally alters soil processes, compromises the nutrition of some trees, and hinders the capacity for sensitive soils to recover. Likens et al. (1996, 1998) observed that more that half of the available calcium had been lost from soil at the Hubbard Brook Experimental Forest, New Hampshire over the past 60 years. Marked decreases in exchangeable calcium and magnesium over the past 20 years are evident from re-sampling of soils in the Northeast (Warby et al. in review).

Mobilization of aluminum

Aluminum is often released from soil to soil water, lakes, and streams in forested regions with high acidic deposition as well as low stores of available calcium and high acidity in soils (Cronan and Schofield 1990; Driscoll and Postek 1995). One of the most significant ecological effects of acidic deposition is the mobilization of aluminum from soil and a shift in the form of aluminum in water from non-toxic organic forms to highly toxic inorganic forms.

Concentrations of aluminum increase markedly with decreases in pH, particularly the toxic inorganic forms of aluminum. It is evident that concentrations of aluminum increase exponentially when lake pH decreases below 6. Aluminum concentrations are thought to be ecologically significant when they increase to values above 2 µmol/L (Driscoll et al. 2001). This condition clearly occurs below pH 6.0.

High concentrations of dissolved inorganic aluminum can be toxic to plants (Cronan and Grigal 1995), fish (MacAvoy and Bulger 1995), and other organisms. Concentrations of dissolved inorganic aluminum in streams in New York, New England and in the Appalachian Mountains are often above levels considered toxic to fish (McAvoy and Bulger 1995) and much greater than concentrations observed in forest watersheds that receive low inputs of acidic deposition (Driscoll et al. 1988).

3.2 Effects of acidic deposition on trees in areas of the Northeast

Acidic deposition has contributed to the decline of red spruce and sugar maple trees in the eastern U.S. (Driscoll et al. 2001) Symptoms of tree decline include poor condition of the canopy, reduced growth, and unusually high levels of mortality. Declines of red spruce and sugar maple in the northeastern U.S. have occurred during the past four decades. Factors associated with declines of both species, have been studied and include important links to acidic deposition.

4.0 Effects of Acidic Deposition on Freshwater Aquatic Ecosystems of the Eastern U.S.

4.1 Surface water acidification

Acidic deposition degrades surface water quality by lowering pH (i.e., increasing acidity); decreasing acid-neutralizing capacity (ANC); and increasing dissolved inorganic aluminum concentrations. While sulfate concentrations in lakes and streams have decreased in the northeastern U.S. over the last 20 years, they remain high compared to background conditions (e.g., approximately 20 µeq/L; Driscoll et al. 1991; Brakke et al. 1989; Chen and Driscoll 2005a,b). Moreover, improvement in other chemical conditions in many lakes and streams in acid-impacted regions of the eastern U.S. has been limited (Likens et al. 1996; Stoddard et al. 1999; Driscoll et al. 2001; Stoddard et al. 2003).

For example, a comprehensive survey of lakes greater than 0.2 ha in surface area in the Adirondack region of New York was conducted by the Adirondack Lakes Survey Corporation to obtain detailed information on the acid-base status of waters in this region (Kretser et al. 1989). Of the 1469 lakes surveyed, 24% had summer pH values below 5.0. Also 27% of the lakes surveyed were chronically acidic (i.e., ANC less than 0 μeq/L) and an additional 21% were susceptible to episodic acidification (i.e., ANC between 0 and 50 μeq/L. An analysis of the anion content of these lakes illustrates that these lakes have predominantly been acidified by atmospheric deposition of sulfate. Other regions of the eastern U.S. showing impacts of acidic deposition on surface waters include New England, and the Northern, Central and Southern Appalachian Mountain regions (Charles 1991).

Seasonal acidification is the periodic increase in acidity and the corresponding decrease in pH and acid neutralizing capacity in streams and lakes (Wigington et al. 1996). Episodic acidification is caused by the sudden pulse of acids and a dilution of base cations (e.g., calcium, magnesium, sodium, potassium) due to spring snowmelt and large rain events in the spring and fall. Increases in nitrate are often important to the occurrence of acid episodes. These conditions tend to occur when trees are dormant and therefore using less nitrogen. At some sites, short-term increases in sulfate and organic acids can also contribute to episodic acidification. Episodic acidification often coincides with pulsed increases in concentrations of dissolved inorganic aluminum. Short-term increases in acid inputs to surface waters can reach levels that are lethal to fish and other aquatic organisms (Baker et al. 1996; Van Sickle et al. 1996). All of the acid-sensitive and acid-impacted regions discussed in this report (i.e., Adirondacks, Catskills, New England, Appalachian mountains) have documented effects associated with episodic acidification (Van Sickle et al. 1996; Webb 2004).

In summary, it is well documented that surface waters in New England, the Adirondacks, and the Northern, Central and Southern Appalachian mountain regions have been adversely impacted by elevated inputs of atmospheric sulfur and nitrogen deposition. Surface waters in these areas exhibit chronically acidic conditions or have low values of acid neutralizing capacity, which make them susceptible to short-term episodic acidification.

Regional trends in surface water chemistry indicate that recovery of sensitive lakes and streams throughout acid-sensitive areas of the East is slow (Stoddard et al. 1999; Driscoll et al. 2003; Stoddard et al. 2003). Lakes and streams in the Adirondacks, northern New England, the Appalachian Plateau, the Upper Midwest and western Virginia have been intensively monitored since the early 1980s. A recent analysis indicates that these lakes and streams have shown decreases in concentrations of sulfate, at all sites except western Virginia. This pattern is consistent with decreases in emissions of sulfur dioxide and atmospheric deposition of sulfate. However, these lakes and streams exhibit limited recovery in pH and acid neutralizing capacity, as well as continued acid episodes

(Stoddard et al. 1999; Stoddard et al. 2003). Note, streams in western Virginia show no recovery of acid neutralizing capacity.

Three factors account for the slow chemical recovery of the water quality of acid impacted surface waters, despite the decreased deposition of sulfur associated with the Clean Air Act. First, levels of acid-neutralizing base cations in streams have decreased markedly due to a loss of base cations from the soil and, to a lesser extent, a reduction in atmospheric inputs of base cations. Second, inputs of nitric acid have acidified surface waters and elevated their concentration of nitrate in many regions of the Northeast, particularly the Adirondack and Catskill regions of New York. Finally, sulfur has accumulated in the soil and is now being released to surface water as sulfate, even though sulfate deposition has decreased. It appears the only approach to accelerate the recovery of acid-impacted lakes is to make additional cuts in emissions of sulfur dioxide and nitrogen oxides (Driscoll et al. 2001; Gbondo-Tugbawa and Driscoll 2002; Chen and Driscoll 2005a, b).

The modest decreases in sulfate concentrations and increases in pH and acid neutralizing capacity exhibited in some surface waters is an encouraging sign that impacted ecosystems are responding to emission controls and moving toward chemical recovery. Nevertheless the magnitude of these changes is small compared to the magnitude of increases in sulfate and decreases in acid neutralizing capacity that have occurred in acid-impacted areas following historical increases in acidic deposition.

4.2 Response of aquatic biota to acidification of surface waters by acidic deposition

Decreases in pH and elevated concentrations of dissolved inorganic aluminum have resulted in physiological changes to organisms, direct mortality at sensitive life history stages, and reduced the species diversity and abundance of aquatic life in many streams and lakes in acid-impacted areas of the East. Fish have received the most attention to date, but entire food webs are often adversely affected (Schindler et al. 1985).

Decreases in pH and increases in aluminum concentrations have diminished the species diversity and abundance of plankton, invertebrates, and fish in acid-impacted surface waters in the East (Baker et al. 1990). A detailed summary of the response of aquatic biota to the acidification of surface waters is provided in Table 2.

In the Adirondacks, a significant positive relationship exists between the pH and ANC levels in lakes and the number of fish species present in those lakes (Gallagher and Baker 1990). Surveys of 1,469 Adirondack lakes conducted in 1984 and 1987 show that 24 percent of lakes (i.e., 346) in this region do not support fish (Gallagher and Baker 1990). These lakes had consistently lower pH and ANC, and higher concentrations of aluminum than lakes that contained one or more species of fish. Experimental studies and field observations demonstrate that even acid-tolerant fish species such as brook trout have been eliminated from some waters in New York (Gallagher and Baker 1990).

Similar relationships are evident in streams of the Shenandoah National Park (Bulger et al. 1999). Studies at the Shenandoah National Park demonstrate effects of acidic deposition on fish at three ecosystem levels:

- Effects on single organisms (condition factor- the relationship between the weight and the length of a fish). Studies of blacknose dace indicated that fish condition factor was related to several chemical indicators of acid-base status, including minimum pH. This analysis suggests that fish in acidic streams use more energy to maintain internal chemistry then would otherwise be used for growth (Dennis and Bulger 1999).

- Population -level effects (increased mortality). Bioassay experiments using brook trout eggs and fry showed greater mortality in a chronically acidic stream than in a high acid neutralizing capacity stream (Webb 2004). Eggs and fry are sensitive life history stages for fish.

- Community -level effects (reduced species richness). As observed for the Adirondacks, species richness decreases with decreasing acid neutralizing capacity and pH in streams of the Shenandoah National Park (Bulger et al. 1999).

Although chronically high acid levels stress aquatic life, acid episodes are particularly harmful because abrupt, large changes in water chemistry allow fish few areas of refuge and impact fish at sensitive stages of life history. High concentrations of dissolved inorganic aluminum are directly toxic to fish and pulses of aluminum during acid episodes are a primary cause of fish mortality (Van Sickle et al. 1996; Baker et al. 1996; MacAvoy and Bulger 1995). High acidity and aluminum levels disrupt the salt and water balance of blood in a fish, causing red blood cells to rupture and blood viscosity to increase. Studies show that the viscous blood strains the heart of a fish, resulting in a lethal heart attack.

5.0 Effects of Atmospheric Mercury Deposition.

Eastern North America receives elevated atmospheric mercury deposition from a combination of local, regional and global sources. Forested regions with a prevalence of wetlands and unproductive surface waters, combine to promote high concentrations of mercury in freshwater biota, and are particularly sensitive to mercury deposition (Driscoll et al. 2007). Methylmercury that is formed from inorganic mercury in wetlands and sediments, bioaccumulates up the freshwater food chain, typically to be a factor of one-million to ten-million, resulting in exposure to humans and wildlife through fish consumption. Average mercury concentrations in yellow perch fillets exceed the EPA human health criterion across the region. Mercury concentrations are often high enough in piscivorous wildlife to cause adverse behavioral, physiological and reproductive effects.

Biological mercury hotspots have been identified in the northeastern U.S. and southeastern Canada using a dataset of biotic Hg concentrations (Evers et al. 2007). Eight layers representing three major taxa and >7,300 observations were used to locate five biological mercury hotspots and nine areas of concern. The biological mercury hotspots include the western and central Adirondacks, the upper Connecticut River, the Merrimack River, the upper Androscoggin and Kennebec rivers in Maine, and southern and central Nova Scotia. Yellow perch and common loon were chosen as indicator species for human and ecological effects of mercury, respectively. Thresholds of 0.30 μg/g in yellow perch fillets and 3.0 μg/g in common loon blood were used in the analysis. The biological mercury hotspots receive elevated atmospheric mercury deposition, have high landscape sensitivity, and/or experience large reservoir fluctuations. In the Merrimack River watershed local mercury emissions are linked to elevated local deposition and high mercury concentrations in biota. Historic data for this region suggest that mercury emission reductions from local sources can lead to rapid reductions in mercury in biota. The existence of biological mercury hotspots has important implications for the controls of mercury emissions through a cap and trade program.

5.1 Linkages between surface water acidification and fish mercury concentrations

Several research studies suggest a linkage between acidic deposition and mercury levels in fish. Atmospheric deposition of sulfate associated with sulfur dioxide emissions provides the necessary substrate for methylating bacteria (Gilmour et al. 1992). Methylating bacteria convert inorganic mercury into methyl mercury, the form of mercury which bioaccumulates in fish.

The role of sulfate in the production of methyl mercury is under investigation by a team of researchers in Minnesota. Jeremiason et al. (2006) experimentally added sulfate to a wetland, observing increased methylation and increased export of methyl mercury. They inferred that increasing sulfur dioxide emissions and sulfate deposition would result in increases in methyl mercury in the fish of receiving waters (Jeremiason et al. 2006). Similar experiments have been conducted in Sweden and Canada (Branfireun et al. 1999, 2001).

Studies across eastern North America have shown that many lakes and reservoirs have elevated concentrations of mercury in fish tissue (Grieb et al. 1990; Suns and Hitchin 1990; Driscoll et al. 1994; Kamman et al. 2004, 2005; Driscoll et al. 2007). Many of these surface waters have fish mercury content above the U.S. Environmental Protection Agency health advisory action level of 0.3 μg/g. In addition numerous studies across eastern North America have also reported increases in fish mercury concentrations with decreases in surface water pH. (Grieb et al. 1990; Suns and Hitchin 1990; Driscoll et al. 1994; Kamman et al. 2004; Kamman et al. 2005; Driscoll et al. 2007).

Hrabik and Watras (2002) used reference data and data from an experimentally acidified lake to examine the relative contribution of atmospheric mercury deposition and acidic deposition in regulating changes in fish mercury concentrations. They observed that decreases in fish mercury in an experimentally de-acidified basin exceeded those in the reference basin. Specifically, they found that approximately one-half of the change in fish mercury concentrations over a six-year period could be attributed to de-acidification

(Hrabik and Watras 2002). This study suggests that acidification of lakes by acidic deposition has enhanced fish mercury concentrations and that concentrations of mercury in fish are likely to decrease with decreasing acidic deposition.

6.0 Monitoring Acidic and Mercury Deposition and the Ecological Effects of These Contaminants on Surface Waters

6.1 Monitoring effects of acidic deposition

Environmental monitoring is a critical tool to help track the effectiveness of past controls on emissions of air pollutants and to guide future air quality management in the U.S. (NRC 2004). There are several national programs which are widely used to evaluate the extent and change in atmospheric deposition and to assess changes in surface water chemistry in response to changes in acidic deposition. In the U.S., wet deposition has been monitored at more than 200 sites, by both independent researchers and the inter-agency National Atmospheric Deposition Program/National Trends Network (http://nadp.sws.uiuc.edu/). Dry deposition is monitored at 97 sites in the U.S. by the U.S. Environmental Protection Agency (EPA) Clean Air Status and Trends Network (http://www.epa.gov/castnet/.

The US EPA currently also funds two surface water programs as part of the Environmental Monitoring and Assessment Program: (1) Long-Term Monitoring Program (LTM), and (2) Temporally Integrated Monitoring of Ecosystems (TIME). Together these two monitoring programs provide important information on changes in water chemistry in response to the deposition of air pollutants. These programs focus on sampling of surface water quality in the eastern U.S to determine the extent which sensitive ecosystems are responding to changes in emissions as a result of the Acid Rain Program within Title IV of the Clean Air Act Amendments of 1990. This combined program (sometimes referred to as LTM/TIME) is the most geographically extensive network of sites in the U.S. that is tracking whether sensitive ecosystems are recovering from decreasing acidity of precipitation since the early 1980s.

Through collection of water chemistry data at regular intervals, in sensitive ecosystems in several regions (i.e., New England, the Adirondacks, the Appalachian Plateau, western Virginia) the value of this program has repeatedly been demonstrated through landmark papers and reports published in the scientific literature as well as in scientific reports that have informed the policy community. For example, several papers published in the peer-reviewed literature in recent years have used LTM/TIME data to examine the issue of recovery in sensitive ecosystems (Driscoll et al., 2003; Kahl et al., 2004; Webb et al., 2004). Recent policy-informing reports that have used LTM/TIME data include an assessment of the response of surface-water chemistry to the 1990 Clean Air Act Amendments (Stoddard et al., 2003) and the most recent report of the federal inter-agency National Acid Precipitation Assessment Program to the U.S. Congress (NAPAP, 2005).

The Clean Air Interstate Rule (CAIR) is currently being implemented by the EPA in part to bring about additional decreases in emissions of sulfur dioxide and nitrogen oxides and to foster the recovery of previously acidified ecosystems. This rule will result in additional emissions reductions beginning in 2010 and continuing through 2015. Data from LTM/TIME program collected during this period when combined with previous data will provide critical information on the effects of these emissions cuts in sensitive ecosystems.

Unfortunately, there are two items in the President's 2008 budget that pose a challenge to those of us in the acid rain research and policy communities. This budget shows a $1 million cut to the CASTNet program and a cut of $5.75 million (effectively zeroing out the program) to the extramural EMAP program---this item supports both the LTM and TIME programs of EPA. Without these two critical monitoring programs it will be difficult if not impossible to track the response atmospheric chemistry and acid-sensitive surface waters current and future controls on emissions of air pollutants.

6.2 Monitoring effects of mercury deposition

There is also a critical need to be able to assess the impacts of past and future controls on emissions of mercury in the U.S. Unlike acidic deposition the monitoring infrastructure has not been developed to monitor ecosystem effects of mercury deposition. In the U.S. and Canada, measurements of wet mercury deposition are largely made through the Mercury Deposition Network (MDN; http://nadp.sws.uiuc.edu/mdn/). The MDN shows that wet mercury deposition is highest in the Southeast (i.e., Florida, Mississippi) and lowest in the West.

While the data and information discussed in this testimony provide insights into the nature and extent of mercury pollution across the Northeast, many data gaps remain and most other regions of the United States do not have such a large biological data set from which to evaluate biological mercury hotspots. In addition, the current Mercury Deposition Network is too sparse and limited by its focus on wet deposition in rural areas to provide a detailed understanding of deposition patterns and their connection to local sources in the United States. In sensitive forest ecosystems most of the mercury inputs are derived from dry deposition (i.e., as particles or gases), so a wet deposition network is not completely effective in tracking total mercury loading.

The problem of insufficient mercury monitoring was recently echoed in a report by the EPA Inspector General which states, "Without field data from an improved monitoring network...'utility-attributable' hotspots that pose health risks may occur and go undetected." The reports goes on to say: "We recommend that EPA develop and implement a mercury monitoring plan to (1) assess the impact of Clean Air Mercury Rule (CAMR) on mercury deposition and fish tissue; and (2) evaluate and refine mercury estimation tools and models" (EPA 2006).

A comprehensive long-term mercury monitoring program focused on mercury deposition, watershed cycling, and biological effects would allow scientists to conduct a national scale assessment of biological mercury hotspots, and to link changes in emissions and deposition with ecosystem effects and response. At present, scientists must rely on limited information to make these important linkages. Increased mercury monitoring should extend to forest ecosystems where recent research revealed elevated mercury in insect-eating songbirds (Evers et al. 2005, Rimmer et al. 2005) but little information exists to determine how mercury accumulates in terrestrial food webs and what levels are harmful to these birds.

A roadmap for a comprehensive national mercury monitoring program was developed by a team of scientists and is detailed in Mason et al. (2005). The proposed program emerged from an EPA workshop in 2003 that brought together 32 scientists from across the United States and a number of other countries to devise a national mercury monitoring program and was recently published in Harris et al. (2007). The critical need for a comprehensive ecosystem mercury monitoring program was recently emphasized by bills introduced in both the House of Representatives and the Senate to establish such a program through a multi-agency initiative (House - H.R. 1533 "Comprehensive National Mercury Monitoring Establishment Act" Sponor: Tom Allen (D-ME). Cosponsors: James Walsh (R-NY), John McHugh (NY), Michael Michaud (ME), Mark Steven Kirk (IL), Raul Grijavla (AZ); Senate - S. 843 "Comprehensive National Mercury Monitoring Act" Sponsor: Susan Collins (R-ME), Joseph Lieberman (R-CT), Hillary Clinton (D-NY)).

Table 2. Biological effects of surface water acidification (after Baker et al. 1990).

pH Decrease	General Biological Effects
6.5 to 6.0	Small decrease in species richness of phytoplankton, zooplankton, and benthic invertebrate communities resulting from the loss of a few highly acid-sensitive species, but no measurable change in total community abundance or production Some adverse effects (decreased reproductive success) may occur for highly acid-sensitive species (e.g., fathead minnow, striped bass)
6.0 to 5.5	Loss of sensitive species of minnow and dace, such as blacknose dace and fathead minnow; in some waters decreased reproductive success of lake trout and walleye, which are important sport fish species in some areas Visual accumulations of filamentous green algae in the littoral zone of many lakes, in some streams Distinct decrease in the species richness and change in species composition of the phytoplankton, zooplankton, and benthic invertebrate communities, although little if any change in total community biomass or production
5.5 to 5.0	Loss of several important sport fish species, including lake trout, walleye, rainbow trout, and smallmouth bass; as well as additional nongame species such as creek chub Further increase in the extent and abundance of filamentous green algae in lake littoral areas and streams Continued shift in the species composition and decline in species richness of the phytoplankton, periphyton, zooplankton, and benthic invertebrate communities; decrease in the total abundance and biomass of benthic invertebrates and zooplankton may occur in some waters Loss of several additional invertebrate species common in oligotrophic waters, including *Daphnia galeata mendotae*, *Diaphanosoma leuchtenbergianum*, *Asplanchna priodonta*; all snails, most species of clams, and many species of mayflies, stoneflies, and other benthic invertebrates Inhibition of nitrification
5.0 to 4.5	Loss of most fish species, including most important sport fish species such as brook trout and Atlantic salmon; few fish species able to survive and reproduce below pH 4.5 (e.g., central mudminnow, yellow perch, and in some waters, largemouth bass) Measurable decline in the whole-system rates of decomposition of some forms of organic matter, potentially resulting in decreased rates of nutrient cycling Substantial decrease in the number of species of zooplankton and benthic invertebrates and further decline in the species richness of the phytoplankton and periphyton communities; measurable decrease in the total community biomass of zooplankton and benthic invertebrates in most waters Loss of zooplankton species such as *Tropocyclops prasinus mexicanus*, *Leptodora kindtii*, and *Conochilis unicornis*; and benthic invertebrate species, including all clams and many insects and crustaceans Reproductive failure of some acid-sensitive species of amphibians such as spotted salamanders Jefferson salamanders, and the leopard frog

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TESTIMONY OF
BENJAMIN H. GRUMBLES
ASSISTANT ADMINISTRATOR FOR WATER
U.S. ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
UNITED STATES HOUSE OF REPRESENTATIVES

I. Introduction

Mr. Chairman and members of the Subcommittee, I am Benjamin H. Grumbles, Assistant Administrator for Water at the United States Environmental Protection Agency (EPA). Thank you for the opportunity to discuss EPA's programs to protect water quality from the adverse effects of atmospheric deposition. Atmospheric deposition is a significant source of water quality impairments, and I welcome the opportunity to discuss this important issue with the Subcommittee.

II. Significance of Atmospheric Deposition as a Source of Water Pollution

EPA's 2002 National Assessment Database summarizes State water quality reports ("Section 305(b) reports") and categorizes the quality of the state's assessed waters as good, threatened, or impaired. States identified 45% of the assessed miles of rivers and streams as impaired; agriculture, hydromodification, and habitat alterations are the leading identified sources, in that order. States identified 47% of assessed lakes, ponds, and reservoirs as impaired and identified agriculture, atmospheric deposition, land application/waste sites, and hydromodification as the leading sources. Finally, States identified 32% of assessed bays and estuaries as impaired, with the leading sources identified as industrial discharges, municipal discharges, resource extraction, urban runoff/stormwater, and atmospheric deposition. About 19% of river and stream miles, 37% of lake acres, and 35% of bay and estuary square miles have been assessed. Impairment in non-assessed waters may be lower, since States often focus assessments on waters with known or suspected problems.

Atmospheric deposition of pollutants is a significant component of waterbody impairments. State Section 305(b) reports cite atmospheric deposition as a source of impairment in 26% of lakes, reservoirs, bays, and estuaries, and 5% of rivers and streams. Over 8,500 waterbodies in 43 states and Puerto Rico have been listed as impaired by mercury on state section 303(d) lists, and most of these are believed to be caused by atmospheric deposition of mercury. Reducing mercury releases to the air is important both domestically and internationally because the mercury can be subsequently deposited to water, converted to methyl mercury, and taken up by fish. In 2004, 44 States had fish consumption advisories for mercury, totaling 13.2 million lakes acres and 765,000 river miles. This represents a decrease of about 1400 river miles under advisory since 2003.

Acid rain, which results from the air-emission and subsequent deposition of sulfur dioxide and (to a lesser extent) oxides of nitrogen, is also a major source of water pollution. Acid rain causes a cascade of effects that harm or kill individual fish, reduce fish population numbers, and decrease biodiversity, as discussed more fully at www.epa.gov/acidrain/effects/surface_water.html.

Air deposition of nitrogen is also a significant contributor to the impairment of many waterbodies through the mechanism of eutrophication. Eutrophication is an accumulation of nutrients which causes an overgrowth of algae and other organisms. This increased growth of algae can cause a depletion of oxygen in shallow waters. For example, air deposition of nitrogen is a significant component of nitrogen-caused problems in many estuaries that are included in the National Estuary Program established by Congress under Section 320 of the Clean Water Act ("CWA"), including Albemarle-Pamlico Sound, NC (estimated to be 38-44% of total nitrogen contributions); Massachusetts Bays (5-27%) ; Tampa Bay (28%); Delaware Inland Bays (21%); Long Island Sound (20%); and others. In the Chesapeake Bay, air deposition of nitrogen accounts for an estimated 28% of nitrogen inputs to the Bay. Other sectors, including agriculture and municipal treatment plants also account for significant deposits. Furthermore, atmospheric deposition contributes significant amounts of nitrogen (estimated to be approximately 20%) to the Gulf of Mexico; Nitrogen, from a variety of sources including agricultural runoff and atmospheric deposition, is generally believed to be the most significant pollutant that is causing hypoxia (oxygen deficiency) to occur in the Gulf.

Air deposition of a range of other atmospheric pollutants can also contribute to impairments of our Nation's waters. For example, estuary programs in Long Island Sound, Mobile Bay, Corpus Christi Bay, Casco Bay, Santa Monica Bay, San Francisco Bay, and Tampa Bay have found that toxic metals, polycyclic aromatic hydrocarbons, and various other organic contaminants from atmospheric sources have contributed to water quality impairments. Through the National Estuary Program, EPA has funded air deposition studies and monitoring programs to better understand the nature, scope, and effects of these contaminants. In addition, EPA has funded individual studies of atmospheric deposition in Casco Bay and Tampa Bay.

III. Atmospheric Deposition of Mercury

A. Clean Air Act Programs

The U.S. has made significant progress in the reduction of industrial emissions of mercury to the air. In the last 15 years, EPA has focused most of its mercury reduction efforts on large point sources of air emissions, such as municipal waste combustors, medical waste incinerators, hazardous waste combustors, and more recently, industrial boilers, chlor-alkali facilities, and electric utilities.

In March 2005, Administrator Steven L. Johnson signed the Clean Air Mercury Rule. This rule will significantly reduce mercury emissions from coal-fired power plants across the United States. Taken together, the 2005 Clean Air Interstate Rule and the Clean Air Mercury Rule will reduce air deposition of electric utility mercury emissions by nearly 70 percent from 1999 levels when fully implemented.

With the March 2005 completion of final regulations for coal-fired power plants, the Agency now has Clean Air Act (CAA) standards in place limiting mercury air releases from most major known industrial sources in the U.S. In addition to implementing these standards, the Agency, under the CAA Area Source program, is in the process of assessing certain smaller point sources that emit mercury. Under the CAA Residual Risk program, the Agency is evaluating the remaining risks, if any, from sources for which EPA has previously issued emissions standards under CAA §112(d). Mercury is one of several hazardous air pollutants that EPA will be investigating under these programs.

B. Clean Water Act Programs

In addition to these CAA programs, EPA is reducing the water quality impacts of air deposition of mercury under the CWA. On March 8, 2007, the Office of Water issued a memorandum which provides States with a new, voluntary approach for identifying and "listing" waters as impaired by mercury mainly from atmospheric sources. This approach uses Clean Water Act tools – the 303(d) listing process - to recognize and encourage state efforts to control mercury sources that may be impacting water quality.

EPA is recommending the voluntary approach for states that have in place a comprehensive mercury reduction program. These states may place waters which have been impaired by mercury that has come primarily from atmospheric sources in a specific subcategory ("5m") of their impaired waters lists. States using this approach may also defer development of Total Maximum Daily Loads (TMDLs) for mercury-impaired waters as a result of having implemented programs to control their mercury sources.

The memorandum recommends the inclusion of the following elements in a mercury reduction program: demonstrating that the state has made some initial progress in reducing mercury sources over which they have control; identifying waterbodies in the state which are impaired by mercury derived predominantly from atmospheric deposition; identifying in-state sources of mercury; implementing appropriate programs to control the state's mercury sources (including **CAIR/CAMR** clean air act programs); describing reduction goals and targets; establishing implementation schedules; monitoring progress in reducing mercury sources; and publicly reporting the state's progress along with the 303(d) list.

This approach acknowledges the challenge of controlling mercury impairments due to air deposition through TMDLs alone. It also calls public attention to states that have strong mercury reduction programs in place. Rather than delaying action, the 5m listing approach allows states to focus resources on early implementation of mercury reduction programs and to achieve environmental results sooner.

Although states may defer mercury TMDLs under the 5m approach, if water quality standards are not achieved, States may need to develop TMDLs at a later date. States also have the option to continue developing TMDLs for mercury-impaired waters sooner, rather than deferring them. TMDLs may provide a valuable framework for identifying the sources that have contributed mercury to a waterbody, and for determining the reductions in mercury loadings that are needed to meet water quality standards. TMDLs by themselves do not provide the ability to control air sources; however, TMDLs provide a basis for further actions to control sources of mercury, including air sources.

Mercury TMDLs have been developed for 304 waterbodies in 20 states and the District of Columbia. In many waterbodies, especially in the eastern US, air deposition is the predominant source of mercury. Through the development of TMDLs, States have been able to better quantify the relative contributions of mercury from air deposition and other sources.

EPA is committed to working with states to identify innovative, effective, and efficient approaches to developing TMDLs for waters impaired by mercury, especially where air deposition is the major mercury source. Along these lines, EPA recently approved a mercury TMDL document developed by Minnesota. Minnesota's TMDL document is the first such "statewide" approach to mercury TMDLs. Rather than developing TMDLs on an individual waterbody-by-waterbody basis, the State grouped waters into two "regions", based on differences in factors that affect fish mercury levels, and developed a TMDL for each of these two regions. The TMDL report covers 511 mercury impairments, or about half of the total mercury impairments in the state.

Many states are interested in how best to control mercury-impaired waters on a watershed basis. I view Minnesota's approach as nationally significant. Minnesota's approach could serve as a model for other states, especially where a state has a large number of mercury impairments due to air deposition, and the contributions from air deposition are relatively uniform. We will continue to work with states to identify tools and approaches to develop TMDLs for mercury as well as other pollutants from air sources.

IV. Air Deposition of Other Pollutants

A. EPA's Acid Rain "Cap and Trade" Program for SO_2

The Acid Rain Program was established under Title IV of the 1990 Clean Air Act Amendments to decrease acid rain and improve public health by dramatically reducing emissions of sulfur dioxide and oxides of nitrogen. For SO_2, Congress established a national cap and trading component. The program has exceeded expectations, obtaining significant reductions earlier than required and at cost much lower than projected. Some of the broad benefits of this approach include: environmental certainty through a firm cap and rigorous monitoring that a specific emissions level is achieved and maintained; providing regulatory certainty for affected sources; allowing for compliance flexibility as sources may choose from many alternatives for reducing emissions without government interference; and public availability of all data.

Specific environmental results have been excellent. Compliance has exceeded 99 percent every year, achieving reductions of roughly 8 million tons per year of SO2; the greatest SO_2 reductions were achieved in the highest SO_2 - emitting states; acid deposition dramatically decreased over large areas of the eastern Unites States, where reductions were most critically needed; trading did not cause geographic shifting of emissions or increases in localized pollution; and the human health and environmental benefits were delivered early and broadly. Moreover, compliance flexibility and allowance trading (and banking) have reduced compliance costs by more than two-thirds from initial EPA and industry estimates.

B. Clean Air Interstate Rule

On March 10, 2005, EPA issued the Clean Air Interstate Rule (CAIR), a rule that will achieve the largest reduction in air pollution in more than a decade. CAIR covers 28 eastern states and the District of Columbia. In addition to and apart from its air pollution benefits, CAIR will result in improvements in the acid buffering capacity for lakes in the Northeast and Adirondack Mountains. Specifically, 12 percent of Adirondack lakes are projected to be chronically acidic without CAIR. However, we project that the CAIR rule will eliminate chronic acidification in lakes in the Adirondack Mountains by 2030. In addition, CAIR is expected to decrease the percentage of chronically acidic lakes throughout the Northeast. However, some lakes in the Adirondacks and New England will continue to experience episodic acidification even after implementation of this rule.

The acidification discussed above is caused by sulfur dioxide emissions. In addition, this rule is anticipated to reduce nitrogen deposition in the CAIR region through the introduction of an annual NOx control program. Nitrogen deposition has the effect of overloading aquatic ecosystems with nutrients. Reductions in the levels of nitrogen deposition will have a positive impact on eutrophication in estuaries and coastal areas in the region.

The Chesapeake Bay provides a good example of how CAIR will reduce the water quality impacts of nitrogen deposition. EPA's Chesapeake Bay Program projects that CAIR will likely reduce the nitrogen loads to the Bay by 8 million pounds per year, a reduction of 8.8%, by 2010.

Conclusion

We have made a major investment in the implementation of programs and practices to protect and restore waters that are impacted or may be impacted by atmospheric deposition. However, much more work remains to be done to achieve the program's long-term goals. We will continue to work with this Committee, our Federal colleagues, and the many partners, stakeholders, and citizens who want to accelerate the pace and efficiency of water quality protection and restoration. This concludes my prepared remarks; I would be happy to respond to any questions you may have.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CONGRESSIONAL AND
INTERGOVERNMENTAL RELATIONS

The Honorable Eddie Bernice Johnson
Chairman
Subcommittee on Water Resources
and Environment
U.S. House of Representatives
Washington, DC 20515

Dear Madam Chair:

Thank you for the opportunity to respond to questions for the record that followed an April 17, 2007 hearing on the impacts of nonpoint source pollution and atmospheric deposition on water quality. I hope this information will be useful to you and the members of the Committee.

If you have any further questions, please contact me or your staff may contact Christina J. Moody in my office at 202.564.0260.

Sincerely,

Stephanie N. Daigle
Associate Administrator

Enclosure

NONPOINT SOURCE POLLUTION:
ATMOSPHERIC DEPOSITION AND WATER QUALITY
HEARING: APRIL 17, 2007
QUESTIONS FOR THE RECORD

Question 1: The committee is concerned with EPA's failure to publish an updated National Water Quality Inventory report, as required by Section 305 of the Clean Water Act. The last report, National Water Quality Inventory 2000 Report, was submitted to Congress in 2002, and summarized water quality reports received from the states as of the year 2000. The updated report is now several years late and we are very concerned that the report may be languishing within the Administration.

As you know, the National Water Quality Inventory provides the only nationwide snapshot on both the condition of the nation's waters, and our efforts to achieve the goals of the Clean Water Act. Without current information, it is virtually impossible for Congress to perform its constitutional oversight of the water program, and make adjustments to the program to address ongoing sources of impairment.

My understanding is that there is a draft revised National Water Quality Inventory report under review within the Administration. You mention data, presumably from this report, in your testimony when referencing a 2002 National Assessment Database. As you know, the information available on EPA's internet site does not contain the complete summary information available in Part I of the published 2000 Report.

a. Question: Has the most recent National Water Quality Inventory draft report been submitted to OMB?

Answer: Yes, the National Water Quality Inventory: 2002 Report to Congress was submitted to OMB for review.

b. Question: Please indicate whether draft reports to 2002, 2004, and 2006 have been submitted to OMB.

Answer: Only a 2002 Report has been submitted to OMB. No other draft National Water Quality Inventory Reports are ready for submission.

c. Question: Please provide the dates when these reports, were, respectively, first submitted to OMB?

Answer: The 2002 Report to Congress was submitted to OMB for review in May 2006. No later Report to Congress has been submitted for review.

d. Question: When does EPA expect that the review for the most current National Water Quality Inventory draft report will be completed?

Answer: The most current National Water Quality Inventory Report is the 2002 report. It was approved by OMB on March 23, 2007 and is currently being prepared for printing and transmittal to Congress.

e. **Question: Can you provide the Committee with a draft version of the report (with summary information similar to material in Part 1 of the National Water Quality Inventory: 2000 Report) for the record?**

Answer: Yes, the draft Report is attached. It is currently awaiting final review, signature and transmittal by the Administrator to Congress.

f. **Question When the latest version of the published report is available to the public, will the backlog of other reports (for example, 2002 and 2004) also be released?**

Answer: We expect to send the draft 2004 report to OMB for clearance in February 2008, and the draft 2006 report to OMB in June 2008. Each Report is based on electronic assessment information submitted by states that must be migrated into a national database, geo-referenced and then provided back to the states for review and approval to ensure accuracy before the agency can tally the state findings into a national report. We anticipate being able to streamline this process in the future as more and more states adopt a consistent electronic format that allows expeditious processing into EPA's assessment database. EPA will be posting the latest available state-by-state assessment information, as soon as it is approved, on our website at http://www.epa.gov/waters/305b/index.html.

g. **Question: As you know, consistent longitudinal, national summary data (similar to that which you cited in your written and oral testimony) is important for Congress to fulfill its oversight obligations and to know whether adjustments should be made to the water program. Any gaps in this data record would impede these congressional functions.**

Answer: The National Water Quality Inventory Report to Congress does not provide a consistent longitudinal national summary of the condition of the nation's waters and the causes and sources of water quality degradation. The reasons that the state and national 305(b) reports do not meet this objective are well documented in a number of studies by independent organizations, including the attached report from the U.S. Government Accountability Office (March 2000). One limitation is the Report summarizes information for only a portion of the Nation's waters amounting to 19% of river and stream miles, 37% of lake acres, and 35% of bay and estuary square miles nationally. Another limitation is these data were collected using a variety of sampling methods and parameters, water quality standards and interpretation methods, extrapolation methods, time periods and locations.

The Report to Congress does provide useful information summarizing the nature of water quality problems identified by state assessment programs (e.g., leading sources and causes of impairment). It identifies, for the subset of assessed waters, which waters are not meeting water quality standards and helps states set priorities for restoration actions. As states begin to geo-reference the assessment units and results for their 305(b) report, this report will allow us to track the effectiveness of restoration actions in those waters. The traditional site-specific assessments summarized in the 305(b) reports do not provide a comprehensive picture of the extent of a state's waters that are healthy or degraded.

EPA is continuing work to improve the quality of the Report to Congress. One key effort is building state capacity to implement probability surveys of state waters in a nationally consistent manner. Probability surveys use a statistical approach for unbiased selection of monitoring sites that represent a population of water resource units (e.g., lakes, stream miles, wetland area, or estuarine area). This is a cost effective design for reporting on the condition of all waters, tracking whether waters are getting better or worse statewide, and identifying key stressors that are both widespread and pose a significant risk to water quality. EPA supports stochastic monitoring statistical network designs to complement traditional targeted monitoring.

Currently, about 30 states are implementing state probability surveys for at least one water resource type and all 50 states are collaborating in national/regional scale surveys intended to build state capacity for state surveys and generate statistically valid estimates of the condition of the nation's waters. EPA and states have completed three National Coastal Condition Reports (the latest is in draft) and the Wadeable Streams Assessment using the probability survey approach. To see these national reports and to learn more about upcoming surveys of lakes, rivers and streams, and wetlands, visit http://www.epa.gov/owow/monitoring/reporting.html.

In addition to the work EPA does with state agencies, consistent national water-quality summary data and information is available from the USGS. EPA often uses USGS data in decision making by the Office of Water, Office of Pesticide Programs, and the Office of Air and Radiation. USGS has provided considerable national information on pesticide use and occurrence, as well as information on the occurrence of fuel oxygenate compounds in water. Two national publications from USGS were distributed in 2006. The first of pesticides is "Pesticides in the Nation's Streams and Ground Water 1992 – 2001", USGS Circular 1291 is available at http://ca.water.usgs.gov/pnsp/pubs/circ1291/. The second publication is "Volatile Organic Compounds in the Nation's Groundwater and Drinking Water Supply Wells," UGSS Circular 1292 is available at http://water.usgs.gov/nawqa/vocs/national_assessment/. These national perspectives supplement the work of state agencies in characterizing the nation's water quality conditions.

<u>Question 2</u>: U.S. air emissions of mercury come from a number of major sources. Of these, the largest source is coal-fired electric power plants. With the exception of electric utilities, Section 112 of the Clean Air Act regulates all major sources of

mercury emissions through Maximum Achievable Control Technology. The 1990 Clean Air Act required the EPA to determine whether regulation of mercury from power plants was warranted, and in a 2000 regulatory finding, the Agency concluded that it was. In 2005, however, EPA discarded its previous finding for the cap-and-trade system under the Clean Air Mercury Rule.

To what extent did the EPA Office of Water enter into discussions with the EPA Office of Air and Radiation as to the type of impacts this policy change would have on mercury pollutants entering the nation's waterways?

Please describe these discussions.

In your opinion, should this exemption under the CAA Section 112 continue?

Answer: In developing the Clean Air Mercury Rule (CAMR), EPA's Office of Air and Radiation (OAR) followed Agency guidelines for regulatory action development. The regulation was considered a Tier 1 rulemaking, requiring concurrence by an internal Agency work group. The working group consisted of OAR, Office of Water, Office of Research and Development, Office of General Counsel, Office of Enforcement and Compliance Assurance and Office of Policy, Economics and Innovation which reviewed the draft and final regulation.

EPA's regulation was not based on, and did not create, an exemption for coal-fired power plants under section 112. Rather, the rulemaking was based on a specific, separate provision of section 112, section 112(n)(1)(A), that Congress adopted only for coal-fired utilities. In that provision, Congress directed EPA not to regulate power plants under section 112 unless EPA first determined that regulation under section 112 was both "appropriate" and "necessary" after considering public health risks reasonably anticipated to occur as a result of power plant emissions following imposition of other requirements of the Act. Pursuant to section 112(n)(1)(A), EPA determined it was neither appropriate nor necessary to regulate coal or oil-fired units under Section 112 of the Clean Air Act, and developed the Clean Air Mercury Rule that establishes standards of performance for new and existing coal fired electric utility steam generating units. EPA conducted a lengthy and comprehensive rulemaking effort that resulted in the issuance of the final section 112(n) Revision Rule and the Clean Air Mercury Rule (CAMR), which resulted in the first ever regulation of mercury emissions from coal-fired power plants in the U.S. EPA explained its rationale in the final rule and thereafter conducted a reconsideration process under the Clean Air Act, taking final action on reconsideration in late May 2006. The final section 112(n) revision rule and the Clean Air Mercury Rule are currently the subject of active litigation in the D.C. Circuit Court, [and EPA expects a decision from the court sometime next year]. EPA is vigorously defending these final rules.

Question 3: What is the EPA Office of Water doing to actively coordinate with EPA's Office of Air and Radiation to reduce atmospheric deposition?

Please provide examples.

What are the expected results of this coordination?

__Answer__: EPA's Offices of Water (OW) and Air and Radiation (OAR) continue to coordinate on an array of air deposition issues such as identification of sources, modeling the fate and transport of pollutants, monitoring deposition, understanding health and environmental effects, and developing policies and regulations. As described in the answer to Question 2 above, OW participates on OAR regulatory workgroups, including those for criteria pollutants as well hazardous air pollutants, involving air pollutants that may adversely impact water quality. In addition to the CAMR work group, other regulatory work groups led by OAR in which OW has participated include those for National Ambient Air Quality Standards (NAAQS) and the Risk and Technology Reviews, such as the Coke Ovens Rule. OAR also participates on work groups for OW-led actions, including the Concentrated Animal Feeding Operations (CAFO) Effluent Guidelines and the Methylmercury Criterion Implementation Guidance.

One of the primary areas in which the two offices have coordinated in order to reduce atmospheric deposition involves the Total Maximum Daily Load (TMDL) Program under the Clean Water Act. This is an important area for coordination because TMDLs identify pollution reductions needed to achieve water quality standards, including reductions needed in air deposition. OAR and OW co-funded pilot projects in Florida and Wisconsin that in part explored and refined the use of atmospheric deposition modeling techniques and inputs that could be used in developing TMDLs for mercury-impaired water bodies where atmospheric deposition loads dominate. The lessons learned in these peer-reviewed pilot projects helped guide subsequent TMDL-related deposition modeling such as that used by EPA Region 6 for the Southern Louisiana Mercury TMDL. Examples of other TMDLs in which the two offices coordinated reviews of State submitted TMDLs include the Statewide Minnesota Mercury TMDL and the Savannah River (Georgia) Mercury TMDL. The two offices are also coordinating review of the recently developed Draft Northeastern States Regional Mercury TMDL.

In another recent TMDL-related activity, OW worked with OAR on development of a guidance document regarding listing waters impaired by atmospheric deposition under Clean Water Act Section 303(d). Under this voluntary approach, as described in our testimony, states with comprehensive mercury reduction programs may put their waters impaired by mercury mainly from atmospheric sources in a subcategory "5m" of their impaired waters list and defer development of TMDLs for those waters. The approach is intended to recognize states that have comprehensive mercury programs in place to reduce mercury from in-state sources, particularly air sources, and thus achieve reductions in those sources prior to developing a TMDL.

OAR has partnered with OW and the Office of Research and Development in developing deposition modeling techniques used in TMDLs. OAR also supplies essential modeling inputs such as emission inventories to OW, EPA Regions, and States who in turn conduct deposition modeling used to develop and implement TMDLs. At the same time, OAR has used OW developed tools such as Mercury Maps in order to estimate necessary reductions in mercury deposition to meet mercury fish tissue criteria. Similarly, OAR is a partner in the National Atmospheric Deposition Program and the Mercury Deposition Network which provide valuable monitoring data to OW that are used to validate deposition modeling results, while OW provides water, sediment, and fish tissue monitoring data to OAR in order to aid its multimedia modeling efforts. OAR is working with NADP membership to establish a new, coordinated network of atmospheric mercury monitoring sites for estimating dry deposition.

Overall, the Agency is striving to implement a multimedia approach to the air and water programs through cooperative efforts and integrated research.

Question 4: A significant portion of your testimony spoke to the use of air-related tools as a means to address atmospheric deposition – as opposed to using tools to address NPS runoff from the land itself.

I realize that some portion of atmospheric deposition is direct -- that it falls directly onto waters – and that this deposition type is more appropriately addressed through air controls. I would also assume that a significant portion falls onto the land and only results in water quality impairment when it runs off the land into neighboring waters.

This hearing, as you know, was held to highlight areas for improvement in controlling nonpoint sources of pollution.

a. Question: What percentage of atmospheric pollutants are direct (falling directly onto water bodies) and what percentage are indirect (falling onto land and then being washed into water bodies)? (Please provide year of data collection for data reported in your response.)

Answer: The percentage of direct vs. indirect pollutant loading can vary significantly from water body to water body. Factors influencing the relative apportionment for a given pollutant include the spatial distribution of contributing sources in relation to the land and water surfaces and the ratio of land to water surface area within a given drainage basin.

Of the various atmospheric pollutants that can have negative impacts on water quality, the direct vs. indirect loadings of deposited nitrogen has been studied the most. In a 2001 report published by the National Geophysical Union entitled "Nitrogen Loading in Coastal Water Bodies - An Atmospheric Perspective," the direct vs. indirect atmospheric nitrogen deposition loadings to thirty-four watershed/estuary systems on the Atlantic and Gulf coasts of the US are reported. The average percentage of the atmospheric loading due to direct deposition to the water surfaces examined is approximately 29%, with the remaining 71% reaching the water bodies via pass through of nitrogen falling onto land surfaces in those watersheds. The range of direct vs. indirect is, however, highly site dependant with the lowest direct percentage contribution of approximately 1% falling onto the Merrimack River while the highest direct percentage reported was 85% for Terrebonne Bay. Indirect loadings dominated over direct loadings in 27 of the 34 systems examined, suggesting land use practices and effective means to reduce non-point source run-off have the potential to lower nitrogen loadings to many water bodies.

b. **Question:** What reduction in water body impairment due to mercury, nitrates, sulfates, other metals (excluding mercury), pesticides, and combustion emissions (excluding nitrates) does EPA project could occur if a more effective ground-based nonpoint program were implemented?

Answer: Once pollutants have been deposited from air to the ground, they are subject to the same transport mechanisms as pollutants that are present on the land surface that were derived from land-based sources. Thus, for example, if nutrients or pesticides are deposited from the air onto farm fields, they simply add to the nutrients and pesticides that are already on that land. From that point on, they will be subject to the broad variety of mechanisms that pertain to those compounds, including uptake by plants and/or release to surface waters, ground waters, or even back into the air. For example, some nitrogen may be returned to the air in gaseous form, just as nitrogen fertilizer that is applied to the land may be transformed into a gaseous form and be volatilized and thereby returned to the air. Similarly, pollutants deposited from the air onto urban areas would simply be added to the pollutant loads that already exist in the urban environment.

Once pollutants have fallen on the land, they are subject to controls through the same mechanisms as pollutants that have been derived from land-based sources. Those management measures and practices that have been designed to prevent or reduce runoff of pollutants from the land would be the same ones that are available to prevent or reduce the runoff of those pollutants that are deposited from the air.

EPA's Office of Water has many efforts that are designed to reduce the transport of pollutants from the land to the water, and these would be applicable to all pollutants on the land, regardless of their origin. Under Section 319 of the Clean Water Act, EPA provides funding support and technical assistance to State nonpoint source agencies to address nonpoint source pollution. They and their many partners implement programs and on-the-ground projects to control soil erosion, manage nutrients, and address other sources of nonpoint pollution, using a broad palette of known management measures and practices.

Due to the site- and pollutant-specific nature of nonpoint source pollution, it is not possible to make general statements as to what reductions in waterbody impairment would occur as the result of improvements in nonpoint source program implementation. Clearly, enhanced or increased implementation of nonpoint source control programs and practices in general will result in greater or speedier success in reducing nonpoint source pollutants that have been deposited from the air onto the land. However, it is not possible to quantify the general amount of improvement, which will vary depending upon a broad set of local factors.

Given the importance of local factors in determining what efforts will be needed to effect successful watershed protection and remediation, EPA is relying on two locally-based tools to achieve our water quality goals. First, States develop total maximum daily loads (TMDL's) under Section 303(d) of the Clean Water Act, which are used identify the amount of point and nonpoint source pollutant load reductions that will be needed to meet water quality standards. When air deposition is a significant source of pollutants on the land, the TMDL is written to include the pollutant contribution from air deposition; this information is then factored into the computation of needed reductions and the plan for reduction of those pollutants. Second, through the national nonpoint source program under Section 319 of the Clean Water Act, EPA funds the development and implementation of watershed-based plans, based on TMDL's, that control nonpoint source pollutants either at the source or at a point where their transport may be intercepted or reduced.

EPA and the States are striving to implement the Section 319 program as effectively as possible using this approach. Under this approach, States analyze the pollutant levels that must be achieved in each waterbody to meet water quality standards on a waterbody-by-waterbody basis. The effectiveness of specific practices varies considerably from watershed to watershed, based on a large variety of factors, such as the nature of land-use practices; soil types, topography of the land; type, size, and configuration of affected waterbodies. These are considered for each watershed in fashioning the watershed-based plan. EPA believes that the implementation of good-quality watershed-based plans is the most effective approach to achieve very significant water quality improvement nation-wide.

To implement TMDL's and watershed plans, EPA relies on a broad variety of agencies, programs, and funding sources. For example, some of the primary funding sources that are used to supplement Section 319 funding to reduce nonpoint source pollution are the set of conservation programs implemented by the U.S. Department of Agriculture; the State Revolving Loan Fund program implemented by EPA under Title VI of the Clean Water Act; and a broad variety of state funding programs.

c. **Question:** What efforts are being carried out by the Office of Water to reduce the transport of these land-side depositions of pollutants to the waters?

Answer: In addition to all of our cooperative efforts with the Office of Air and Radiation to reduce the land deposition of air pollutants, EPA's Office of Water relies to a very significant extent on a watershed-based planning and implementation approach to solve water quality problems, as explained in response to Question 4(b) immediately above. This approach is used regardless of the original source of the land-based pollutants. Hundreds of watershed projects are being implemented throughout the United States to implement these watershed plans.

Equally important, the Office of Water and state nonpoint source agencies multiply the effects of their own efforts through enlisting, engaging, and cooperating with many partners to implement watershed-based projects. For examples, see www.epa.gov/nps/success, which features many successful Section 319-funded watershed projects that have solved water quality problems by removing or reducing nonpoint source pollutants that impaired the waterbody. Each of these stories ends with a section entitled "Partners and Funding", which identifies the set of public and private entities that were involved in making the project a success.

In addition, EPA engages in a wide range of activities to promote effective control of land-based pollution sources. These include technical guidance; training; promotion of watershed-based approaches; watershed-based outreach and education programs; water quality monitoring; partnering with industry and citizens groups; and many other activities to promote greater knowledge and awareness of nonpoint source pollution and available solutions.

Submitted by
Lenny Fineday

Leech Lake Band of Ojibwe

George Goggleye, Jr., Chairman
Arthur "Archie" LaRose, Secretary/Treasurer
District I Representative District II Representative District III Representative
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Testimony of The Honorable George Goggleye Jr., Chairman
Leech Lake Tribal Council
115 Sixth Street NW
Cass Lake, MN 56633

To

Chairwoman Johnson and Distinguished Members of the House
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment

Regarding

Non-Point Source Pollution: Atmospheric Deposition and
Water Quality

April 17, 2007

Testimony of The Honorable George Goggleye Jr., Chairman
Leech Lake Tribal Council
115 Sixth Street NW
Cass Lake, MN 56633

To

Chairwoman Johnson and Distinguished Members of the House
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment

Regarding

Non-Point Source Pollution: Atmospheric Deposition and Water Quality

April 17, 2007

Good afternoon Madam Chairwoman and members of the Committee. I am Lenny Fineday, Director of Leech Lake's Administration and Governmental Affairs Department. I come before you today representing the Chairman of our Tribal Government, The Honorable George Goggleye Jr. The Chairman extends his greetings to the Committee and regrets that he cannot be here today.

Thank you for taking testimony today on this critical issue of non-point source pollution impacts to water quality. There are several toxic pollutants or contaminants that are known to be capable of adversely impacting our watersheds and waters via atmospheric deposition. Mercury, Dioxins and PCBs (polychlorinated biphenyls) quickly come to mind. Of these, mercury is the most ubiquitous because it comes from any fossil fuel combustion source and is deposited through atmospheric deposition both into the watersheds and directly into lakes. The fish in all of our Tribal lakes, and in all Minnesota lakes, contain mercury from atmospheric deposition. Because of the widespread adverse impacts of mercury I will direct my remarks today to this atmospherically deposited non-point source pollutant.

Briefly, what do we know about mercury and its adverse impacts? Mercury is a potent neurotoxin and human developmental impacts are well described.[1] Mercury falling out of the air into a lake or watershed becomes methylated, usually through natural bacteriologic processes. Once methylated the mercury enters a terrestrial or aquatic food chain.[2] All forms of mercury may be transformed biologically to methylmercury. Once methylmercury is incorporated into a food chain it may be bio-accumulated (build up in an organism or body) and biomagnified as one organism eats another. Human exposure to mercury occurs primarily (95%) through consumption of fish and seafood. Because mercury is a potent neuro-toxin, exposure to small amounts in the womb and during childhood can cause permanent neurological damage. In addition to IQ reduction, mercury toxicity has been associated with childhood diseases and disorders including mental retardation, cerebral palsy-like symptoms and hyperactivity[1], as well as heart disease in men. An additional sobering fact regarding the toxic impacts of mercury is that the slope of the dose-response curve appears to be steeper at lower doses, a term known as supralinear.[3] This means that even at very low doses mercury can cause significant adverse impacts to children and, impacts to fetuses may occur with minimal or no apparent symptoms in the mother. The following quote by the physician Dr. Ian Donald must be in the foreground of our thoughts as we deliberate mercury issues: "The first 38 weeks of life spent in the allegedly protected environment of the amniotic sac are medically more eventful and more fraught with danger than the next 38 years in the lifespan of most human individuals."[4]

Tribes using their fishery resources are disproportionately impacted by mercury contamination because of their generally higher fish consumption as compared to the overall U.S. population. Based on human blood mercury research by Schober[5], the U.S. Centers for Disease Control and Prevention estimates that 8% of American women of childbearing age have blood mercury levels above EPA safe levels. This percentage increases by four times to 31.5% for Native American women with blood mercury levels above the safe limit established by EPA.[6]

The primary reason that Indian women may have elevated blood mercury levels is because Tribal members, particularly members of Tribes in and around the Mississippi and Great Lakes watersheds, harvest fishery resources for our nutritional needs in accordance with our Federally protected Treaty Rights. Good, clean fish are widely recognized as an excellent source of protein and healthful omega oils. The United States Environmental Protection Agency (EPA) reports that the average American consumes approximately 17.5 grams of fish per day. This translates to about 14 pounds of fish per person per year. Our Tribal sustenance fish consumption rate is over 200 grams per day or about 180 pounds of fish per year. I must note here that some Tribes report per person fish consumption rates of more than 365 pound per year. Consequently, Tribal exposure to mercury via fish ingestion may be 10 times greater, or more, than the average American.

Chairman Goggleye asked his technical staff to provide some specific mercury impact information for his testimony to your Committee here today. The ability of mercury to cause IQ deficits in children is perhaps the most widely recognized quantifiable mercury impact. The following calculations are derived from the findings of the three major studies that have been done regarding mercury impacts to children, the EPA, and our ongoing Tribal research of mercury in fish. The three major studies are named for their geographic locations: Faroe Islands, New Zealand and Seychelles. The range of potential IQ deficit for children in the above studies is quite large, spanning from -0.53 to -0.024 IQ point for each part per million of maternal hair mercury.

Our assessment of potential IQ impacts to Leech Lake children incorporates the above referenced study data, Tribal specific fish mercury data and Tribal seasonal fish consumption data (bolus dosing). All of this data translates to potential IQ losses of up to 14 IQ points per Leech Lake child. Then, as distasteful as this may be, using EPA's economic valuation per IQ point of $11,871, a child losing 14 IQ points to mercury would also be at an economic disadvantage of $166,194.

These potential impacts are clearly unacceptable.

Perhaps mercury can be a rallying point for all nations, states, cities and counties to say enough is enough with pollution. We need to constructively engage as humans and as governments to expeditiously move our policies and regulations in a direction that puts health and welfare at the top of our priority list. After all, if we are healthy we can be economically productive and most able to pursue our chosen cultural traditions be they lacrosse or baseball or soccer, sauna or sweatlodge, beadwork or watercolor painting. But first and foremost, to pursue happiness as we describe it for ourselves, we need our health.

We, as Indian people, cannot afford to relinquish the fish that have sustained us for centuries. Fish are an integral part of our culture, who we are. Thank you again for allowing me time to speak here today.

Miigwetch.

Testimony of Chairman Goggleye
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Chesapeake Bay Foundation, Inc.

STATEMENT

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BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
COMMITTEE ON TRANSPORTAION AND INFRASTRUCTURE

CONCERNING
NONPOINT SOURCE POLLUTION: ATMOSPHERIC DEPOSITION AND WATER QUALITY

PRESENTED ON
APRIL 17, 2007

Nonpoint Source Pollution: Atmospheric Deposition and Water Quality

This statement focuses on the impacts of air pollution on water quality in the Chesapeake Bay Region, Exhibit 1 (the Chesapeake Bay Watershed) & Exhibit 2 (the Chesapeake Bay Airshed), and the inability of the current statutory scheme to adequately control this pollution.

IMPACTS

Air pollutants such as mercury, sulfur dioxide (SO2), and nitrogen oxides (NOx) are emitted into the atmosphere from various sources and eventually fall directly into or run off the land into bodies of water. These pollutants lead to fish contamination, acidification, and excess algae blooms that block sunlight and deprive aquatic organisms of oxygen.

Acidification

Scientists, legislators, and policy makers have been aware for decades that air pollution can affect water quality. For example, the 1990 Title IV amendments to the Clean Air Act (better known as the Acid Rain amendments) were driven by the acidification of numerous lakes and streams throughout the Northeast caused by air pollution. 42 U.S.C. § 7651. The lowering of pH (acidification) in those bodies of water due to sulfur dioxide and nitrogen oxide air pollution had significant adverse impacts on fish and other aquatic wildlife. Despite a substantial body of evidence acquired over a long period of time, it took many years for this issue to be addressed.

Unfortunately, in many mountain lakes and streams, the reductions required by Title IV have not been sufficient. Acid Deposition Standard Feasibility Study Report to Congress, EPA 430-R-95-001a, U.S. Environmental Protection Agency, Office of Air and Radiation, Acid Rain Division, Washington, D.C (1995). In the Bay Region, four areas particularly susceptible to continued acidification are Shenandoah National Park (a 100-km segment of the Blue Ridge Mountains in western Virginia), St Mary's River Wilderness Area (the Saint Mary's River drains the western slope of the Blue Ridge Mountains in the George Washington National Forest), and the Otter Creek and Dolly Sods Wilderness areas (located in the Monongahela National Forest in north-central West Virginia). Exhibit 2. *See* Baker, L.A., A.T. Herlihy, P.R. Kaufmann, and J.M. Eilers, *Acidic lakes* *and streams in the United States: the role of acidic deposition*, Science, 252: 1151 (1991).

For the Chesapeake Bay and its tributaries, mercury and nitrogen pollution from atmospheric deposition are significant problems.

Mercury

The problem air borne mercury presents is quite insidious. Mercury is emitted into the air in several chemical forms. One form, reactive gaseous mercury, falls to earth and through a complex biological process becomes methylmercury that is taken up by aquatic organisms. U.S. EPA, Mercury Study Report to Congress, EPA-452/R-97-005 (December 1997), Vol. I: Executive Summary & Vol. III: Fate and Transport of Mercury in the Environment. Eventually this form of mercury finds its way into fish tissue. People consume the fish and are exposed to the pollutant. Mercury is a harmful neurotoxin that is especially damaging to the unborn and small children. National Research Council, *Toxicological Effects of Methylmercury* (prepublication copy July 2000). Harm to biota such as birds and small mammals has also been well documented. *See generally* Biodiversity Research Institute, *Mercury Connections, The Extent and Effects of Mercury Pollution in Northeastern North America*, at 12-13, 16, 18 and 20 (2005).

What is insidious about this problem is that expectant mothers are encouraged to eat fish because it has well recognized health and cognitive benefits for their children. Unfortunately, one cannot simply look at a fish or a piece of fish in the market and determine whether it is contaminated or not. Further, surveys have determined that health advisories are ignored. CITE Thus, thousands of unborn babies and children are needlessly exposed to this danger every year and instead of promoting healthy food we are actually risking their health. Kathryn R. Mahaffey, *et al., Blood Organic Mercury and Dietary Mercury Intake, National Health and Nutrition Examination Survey, 1999 and 2000*, 112 Env'tl Health Persp. 562 (April 2004); Mahaffey, *Methylmercury: Epidemiological Update*, Presentation at Fish Forum 2004).

The primary atmospheric sources of mercury pollution are coal burning power plants and waste incinerators. EPA has imposed strict standards on waste incinerators. Mercury levels in fish located in bodies of water near those sources have been dramatically reduced since promulgation of those regulations. Florida Dept. of Environ. Pro., The Everglades Mercury TMDL Pilot Study: Final Report, 2003. Regrettably, EPA has failed to take similar action with respect to coal fired power plants.

In 2000, EPA found that mercury posed a serious health risk and should be governed by strict, maximum achievable control technology (MACT) standards, 42 U.S.C. § 7412. 65 Fed. Reg. 79,825. However, the Agency later reversed course and decided to remove power plants from the MACT list, 70 Fed. Reg. 15994 (Mar. 29, 2005), and, instead, subject those plants to a cap and trade program. 70 Fed. Reg. 28606 (May 18, 2005). The Chesapeake Bay Foundation, several other citizen groups, and numerous states have sued EPA over this flawed rule that does not fully address the local impacts associated with utility mercury emissions.

Research in the Chesapeake Bay airshed has confirmed that mercury emitted from coal fired electric utilities contributes to local deposition. Mark Cohen, NOAA, *Modeling the Fate and Transport of Atmospheric Mercury in the Chesapeake Bay Region* (May 17, 2004); Mark Cohen, NOAA, *Modeling the Deposition and Transport of Atmospheric Mercury to the Great Lakes (and the Chesapeake Bay)* (June 27 – July 2, 2004). Keeler, *et al., Sources of Mercury Wet Deposition in Eastern Ohio, USA*, Environ. Sci. Technol. 2006, 40,5874-5881. In response, many states have enacted legislation much stricter than the federal standard. *See e.g.*, Maryland Healthy Air Act, 2006.

As you can see from Exhibit 3, mercury pollution is the number one source of water impairment in the nation. In the Chesapeake Bay region, one hundred and forty-one bodies of water are impaired due to mercury contamination in fish. http://oaspub.epa.gov/waters/national_rept.control#IMP_STATE A health advisory is listed for Maryland's state fish, the rockfish, throughout Maryland's portion of the Chesapeake Bay. All water bodies in Pennsylvania are impaired for mercury. According to a Virginia Health Department official, other state waters are not listed simply because they have not been tested. Given the population within the Bay region, the potential health effects and impacts to recreational and commercial fishing are tremendous.

Nitrogen

Nitrogen deposition to the Chesapeake Bay and its tributaries causes excessive algae blooms. Some of this alga is toxic to humans and wildlife. However, the most deleterious effect of these blooms is how they deplete the water of oxygen necessary for aquatic life. Hardest hit are sessile benthic organisms such as oysters and plants that cannot swim to more oxygenated waters. However, if the area of depletion is large, even mobile organisms can be adversely affected. Crab "jubilees" where crabs run on to the land for air have been reported in several areas of the Bay. In 2003, the Chesapeake Bay Program identified the largest area of anoxic water in the mainstem of the Bay ever recorded. Exhibit 4, Chesapeake Bay Oxygen Levels July 7-9, 2003.

It is estimated that approximately one fourth of the total nitrogen load to the Bay comes from air pollution. http://www.chesapeakebay.net/air_pollution.htm The sources of nitrogen air pollution include mobile sources such as automobiles, trucks, and shipping. Stationary sources like power plants and industrial manufacturing also contribute to the load. In addition, cattle and poultry production contribute nitrogen to the air in the form of ammonia emitted as a gas from manure. *Id.*

CURRENT REGULATORY SCHEME

Unfortunately, there is no clear statutory way in which to control air pollution that harms water quality.[1]

The Clean Air Act sets ambient air standards. That is, standards that protect health and visibility due to pollution in the air, not on the land or in the water. 42 U.S.C. § 7409. While there are secondary standards that can address impacts to natural resources, they are typically only triggered when a new air pollution source or a source that wants to increase emissions affects a national park or wilderness area. 42 U.S.C. §§ 7475, 7491.

[1] In its "Atmospheric Deposition and the Chesapeake Bay" power point presentation available on-line, the Chesapeake Bay Program, an arm of US EPA, recognizes that the Clean Air Act and the Clean Water Act "were written without any consideration of the relationship between air and water." http://www.chesapeakebay.net/air_pollution.htm

The Clean Water Act sets effluent limits for discharges directly to water from point sources. Point sources are defined as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." 33 USC § 1362(14). While it could be argued that this definition includes emissions from a power plant stack, for example, that is not how the act has been interpreted. Thus, air pollution cannot be directly addressed via the Clean Water Act.

Some states and regions have attempted to address water pollution by formulating Total Maximum Daily Loads (TMDL) for specific water bodies or all similarly impaired waters within a state. For example, several Northeast states recently drafted a region wide TMDL for mercury impaired waters in their respective jurisdictions. While section 303 of the Clean Water Act requires states to identify waters impaired by a particular pollutant and to then propose TMDLs for those waters that are designed to remove the impairment, 33 USC § 1313(d), there is no statutory requirement that they implement a plan to stop the pollution. *See Sierra Club v. Meiburg*, 11th Circuit.

Although the Northeast states have done much to reduce mercury pollution from sources within their borders, they readily admit that the bulk of the problem is coming from out of state sources. They further recognize that current federal Clean Air Act programs such as the Clean Air Mercury Rule and the Clean Air Interstate Rule will not entirely alleviate the problem. Tacitly recognizing they are powerless to address this issue under the current statutory structure, these states call upon EPA to implement plant specific MACT limits for mercury from coal fired power plants under section 112(d) of the Clean Air Act. Thus, they have thrust the ball back into EPA's court.[2]

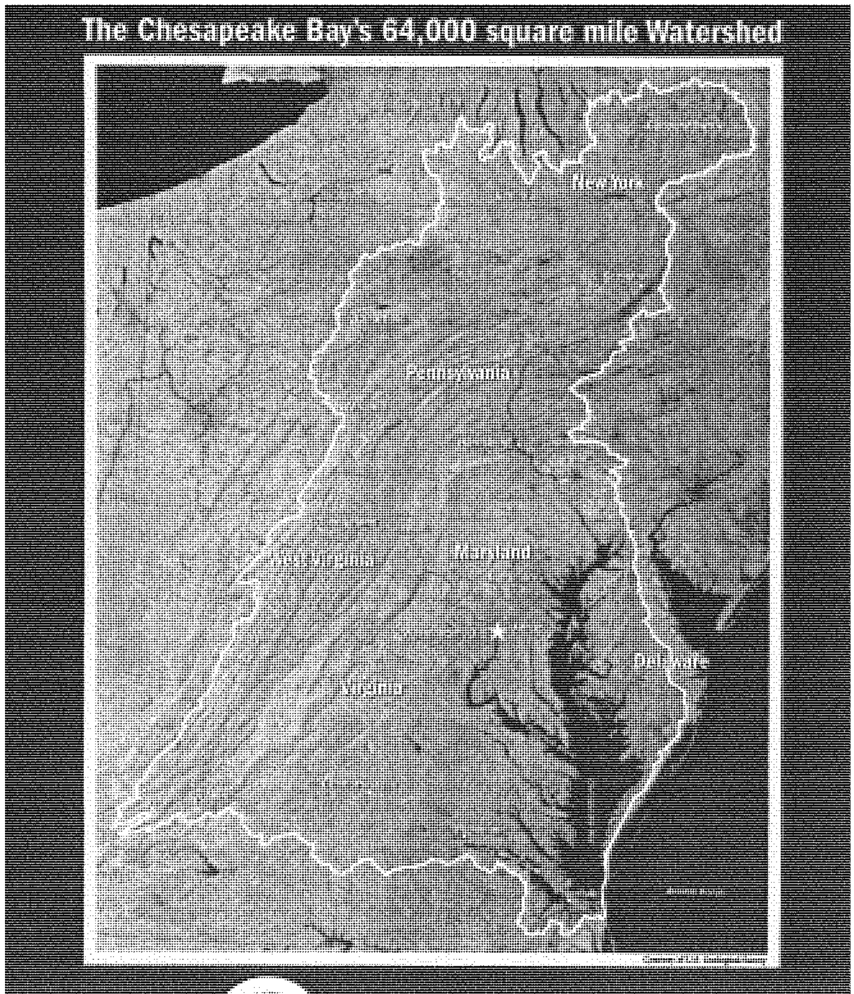
Given this statutory "gap," citizen groups have had to be creative in their attempts to control the impact of air pollution on water. For example, the Waterkeeper Alliance petitioned the NAFTA Commission for Environmental Cooperation to investigate why US EPA has failed to enforce the Clean Water Act to address mercury pollution from coal fired electric utilities. http://www.waterkeeper.org/mainarticledetails.aspx?articleid=207

[2] These same states are parties to the suit against EPA for removing power plants from the MACT list and promulgating CAMR.

They have also sued a US utility for allegedly polluting Canadian waters with mercury. http://www.waterkeeper.org/mainarticledetails.aspx?articleid=286 To date, no similar action has been successfully brought in a United States court.

POSSIBLE SOLUTION

A possible solution to this dilemma is to regulate stationary air sources like point source water pollution. There are several models that can determine the deposition patterns of these pollutants from individual or multiple sources. *E.g.*, AERMOD, CALPUFF and CMAQ. http://www.epa.gov/scram001/ These models can be used to determine the estimated pollutant loads to a specific watershed by each source. Modeled estimates could be verified by air pollution deposition monitors located in each watershed. As states develop and implement pollutant load allocations for specific bodies of water, each significant air source's contribution to that allocation can be determined and their emissions limited via an air pollution permit.



CHESAPEAKE BAY FOUNDATION
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Exhibit 1

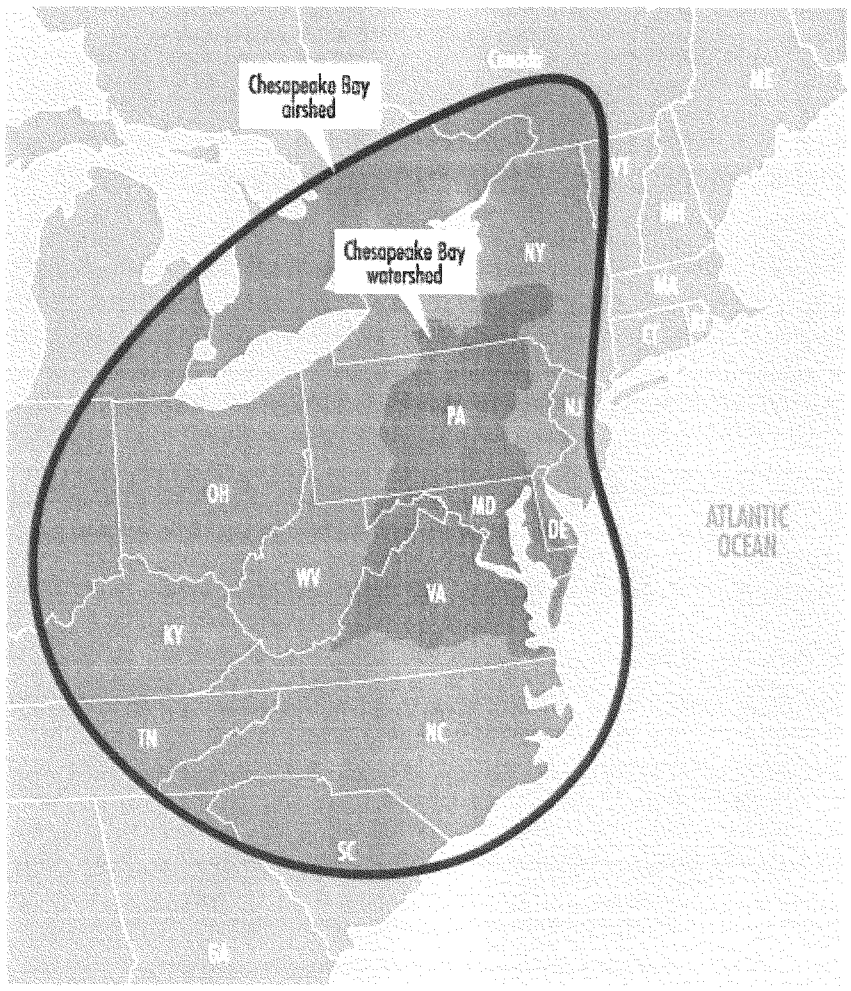
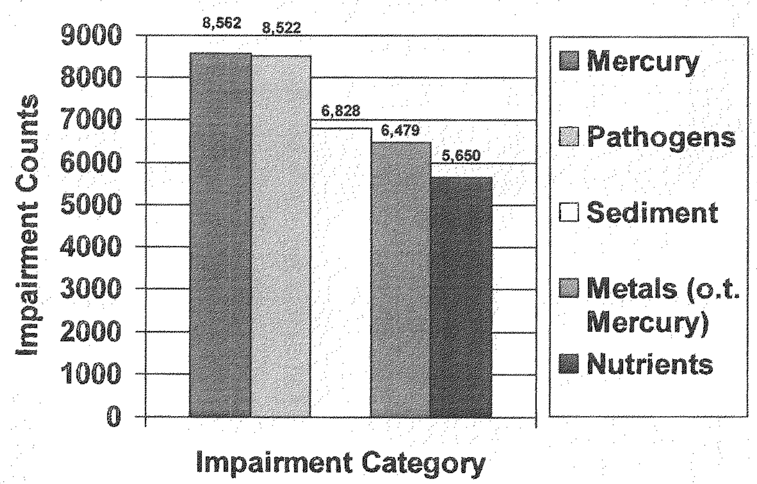

Chesapeake Bay airshed
Chesapeake Bay watershed
NY
PA
NJ
OH
MD
DE
WV
VA
KY
TN
NC
SC
GA
VT
NH
MA
CT
ME
ATLANTIC OCEAN

Exhibit 2

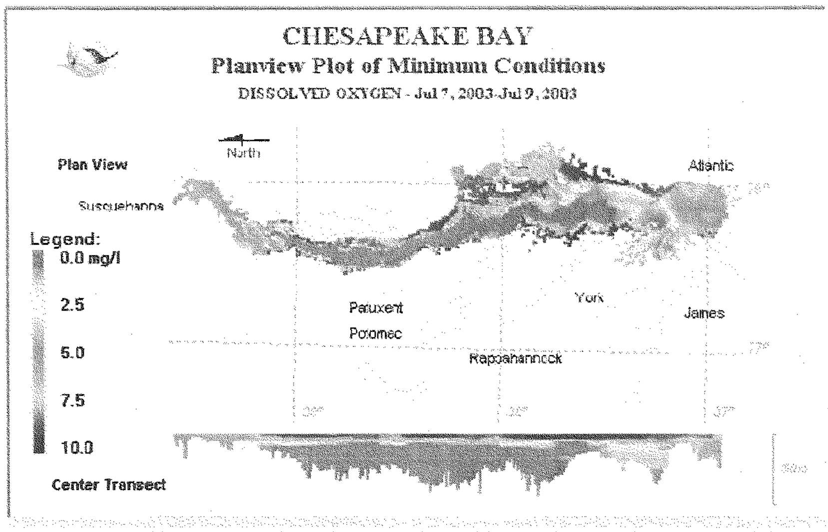
U.S. Top 5 Causes of Impairments on 303(d) List



Total U.S. Counts of Impairments: 64,496

Source: U.S. EPA, National Section 303(d) List Fact Sheet (http://oaspub.epa.gov/waters/national_rept.control#IMP_STATE)

Exhibit 3



Data gathered from bi-weekly monitoring cruises shows the spatial extent of low dissolved oxygen levels in the Bay's mainstem. The top map is an aerial view of the Chesapeake with the head of the Bay on the left and the mouth on the right. The bottom diagram is a transect of the Bay with surface waters at the top. The red and orange areas indicate low dissolved oxygen conditions inhospitable to most species living in the Bay.

Source: The Chesapeake Bay Program, Backgrounder, available at http://www.chesapeakebay.net/lowdo2003.htm

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Statement of DEP Acting Commissioner Arleen O'Donnell.
Subcommittee on Water Resources and the Environment
Joint Committee on Transportation and Infrastructure
Nonpoint Source Pollution: Atmospheric Deposition and Water Quality
Tuesday, April 17th, 2007

To the chairs and the members of the committee, I am pleased to appear before you today to discuss Nonpoint Source Pollution, in particular the topic of Atmospheric Mercury Deposition.

Atmospheric Mercury Deposition: Steep Emission Reductions Are Needed to Restore Water Quality and Contaminated Fisheries

The Mercury Problem Mercury is a public health and environmental health problem across the northeast region, the country and the globe. Environmental monitoring over the past two decades has demonstrated that mercury levels in fish from many lakes and ponds across Massachusetts (MA), the New England States and the country as a whole are too high. As a result, fish consumption advisories are in place across the US warning the public to limit or completely avoid consuming many species of freshwater fish and some marine species as well. In MA, over 50% of the water-bodies tested in the state have one or more species of fish with sufficiently high levels of mercury to warrant a consumption advisory and the state Department of Public Health warns pregnant women, children and nursing mothers to avoid consuming any native freshwater fish caught in the state (http://www.mass.gov/Eeohhs2/docs/dph/environmental/exposure/fish_mercury_in_ma.pdf; http://db.state.ma.us/dph/fishadvisory/). In "mercury hotspot" areas like the northeast part of MA and southern New Hampshire, close to 100% of the tested water bodies have fish wirh elevated mercury levels (http://mass.gov/dep/images/fishmerc.doc). Overall, in the Northeast states as a whole, fish consumption advisories due to mercury are in effect on more than 10,000 lakes, ponds and reservoirs, and over 46,000 river miles. Nationally, as of 2004, 44 states had fish consumption advisories in effect because of mercury, affecting over 13 million lake acres and 767,000 river miles. 21 states had statewide fish consumption advisories in place. National advisories for saltwater fish, such as shark, tuna and swordfish, are also in effect.

Mercury is such a concern because it is a potent brain toxin that adversely affects children and wildlife. Once released into the environment mercury persists and does not break down into harmless components like many other pollutants. It also bio-accumulates, or concentrates, into fish which, when eaten, are the major pathway for human exposures to this toxin. A little bit of mercury pollution can create a big problem- for example, a 2-pound fish containing less than 1/100,000th of an ounce of metbyl mercury would exceed the acceptable consumption criterion. Put another way, one pound of methyl mercury has the potential to contaminate almost 2 million pounds of fish. Although mercury is a natural element, due to human activities, the level of this toxin entering lakes and ponds in New England is from 200% - 800% higher now than it was 150 years ago.

The brain and developing neurological system of the fetus and children are particularly sensitive to mercury and can be damaged by fairly low levels of exposure. Of particular concern is the fact that children can be exposed to toxic amounts of this pollutant before birth because mercury in a mothers' diet crosses the placenta and enters the fetus. Based on data from the US Centers for Disease Control, which measures mercury levels in the blood of women across the country, *several hundred thousand newborns each year* are at risk of mercury toxicity in the US because of their mother's exposure to mercury. Based on this data over 8,000 newborns are at risk each year in my state alone.

In addition to its neurotoxicity, mercury can also damage the kidneys and immunological system and emerging data also suggest that it may adversely impact the cardiovascular system, potentially increasing the risk of heart attacks in adults. Wildlife can also be adversely affected by mercury, including loons and fish eating mammals. Data indicates that exposures to loons may be high enough in the Northeast to reduce their ability to reproduce and near lethal levels of mercury have been measured in otters in our region (http://www.hubbardbrookfoundation.org/MercuryStudy/; http://www.briloon.org/mercury/mercon_contents.htm). Surprisingly high levels of mercury have also been detected in non-fish eating songbirds suggesting that wider environmental impacts may be occurring.

Mercury Pollution Knows no Borders Mercury is a multimedia pollutant that can readily transfer between air, water and soils, and thus crosses geographical boundaries and the boundaries of traditional regulatory programs that focus on specific media. Because of its chemical attributes mercury can be transported long distances in the atmosphere, creating transboundary issues that are regional, national and global in scope. Effectively reducing mercury levels in polluted water bodies therefore requires multimedia programs at the state, regional, national and international levels.

Because MA and many other states are being impacted so significantly by mercury deposition, reducing sources of mercury pollution at the national level is a priority for us. In fact, reducing mercury levels in impacted water bodies is not only desired by the states, it is required by US law. The Clean Water Act mandates that states develop total maximum daily loads (TMDLs) for waters that are impaired by pollution. A TMDL is a calculation of the maximum amount of a pollutant that a water body or group of water bodies can receive and still meet applicable water quality standards, and an allocation of that amount to the pollutant's sources. Section 303(d) of the Federal Clean Water Act requires that states develop lists of impaired waters, i.e., waters that are not meeting water quality standards, and develop TMDLs for these waters. In MA and many other states, mercury contamination of fish is the largest cause of impairment. To address this widespread problem, the New England States and New York completed and released a draft regional TMDL for mercury on April 11, 2007 (http://www.neiwpcc.org/). This TMDL concludes that anthropogenic mercury inputs to our region's freshwater water bodies will need to be reduced between 86 and 98 percent to restore our contaminated fisheries and lift the consumption advisories now in place. The TMDL assessment also concluded that, because of the steep in-region reductions in mercury emissions detailed below, the majority of the mercury deposition in the region is currently attributable to atmospheric transport from out-of-region sources. These findings are similar to those reached by Minnesota in their recent statewide TMDL for mercury, which concluded that a reduction in anthropogenic inputs of 93% was necessary to restore their mercury impaired water bodies. Thus, individual state and even regional actions alone will not be sufficient to achieve the goals articulated and required by law in the Clean Water Act. MA strongly believes that this issue deserves to be a national priority, and in turn, requires strong federal programs to address it.

The States Lead the Way to Reduce Mercury Pollution Rather than wait for effective national and international solutions to the mercury problem, MA and the NE states decided almost a decade ago to act decisively to address elements of the problem that are under our control. In 1998, the New England Governors and Eastern Canadian Premiers, representing six political parties in the US and Canada, unanimously adopted a regional bi-national Mercury Action Plan (http://mass.gov/dep/images/negecp.pdf). MA additionally adopted a statewide Zero Mercury Strategy in 2000. (http://www.mass.gov/envir/Sustainable/resources/pdf/Resources_Hg_Strategy.pdf). These comprehensive plans were based on scientific and policy assessments that delineated the scope of mercury's impacts and established regional and state inventories of mercury sources. (http://www.mass.gov/dep/toxics/stypes/hgtoc.htm; http://www.nescaum.org/topics/mercury-inventory) The plans established a long-range goal of virtually eliminating anthropogenic mercury pollution in the region and milestone reduction goals of 50% by 2003 and 75% by 2010. Under these strategies, MA and the region as a whole have developed and are implementing some of the strongest programs to reduce mercury pollution and monitor environmental results in North America and the world. As a result of these efforts, the region exceeded the 2003 target achieving a 54% reduction in emissions. In MA, over 70% of in-state emissions have now been eliminated. Further reductions will be achieved over the next few years and we anticipate that MA will exceed the 75% 2010 goal. MA has successfully reduced in-state mercury emissions by going beyond federal requirements and establishing strict but achievable control requirements on the state's mercury sources. Specific accomplishments include the following:

- Massachusetts has the most stringent regulations on mercury emissions from trash incinerators in the country, with an emission limit about 3-fold more stringent than required by USEPA, and requires incinerators to divert mercury-containing products from the trash (http://mass.gov/dep/images/mwcregs.pdf). These regulations have reduced mercury emissions from these facilities by over 90 percent and have led to the collection and recycling of thousands of pounds of mercury from homes, businesses and municipalities.
- Massachusetts' tough multi-pollutant regulations for power plants require an 85 percent control of mercury emissions from combusted coal by 2008 and a 95 percent control by 2012 (http://mass.gov/dep/images/hgfact.doc; http://mass.gov/dep/images/hgreg.doc). These limits were adopted after careful evaluation of feasibility issues (http://mass.gov/dep/images/mercfeas.doc; http://mass.gov/dep/images/hgtsdx03.doc; http://www.nescaum.org/topics/mercury-control-technology).
- The state's and region's commitment to a mercury emissions limit for medical waste incinerators 10-fold more stringent than required by USEPA lead the medical community to shift to alternative and innovative technologies to sterilize medical waste that do not emit significant amounts of mercury. Thus, mercury emissions from this category have been essentially eliminated in MA.
- Through an innovative voluntary program conducted between 2004 and 2006 over 74% of MA dental offices installed amalgam separators capable of capturing >95% of mercury amalgam particles that would otherwise be discharged to wastewater and contaminate sludge and treatment plant effluent (http://mass.gov/dep/service/dentists.htm). Regulations adopted in 2006 now require all dental offices that place or remove mercury-containing dental amalgam to install amalgam separators and use other best management practices to reduce environmental releases of mercury (http://mass.gov/dep/service/regulations/310cmr73.pdf). Over this period mercury levels in sludge at MA's largest sewage treatment plant decreased by about 48% (http://www.mass.gov/dep/public/publications/enews.htm#article3).
- In 2006, the Commonwealth joined the other New England states and adopted comprehensive mercury-products legislation that will further reduce emissions from incinerators, as well as releases from product breakage and other disposal methods. The law phases-out many unnecessary uses of mercury; requires mercury-added products to be labeled; and expands collection and recycling programs for mercury-added products, with aggressive collection targets for automobile switches and fluorescent lighting. (http://mass.gov/dep/toxics/laws/hglawfax.doc; http://www.mass.gov/legis/laws/seslaw06/sl060190.htm; http://www.newmoa.org/prevention/mercury/modelleg.cfm)

Environmental Results- Mercury Levels in Freshwater Fish Decline in MA. The MassDEP Office of Research and Standards, with technical and analytical support from the Bureau of Resource Protection's Watershed Group and the William X. Wall Experimental Station, has established a monitoring network to measure variation and long-term trends in mercury levels in fish in MA. Data from this effort has provided welcome and unexpected good news about the rapidity with which these valuable aquatic resources respond to major reductions in mercury inputs to the environment. Fish testing in MA has revealed substantial reductions of mercury levels in both of the freshwater species being evaluated (http://mass.gov/dep/toxics/stypes/hgtrend.doc). The most significant reductions were observed in the northeast part of MA, a mercury "hotspot" area associated with past emissions from incinerators and coal-fired power plants. From 1999 through 2004 average mercury concentrations in yellow perch from lakes in the "hotspot" area declined by about 32%, and from lakes elsewhere in the state by about 15%. For largemouth bass the decline in the "hotspot" area averaged about 24% and elsewhere in the state about 19%. These are encouraging results that suggest that local actions can result in relatively quick and significant improvements. Unfortunately, even with these improvements the fish remain unsafe to eat and further significant reductions in inputs, especially from out-of-state sources, are needed.

Looking Forward While MA has been very successful in reducing mercury emissions from its sources and fish mercury levels have improved, the sobering facts are that mercury levels in freshwater fish in many MA, New England and the Eastern Canadian Province lakes and ponds remain unacceptably high. Although substantial progress has been made, there is clearly further work to be done. MA and the region as a whole, remain committed to the continued implementation of mercury reduction efforts under the Massachusetts Zero Mercury Strategy and the New England Governors-Eastern Canadian Premiers Mercury Action Plan and further significant mercury emissions reductions will occur over the next few years. However, because the majority of the mercury pollution entering our lakes and ponds is now coming from atmospheric deposition from out-of-region sources, we will not be able to achieve the goals of the Clean Water Act without reinvigorated federal efforts to clamp down on controllable sources of mercury pollution across the nation. In particular, the USEPA Clean Air Mercury Rule, which will achieve about a 70% reduction in emissions by 2018 at the earliest, is not sufficient to achieve the reductions needed.

Thank you for your time and your attention today, and in particular for the invitation to speak before you. I wish you all the best as you continue to explore this topic.

Sincerely,

Acting Commissioner Arleen O'Donnell

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Before the House Committee on Transportation and Infrastructure's Subcommittee on Water Resources and Environment

Hearing on Nonpoint Source Pollution: Atmospheric Deposition and Water Quality

April 17, 2007

Madame Chairwoman and members of the subcommittee, thank you for the opportunity to testify before you on the issue of atmospheric deposition and aquatic pollution. My name is Michael Slattery. I am the Director of the Institute for Environmental Studies at Texas Christian University, and a Full Professor in the Department of Geology. My area of expertise is human impact on watershed processes, particularly the transport and delivery of sediment and other pollutants from source areas to sinks. I also have an undergraduate degree in pollution meteorology.

My testimony today will focus on the atmospheric deposition of mercury (Hg) and its impact on aquatic ecosystems. First, I will provide a brief overview of studies of Hg in the environment and contamination of fishes in Texas reservoirs, and will show that there should be concern over current Hg levels in fish in Texas water bodies. I will then use atmospheric modeling to show that deposition of Hg from coal-fired Electricity Generating Units (EGUs), widely recognized as the largest single anthropogenic source of environmental Hg, is of widespread regional significance, even in areas where non-US sources are assumed to dominate. The dominant transport direction of the wind over Texas, coupled with the location of most of the EGUs, contributes to widespread deposition of Hg in the region, and will continue to do so if Hg emissions are not adequately controlled. I focus here on Texas, because it contains some of the highest Hg emitting coal-burning EGUs in the US and the State is currently embroiled in a debate over the construction of a further 17 coal-fired plants. The Governor has fast tracked the permitting process. As you may know, eleven of the 17 proposed EGUs would be operated by Texas Utilities (TXU). Although an agreement was recently reached between TXU and environmental groups to drop eight of the proposed units as a result of a major buyout, the deal is not yet final, and there is ongoing debate regarding the current effect of Hg emissions from existing plants and how those emissions will change in the future.

Context: Hg in the environment

Mercury is an environmental pollutant that biomagnifies in aquatic food webs to levels that threaten the health of wildlife and humans that consume contaminated fish (*1*). Generally, the concentrations of all forms of Hg in most natural waters are very low (*2*). However, inorganic Hg undergoes methylation by microbes in water bodies; this greatly increases the bioavailability and toxicity of Hg (*2*). Organisms at the base of the food web, such as phytoplankton, absorb methylmercury directly from the water (*3*) while consumers, including fish, are primarily exposed to methylmercury through their diet (*4*). Because Hg bioaccumulates from trophic level to trophic level, concentrations of methylmercury in fish can exceed those in ambient surface water by a factor of 10^6 to 10^7 (*2*). The biomagnification of Hg in aquatic food webs also leads to high concentrations in fish-eating birds and methylmercury can adversely affect adult bird survival, reproductive success and behavior (*2*).

To help reduce the risk of Hg exposure, fish consumption advisories regarding Hg contamination have been issued for 44 states as of 2004 (*5*). In Texas, the Department of State Health Services (DSHS) monitors fish in the State for the presence of environmental contaminants and alerts the public through bans (closures) and advisories when a threat to human health may occur from the consumption of contaminated fish. DSHS issues an advisory if the mean Hg concentration of the fish sampled exceeds a screening level of 700 ng g^{-1} ww, a much less stringent criteria than the USEPA value of 300 ng g^{-1} ww. Eleven lakes and the coastal waters of Texas currently have advisories on at least one fish species (Fig. 1). These advisories help to illustrate the extent of the Hg problem in Texas reservoirs. However, simply examining the number of fish advisories does not give a complete picture of the Hg contamination problem in Texas reservoirs. Caddo Lake along the Texas-Louisiana border is an example of this. Caddo Lake currently has a fish consumption advisory for largemouth bass (*Micropterus salmoides*) and freshwater drum (*Aplodinotus grunniens*). Samples from 319 fish in Caddo Lake showed that all species contained Hg (Fig. 2), at least half of which exceeded the USEPA limit. In some species, the concentrations of Hg were higher than the DSHS human health screening value but no consumption advisory is present for these species. These data illustrate that some species of fish not currently included in fish advisories have high levels of Hg and that additional Hg input to lakes like Caddo could push additional fish species over the Hg levels deemed safe by the DSHS.

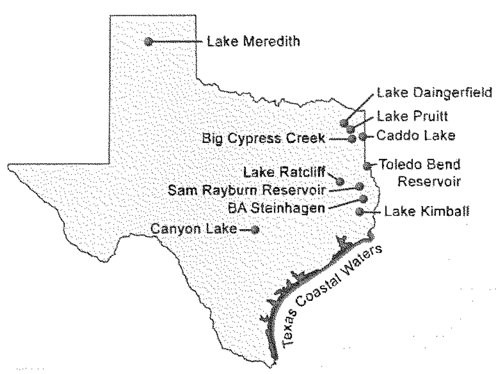

Fig. 1. Fish consumption advisories for Hg in freshwater reservoirs and the Texas coastline. Information taken from the www.tpwd.state.tx.us website.

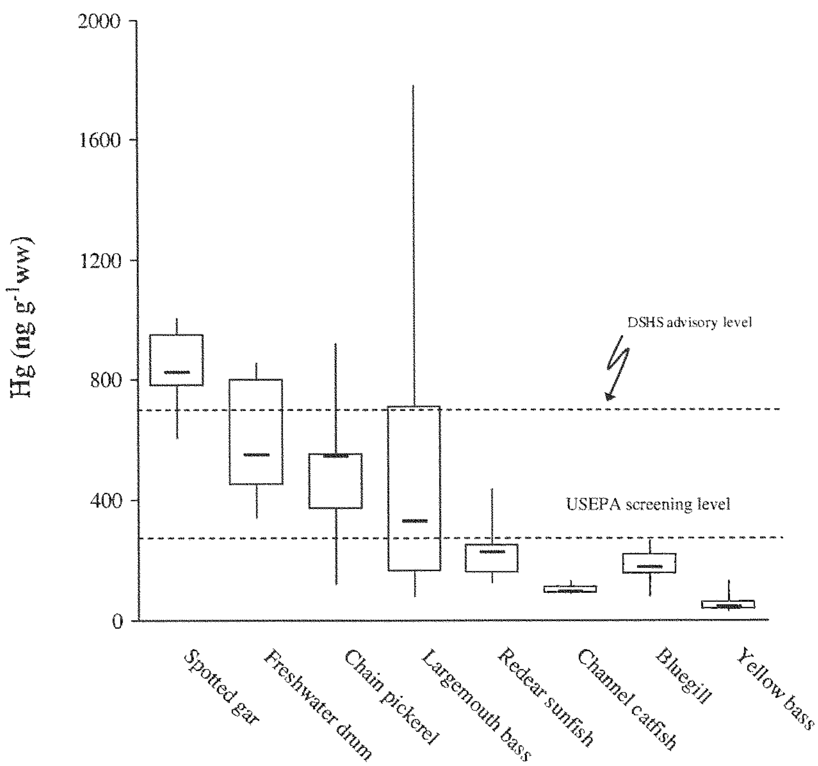

Fig. 2. Box and whisker plot of total Hg concentrations in fish species from Caddo Lake, Texas. Dashed lines indicate USEPA (300 ng g^{-1}ww) and DSHS (700 ng g^{-1}ww) screening levels.

Source, Transport, and Fate of Atmospheric Hg in Texas

The largest single anthropogenic source of environmental Hg is emissions from coal-burning EGUs, and coal consumption is predicted to increase over the next decade because it is a low cost fuel (*6, 7*). Figure 3 presents the geographic distribution of power plant Hg emissions in North America. The largest concentration of Hg emissions occurs in the US Midwest and Southeast, regions that depend heavily on coal-fired power plants. East Texas, which relies primarily on lignite coal, is also a high Hg emitting area. In fact, East Texas is one of the highest Hg emitting areas in North America, with TXU's Monticello, Martin Lake, and Big Brown plants being three of the largest emitters of Hg in the US.

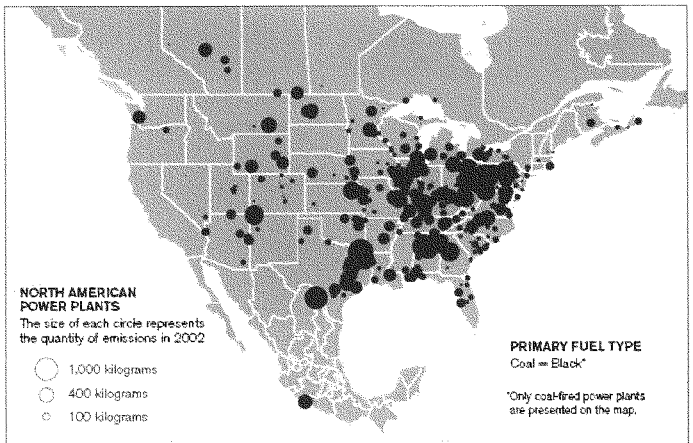

Fig. 3: Geographic distribution of power plant Hg emissions in North America in 2002 (Source: Miller and Van Atten, 2004)

At first glance, there appears to be a strong geographic correlation between the east Texas fish consumption advisories (Fig. 1) and the northeast-southwest axis of emissions from Texas' coal-fired power plants (Fig. 3). However, the coal industry continues to deny this apparent causal relationship. For example, the Center for Energy and Economic Development, a non-profit group that represents the interests of the coal industry, claims in several company reports that power plants are not the major source of Hg emissions in the US, local deposition of Hg from power plants is not prevalent, and that there are currently no Hg advisories on Texas' power plant lakes (see CEED, http://www.ceednet.org/). This view is clearly at odds with the consensus among the general scientific community (*8, 9*).

The USEPA has stated that regional transport of Hg from coal-fired EGUs in the US is responsible for very little of the total Hg in US waters (*10*). I have used NOAA's HYSPLIT model developed at the Air Resources Laboratory to simulate Hg plumes over Texas and surrounding regions. The goal of this work was to clarify Hg source-sink relationships and determine the extent to which, under prevailing wind regimes, pollution plumes emitted from existing and proposed power plants in south-central and east Texas could potentially impact aquatic ecosystems in Texas and beyond. Archived meteorological data from 2005 were used to simulate atmospheric deposition of Hg. I modeled 24-hour deposition plumes on days where winds were from the dominant direction (i.e., statistically, the most frequently occurring direction) on two or more consecutive days.

Hg deposition from existing and proposed EGUs

Seventeen EGUs in Texas currently emit ~ 5.5 Mg Hg yr^{-1} (Table 1). Under the most dominant atmospheric transport condition (i.e., winds from the S, SSE and SSW), modeled plumes (Fig. 4) covered an area of >15,000 mi^2 with highest Hg deposition occurring within 125 miles of the plants. Twenty-four hour deposition rates are on the order of 1×10^{-2} $\mu g\ m^{-2}$ (3.5 to 4.0 $\mu g\ m^{-2} yr^{-1}$). Because of considerable overlap and mixing between plumes, I hypothesize that actual deposition is much higher than the single plume rates. The plumes reach as far north as Lake Michigan, although deposition rates at that distance are much smaller, on the order of 1×10^{-4} $\mu g\ m^{-2}$ (0.3 to 0.4 $\mu g\ m^{-2}\ yr^{-1}$).

Table 1. Hg emissions for Texas EGUs in 2004, in tons. Note that eight plants rank in the top 50 US power plant Hg polluters (Source: http://www.environmentalintegrity.org/pubs/Dirty%20Kilowatts%20report.pdf); of those, five are in the top ten.

FACILITY	CITY	COUNTY	HG (tons)	RANK
MARTIN LAKE STEAM ELECTRIC STATION	TATUM	RUSK	0.872	1
MONTICELLO STEAM ELECTRIC STATION	MT PLEASANT	TITUS	0.665	4
BIG BROWN STEAM ELECTRIC STATION	FAIRFIELD	FREESTONE	0.591	6
H.W. PIRKEY POWER PLANT	HALLSVILLE	HARRISON	0.561	7
LIMESTONE ELECTRIC GENERATING STATION	JEWETT	LIMESTONE	0.544	8
W. A. PARISH ELECTRIC GENERATING STATION	THOMPSONS	FORT BEND	0.456	16
SANDOW STEAM ELECTRIC STATION	ROCKDALE	MILAM	0.279	41
J. .T DEELY J. K. SPRUCE GENERATING COMPLEX	SAN ANTONIO	BEXAR	0.267	44
WELSH POWER PLANT	PITTSBURG	CAMP	0.216	
SAM SEYMOUR POWER PLANT	LA GRANGE	FAYETTE	0.163	
TWIN OAKS POWER L P	BREMOND	ROBERTSON	0.149	
HARRINGTON STATION	AMARILLO	POTTER	0.131	
SAN MIGUEL ELECTRIC COOPERATIVE INC	CHRISTINE	ATASCOSA	0.125	
GIBBONS CREEK POWER PLANT	CARLOS	GRIMES	0.124	
TOLK STATION	SUDAN	LAMB	0.104	
COLETO CREEK POWER PLANT	FANNIN	GOLIAD	0.084	
OKLAUNION POWER STATION	VERNON	WILBARGER	0.081	

Current rates of Hg deposition in Texas and Oklahoma are 1.5 to 3 times higher than those found in the western US (Fig. 5), a region recognized as having high levels of Hg deposition from sources outside the US, predominantly long-range transport from China (*11*). This 1.5- to 3-fold increase in Hg can only be the result of accelerated deposition from local sources. There is no other logical conclusion. Importantly, the modeling also shows that Hg from the power plants is deposited beyond Texas' borders and is very likely contributing to areas like Arkansas, a state with watersheds that already contain fish with very high concentrations of Hg (Fig. 6). Our simulations show these watersheds are in the direct path of Hg emissions from power plants in Texas, as evident in Figure 4. Moreover, many of these watersheds require a 75% reduction of Hg to meet the methylmercury criterion of Hg in fish tissue at the present time (*12*).

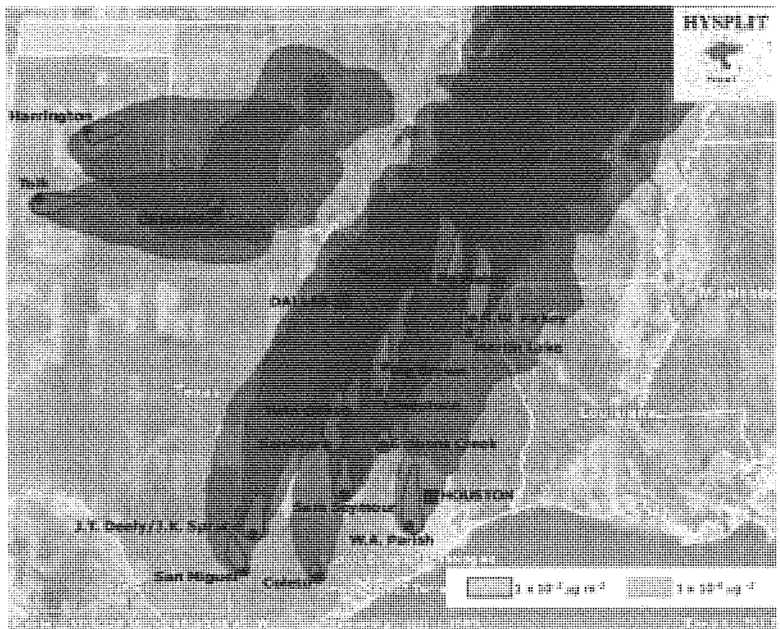

Fig. 4. Hg deposition (μg m^{-2}) for the 24-hour period as at 000UTC 6 November 2005. For central Texas, the dominant transport classes are S, SSE and SSW (43% of the year, shown here), N, NNE and NNW (21% of the year) and ESE and SE (10% of the year).

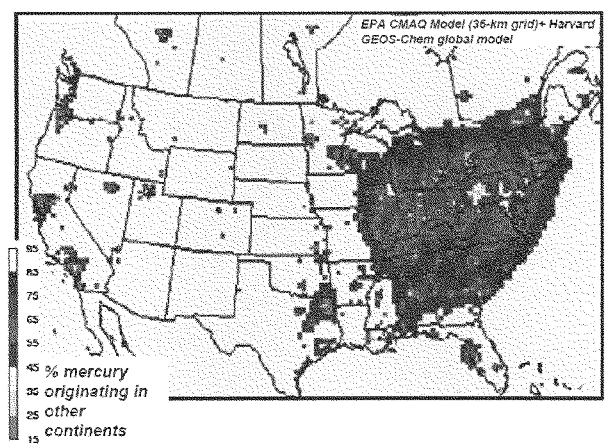

Fig. 5: Estimate of US Hg deposition originating from non-US sources (Source: EPA, cited in TCEQ, 2006).

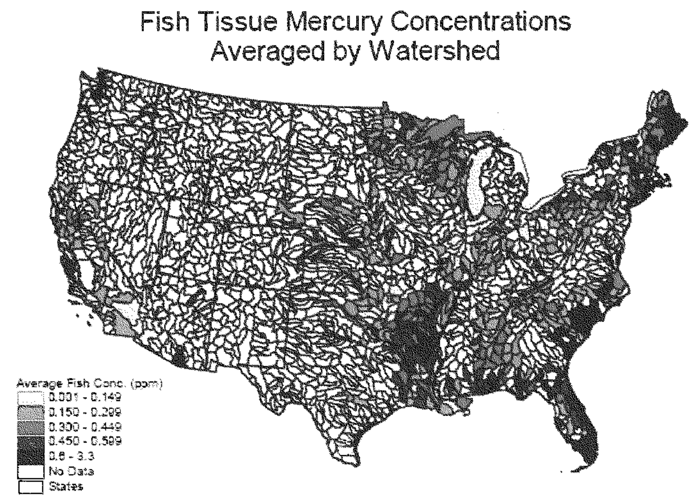

Fig. 6: National data set of Hg fish tissue averaged across USGS HUC-8 watersheds (Source: http://www.epa.gov/waterscience/maps/report.pdf)

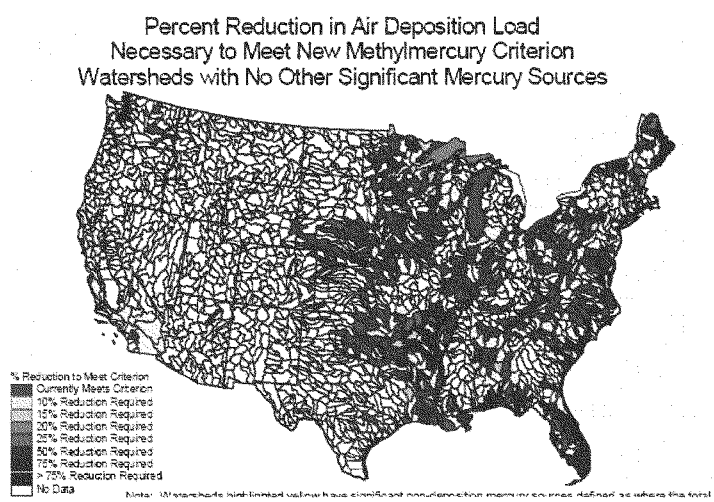

Fig. 7: Estimates of percent air deposition reductions, by watershed, required to meet the new methylHg criterion. Watersheds colored red indicate where fish concentrations exceed the criterion, while those colored green indicate watersheds in which no reductions are necessary and are unlikely to have a fish advisory. (Source: http://www.epa.gov/waterscience/maps/report.pdf)

Hg emission rates from the proposed TXU EGUs are shown in Table 2. The four major emitters of Hg (Big Brown, Martin Lake, Monticello, and Sandow) currently emit 2.184 tpy. After proposed offsets, these four plants would emit ~0.857 tpy (a reduction of ~60%). The bottom section of Table 2 lists the ten new units proposed by TXU. Eight of these units have Hg targets of 0.08 tpy with the lignite units at Oak Grove targeted for 0.36 tpy/unit. Total Hg emitted from the ten new units equals 1.36 tpy. Thus, Hg output from the proposed EGUs shows an overall **increase** of 1.5% once all plants, including the existing units at Big Brown, Martin Lake, Monticello and Sandow, become operative.

Table 2. Hg emissions data from current and proposed TXU EGUs.

Plant	Location	County	Lat.	Long.	Emissions [tpy]	Reduction [%]
Current EGUs						
Big Brown	Fairfield	Freestone	31.8192	96.0558	0.5362	
Martin Lake	Tatum	Rusk	32.2578	94.5689	0.7911	
Monticello	Mt. Pleasant	Titus	33.0906	95.0375	0.6033	
Sandow	Rockdale	Milam	30.5603	97.0675	0.2531	
Total					**2.184**	
Current EGU's (with offsets)						
Big Brown	Fairfield	Freestone	31.8192	96.0558	0.1930	-64
Martin Lake	Tatum	Rusk	32.2578	94.5689	0.3560	-55
Monticello	Mt. Pleasant	Titus	33.0906	95.0375	0.2172	-64
Sandow	Rockdale	Milam	30.5603	97.0675	0.0911	-44
Total					**0.857**	
Proposed EGUs						
Big Brown	Fairfield	Freestone	31.8192	96.0558	0.08	
Lake Creek	Waco	McLennan	31.4606	96.9867	0.08	
Martin Lake	Tatum	Rusk	32.2578	94.5689	0.08	
Monticello	Mt. Pleasant	Titus	33.0906	95.0375	0.08	
Oak Grove (2)	Franklin	Robertson	31.1819	96.4875	0.72	
Sandow	Rockdale	Milam	30.5603	97.0675	0.08	
Tradinghouse (2)	Waco	McLennan	31.5722	96.9631	0.16	
Valley	Savoy	Fannin	33.6283	96.3675	0.08	
Total					**1.36**	
Summary:						
Current EGUs					**2.184**	
Current EGUs (with assumed offsets)					**0.857**	
Proposed EGU's					**1.36**	
Current and proposed EGUs (with assumed offsets)					**2.217**	

Implications for Texas and surrounding states

A key point to emerge from the modeling analysis is that deposition rates of 3.5 to 4.0 $\mu g/m^2/yr$ from any single plume would be **new Hg added to the environment**, over and above deposition from existing sources, be they natural or anthropogenic. If we assume no plume synergy, thereby keeping the deposition rates conservative, this would represent a 30-45% increase in Hg deposition for the DFW Metroplex and east-Texas region over current average annual values. If considerable plume mixing occurs, which is highly probable, deposition rates could potentially be higher.

Although Hg emissions from the US power sector are estimated to account for only about 1% of total global emissions, this does not mean that Hg from US coal-fired EGUs does not deposit in regions near the plants, nor that deposition has negligible environmental impacts on those regions. Under the new Clean Air Hg Rule (CAMR), utilities will be required to meet a national cap, rather than reduce emissions at all facilities. If adequate Hg emission control strategies are not used, the construction of new plants in Texas would add new Hg to areas already impacted by deposition which could lead to further Hg contamination of aquatic ecosystems.

It is also clear that pollutants within the plumes will be transported and deposited beyond Texas' borders. Current fish advisories for Hg for states surrounding Texas show 20 advisories in Arkansas, 38 in Louisiana and a statewide advisory in Oklahoma[1]. It is highly likely that fallout from the Texas plumes will impact these regions because the Hg deposition from the plants adds to Hg deposition from the atmosphere. Although some of the emitted Hg is not deposited locally or regionally, and would contribute to the global Hg pool (eventually being deposited at remote sites around the world), the most significant impacts are regional. A simple catch-phrase may help to clarify this: "If you live in Paris, France, Hg emissions from Texas power plants will have no immediate impact. However, if you live in Paris, Texas, the impacts are likely to be widespread."

Finally, the USEPA has stated that regional transport of Hg from coal-fired EGUs in the US is responsible for very little of the total Hg in US waters (*10*). According to the EPA website, "the agency has conducted extensive analyses on Hg emissions from coal-fired power plants and subsequent regional patterns of deposition to US waters. Those analyses conclude that regional transport of Hg emission from coal-fired power plants in the US is responsible for very little of the Hg in US waters. That small contribution will be significantly reduced after EPA's Clean Air Interstate Rule and Clean Air Hg Rule are implemented." In some regions, like the western US, that may well be the case. But requiring utilities to meet a national cap will have very little effect in areas such as the north Texas and surrounding regions, where the addition of new Hg from new plants will very likely lead to increased deposition in certain areas. This will be particularly problematic in areas that are already affected by Hg deposition, such as the Ark-La-Tex region, that will require significant reductions to meet the USEPA's screening criterion.

[1] http://www.deq.state.ok.us/factsheets/land/fishmerc.pdf

Conclusions

In this report I have (i) provided a brief review of the importance of Hg in the environment, specifically as it relates to Hg contamination of fishes in Texas reservoirs, (ii) modeled pollutant plumes under dominant transport conditions for existing and proposed EGU's, and (iii) predicted Hg deposition to the environment. From this work I conclude the following:

1. There is currently cause for concern with respect to Hg contamination in fish in Texas and surrounding states. Many reservoirs in the region contain fish with concentrations of Hg hazardous to human health and consumption advisories have been issued by the State. Some species of fish not currently included in fish advisories have high levels of Hg and additional Hg input could push other fish species over the Hg levels deemed safe by the Texas Department of State Health Services (DSHS) and the US Environmental Protection Agency (USEPA);
2. Mercury emitted from EGUs in central Texas is carried by the dominant transport winds and impacts aquatic ecosystems in north and east Texas and surrounding areas. Mercury concentrations in the region's ecosystems may increase further with proposed increased coal combustion if Hg emissions are not adequately controlled. This Hg will biomagnify once it enters the aquatic food chain and be at highest concentrations in piscivorous fish and wildlife;
3. Any new coal-fired power plant will add new Hg to an environment that is affected by Hg deposition;
4. Hg deposition rates in north Texas and surrounding regions are currently ~ 1.5- to 3-fold higher than deposition in the western US, a region dominated by non-US sources. Mercury deposition in areas in north-central Texas is currently dominated by local, anthropogenic sources;
5. Pollution plumes from Texas' coal-burning power plants do (and will continue to) travel well beyond State boundaries. The modeling has shown that states including Louisiana, Oklahoma, and Arkansas, as well as those as far north as Illinois and Ohio, will potentially be affected even within 24 hours of emission from the proposed EGUs.

The Hg linkage, from air to water to fish and other biota, is a complex one that challenges state and federal regulators charged with controlling airborne emissions and with decreasing Hg deposition to levels that meet standards for concentrations in fish tissue. The scientific evidence in peer-reviewed scientific papers clearly shows that the global Hg problem is driven by anthropogenic emissions of Hg into the air, the subsequent atmospheric transport and deposition of Hg, and finally the biological transformation and biomagnification in aquatic ecosystems.

Thank you again for the opportunity to offer my thoughts on this issue. Please enter my entire written and oral testimony into the published record. I look forward to responding to your questions.

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HEARING ON NONPOINT SOURCE POLLUTION: THE IMPACT OF AGRICULTURE ON WATER QUALITY

Thursday, April 19, 2007,

House of Representatives,
Committee on Transportation and Infrastructure,
Subcommittee on Water Resources and Environment,
Washington, DC.

The committee met, pursuant to call, at 2:00 p.m., in Room 2167, Rayburn House Office Building, the Honorable Timothy H. Bishop [chairman of the committee] presiding.

Mr. Bishop. We are about to get called for a set of votes, and that is why our Ranking Member is not here. He has gone directly to the Floor. So if you all will indulge us for another, I would say 20 or 25 minutes, we have a series of votes coming up on the Floor. Then we will be back and we will begin the hearing. So I thank you for your patience and your indulgence.

[Recess.]

Mr. Bishop. I would like to call the Subcommittee to order.

Let me start by thanking you all for your patience and for your indulgence as we went through a series of votes. Today we will be having a hearing on nonpoint source pollution and the impacts of agriculture on water quality.

I would like to welcome today's witnesses to our hearing on the impact of agriculture on water quality. Today we will hear from representatives from Federal, State and municipal governments, as well as from academia and other interested stakeholders. These diverse perspectives will provide the Subcommittee with a much broader understanding on whether and the degree to which agricultural activities impact water quality. We also hope to learn more about how the Federal Government can further assist the agricultural community in reducing runoff.

To begin, let me extend a warm greeting to Dr. Robert Howarth, who hails from my home State of New York. Dr. Howarth is a professor in Cornell University's Department of Ecology and Evolutionary Biology. He is one of our Nation's preeminent scientists and he will be speaking on the second panel. Dr. Howarth, thank you for being here.

Let me say that in large part, this hearing is about protecting our heritage. A very important part of that heritage is farming. Today the United States is the breadbasket of the world, and it wouldn't have this role without the important part played by farms and ranches across the land.

But there is another part of our heritage, too, and this includes protection of our natural resources; critical among them, protection of the Nation's water bodies. The hearing we are holding today will look at the impacts of agricultural runoff on water quality. As we will learn, the promotion of agriculture and the protection of the Nation's waters are not exclusive concepts. Indeed, the Federal Government is actively working to promote both.

The question is, however, is the Federal Government doing enough? Let me be very clear: any suggestion that we want to end farming and return farmland to its natural state in order to protect our waters is nothing but a red herring. We seek agricultural practices that make sense, environmental sense, and economic sense.

Agricultural runoff consists of pollutants from farming and ranching that are picked up by rainfall and snowmelt and eventually deposited into water bodies. These pollutants can include nutrients, pesticides, sediment and animal waste. Why is agricultural runoff important? It is important because these pollutants can lead to water body impairments, as well as threats to human health. In fact, the EPA tells us that the States have reported that 45 percent of rivers and streams across the Country are impaired, and that agricultural runoff is a leading culprit.

Water body impairment is not just a box on a scientific report somewhere that is just checked off impaired or not impaired. No, there are very real-world implications that impact our communities, making it harder for ordinary working folks to make a living and harder for municipalities to provide basic services. Let me provide just a few examples.

As we will learn today from our witness from Waco, Texas, the City of Waco has had to spend literally millions and millions of dollars to upgrade its drinking water facilities as a result of water contamination from upstream dairies. Through relatively simple dairy farm management reforms that would have been far cheaper to implement, those upgrades would not have been necessary. This money could have been spent on schools in Waco, it could even have been returned to the taxpayers of this community through lower taxes.

Similarly, blue crabs are in decline in the Chesapeake Bay and commercial oysters harvesting is nothing compared to what it once was. On the Gulf of Mexico, one of the Nation's greatest natural resources, fishermen are suffering because shrimp and commercial fish populations are in decline due to the infamous Dead Zone. This Dead Zone is in part the result of nutrient runoff hundreds of miles upstream along the Mississippi River.

The Federal Government has a number of programs that provide opportunities for the farming community to receive funding and assistance to decrease this runoff. These programs are largely voluntary and entail farmers and landowners adopting best management practices. Many of these programs make both economic and agronomic sense.

For example, water body impairment through excess nutrient runoff is often the result of too much nutrient being applied to fields. Precision agriculture means fewer nutrients which means that farmers have to spend less on buying fertilizer. At the end of the day, this leaves a bigger paycheck.

Erosion control programs help keep valuable topsoil on the fields. As any farmer will tell you, healthy, abundant topsoil is critical to success. These programs are just further examples of what makes economic sense makes environmental sense also.

The trouble is that not enough farmers are receiving benefits from these programs. Given that some of these practices have been proven to work, the onus is on us to work out why there is not more enrolment in these Federal programs. Part of the reason is that the programs just aren't big enough. There is not enough funding for conservation programs that provide grants to farmers. In fact, funding is so low and the backlog of applications so long that there are currently 195 farmers in Iowa who have chosen to take out conservation loans, that is loans, not grants, through Iowa's local water protection program. This just goes to show that farmers want to do what makes environmental, economic and agronomic sense. It is just that the Federal Government doesn't seem to be there for them.

Today we hope to learn more about what the Federal Government is doing with these programs, whether it is doing enough and if we all work together, the Federal Government, the States, the farmers and conservationists, what more needs to be done. I welcome the witnesses to today's hearing and I look forward to their testimony.

Now I would like to recognize the Ranking Member, Mr. Baker, for any opening remarks he wishes to make.

Mr. BAKER OF LOUISIANA. I thank you, Mr. Chairman, and appreciate the interest in the subject matter and the calling of this hearing on this important topic.

Data which is not all that recent, but still relevant enough for this hearing, indicates that less than 3 percent of the American population is engaged in or in some way acts in concert with a principal farming operation. That number is continuing to decline.

Concurrently with that decline in number of producers, we are also seeing commercial operators grow the scope of farming operations in geographic size dramatically. In my state, unless you are at least 2,000 acres, in the soybean business, you are probably not going to be economically viable. Which leads to an observation: these folks are sophisticated people trying to make a living producing from the land which is the essential core of their long-term economic viability. They are folks that are necessarily going to do what they believe best for the preservation of that natural resource.

And as you pointed out, Mr. Chairman, fertilizer isn't cheap. And the less of it you use, the better off your yield is in the bank. So the idea is to use sophisticated production technologies to increase the yield, keep costs down, and for us to help keep farmers alive. We do not need to rely on foreign nation's generosity to feed our people.

In fact, in looking at the end result of this process that we have been engaged in, the atmospheric transport of mercury, for example, that filled the room up last week, we appear to be on a course of designing a new set of regulatory standards for all sorts of environmental activities. I only hope that at the conclusion of this work, we find economically viable methodologies, which will enhance the ability of people to continue to produce.

I would also point out that in looking for causes of water contamination, we should not divert our attention too far from urban centers, where weekend landscapers use material this time of year to weed and feed their lawns. Just a casual observation I have made, not too many appear to be reading labels. They are walking around slinging it out by the handfuls. That stuff winds up in the same groundwater supply as everybody else's by product, and we need to be carefully examining all sources of potential contamination to determine what if any action might be taken to assist in that arena.

Finally, aging municipal water treatment systems. It is not uncommon for, in a severe storm, to have systems back up and overflow and that contamination finds its way again untreated into public water systems. For these reasons, we have a lot of work to do, Mr. Chairman. I am hoping that throughout the course of our discussion we will learn here today from learned individuals perspectives on how we can help, not hinder, and how we can accomplish these goals in an economically responsible manner.

With that, I yield back.

Mr. BISHOP. Thank you very much.

Mr. Salazar, do you wish to make an opening statement?

Mr. SALAZAR. Thank you, Mr. Chairman.

First of all, I appreciate that we are addressing the topic of water pollution, specifically the issue of nonpoint source pollution. There is no question that having a clean and safe water supply is important to all of us, including those of us who are in agriculture. Ecosystems work together. Healthy wildlife populations, vibrant plant systems and clean water each contribute to the overall well-being of our environment.

But I must assure you that America's farmers and ranchers are the best stewards of the Nation's land and water resources. Their production and profitability can only be as good as the land from which it comes. So appropriate care for land and water resources makes both environmental and economic sense for them.

As a farmer and rancher myself, I fully appreciate the importance of a healthy, functioning ecosystem. I firmly believe that we can have agriculture and a clean water system in this Country.

I think it is important to recognize that agriculture is a regulated industry. Extensive new regulations were put in place in the 109th Congress to control discharges from concentrated animal feeding operations, known as CAFOs. In fact, there has been a significant shift over the past several years in Federal efforts to regulate and prohibit production area discharges from CAFOs. In addition, CAFOs must utilize and comply with strict nutrient management plans when applying manure to agricultural fields, to ensure that manure is applied at agronomic rates. Any violation of these requirements can result in substantial penalties in certain situations, even imprisonment. We should consider these new regulatory requirements that ensure protection of our waters and give them time to work.

There are also several programs in place under the Clean Water Act that specifically address nonpoint source pollution. This Congress should consider increased funding, and I associate myself with the Chairman's remarks, that the Government does not do enough for agriculture. But this Congress should consider increasing funding of these programs to levels that will enable States to address nonpoint pollution as intended.

Agriculture producers are also taking measures to be as environmentally friendly as possible in their operations. We just had a hearing in the Ag Committee. Just one example is the implementation of the projects of the USDA Farm Bill conservation programs that work to improve water quality. We discussed the buffer strip initiative that is being proposed.

From 2002 to 2006, NRCS disbursed over $2.7 billion to ag producers for projects to improve water quality. But as the Chairman said, there is still not enough. Most of those projects were through the Environmental Quality Incentives Program. In the same time period, they spent almost $1.2 billion conserving and improving wetlands, mainly through the Wetlands Reserve Program.

Family farmers and ranchers are excellent stewards of their land, natural resources, and water. Their livelihoods depend on it. We should enable them, through programs like these, to continue to produce our Nation's food and fiber in an environmentally sound and sustainable way.

Last year for the first time in the history of the United States, the United States became net food importers of specialty crops. That is a scary thought to me. I think it is the responsibility of this Committee, this Congress, to ensure that we preserve and protect our water sources for today's use as well as for future generations. But it must be done in a way that does not negatively impact the slim margins that farmers face today.

Thank you, Mr. Chairman, and I look forward to today's hearing. I yield back.

Mr. BISHOP. Mr. Salazar, thank you.

Mr. Gilchrest, do you wish to make an opening statement?

Mr. GILCHREST. Thank you, Mr. Chairman. Just very briefly.

Thank you for holding this hearing. This is an issue in many parts of the Country. In my Congressional district, the biggest industry is agriculture. It wraps around the Chesapeake Bay.

Just a couple of comments. There are a myriad of programs in the Department of Agriculture that attempt to address nonpoint source pollution, particularly in agriculture. What we have been doing for years and what we really want to try to do in this Farm Bill is to pump more money into those programs to help the farmer whose only source of income is production agriculture, but give him ready cash to be a part of the solution of reducing runoff from herbicides, pesticides, too much nitrogen, too much phosphorus, et cetera. That is in the form of cover crops, CRPs, forested buffers, grass buffers, technical assistance on the kinds of crops to plan, you name it.

This Country is a lot better off and our taxes are a lot lower with a landscape carpeted with farms as opposed to a landscape carpeted with sprawl. You don't need a lot of bureaucracy to take care of an agricultural area. But you need a lot of bureaucracy and you get a lot more pollution from sprawl.

So if we just recognize that economic viability for communities, but especially agriculture, rests on the Federal Government being an assistant in helping with money, with technical assistance, with expertise, the farmers dealing with their stormwater runoff. Because that is what this is. Agriculture has a problem with stormwater runoff, just like an urban area does. But you can sure capture that stormwater runoff with the expertise that we now have in-house.

So I want to thank the Chairman for holding this hearing. The hypoxia Dead Zone in the Gulf of Mexico is a classic example of something that we can solve, the dead zone in the Chesapeake Bay which is caused by urban and ag runoff. Like the previous speaker said, the farmers in Maryland have applied, there are more farmers applying for those kinds of dollars to deal with that kind of stormwater runoff, which in essence is what it is, because we all know from our seventh geology class or geography class that water runs downhill. And the way we absorb that is something that is a well-known quantity: preserve agriculture, put money into these programs and we all benefit.

Thank you, Mr. Chairman.

Mr. BISHOP. Mr. Brown?

Mr. BROWN. Thank you, Mr. Chairman.

If I can just ask the former speaker, what he had against straw.

Mr. GILCHREST. What I have against what?

Mr. BROWN. Straw.

Mr. GILCHREST. Straw? I like straw. It's a good bedding for cows, horses, hogs. I think I said sprawl. I didn't say straw.

Mr. BROWN. Oh, sprawl.

I thought you said straw. It must be your southern accent.

[Laughter.]

Mr. BAKER OF LOUISIANA. For a small fee, I will gladly interpret for you.

[Laughter.]

Mr. OBERSTAR. Mr. Chairman, this morning Mr. Brown wanted an interpreter for me. Now I think we need one for him.

[Laughter.]

Mr. BISHOP. If there are no other members who wish to make an opening statement, we will now proceed to the first of our two panels. We are pleased to have a very distinguished panel of witnesses here with us this afternoon. First, we have Mr. Richard Coombe, Regional Assistant Chief of the USDA's Natural Resources Conservation Service. Next will be Mr. Craig Hooks. Mr. Hooks is the Director of the Environmental Protection Agency's Office of Wetlands, Oceans and Watersheds, which is located in the Office of Water. And our final witness on the first panel will be Mr. Wiley Stem, Assistant City Manager for the City of Waco.

We are pleased to welcome you all here this afternoon. We ask that the witnesses try to limit their testimony to a five minute oral summary of their written statements, and their full written statement will be entered into the record in its entirety.

We will proceed in the order in which you were introduced, so let us begin with Mr. Coombe.

TESTIMONY OF RICHARD COOMBE, REGIONAL ASSISTANT CHIEF, NATURAL RESOURCES CONSERVATION SERVICE, U.S. DEPARTMENT OF AGRICULTURE; CRAIG HOOKS, DIRECTOR, OFFICE OF WETLANDS, OCEANS AND WATERSHEDS, OFFICE OF WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY; WILEY STEM, ASSISTANT CITY MANAGER, CITY OF WACO, TEXAS

Mr. COOMBE. Thank you, Mr. Chairman and members of the Subcommittee. Thank you for the opportunity to appear before you today to describe the relationship between water quality and agriculture and the activities the Natural Resources Conservation Service is participating in to provide assistance to address this issue.

This topic is of special interest to me, as I served as CEO of the Watershed Agricultural Council, Inc., of the New York City watershed. This watershed project was a showcase example of how agricultural forest landowners took successful, proactive steps to protect the water supply of the city of New York. For over 70 years, NRCS has been committed to working with America's private landowners through a locally-led, voluntary, cooperative conservation approach. This approach has proven time and time again that when given sound information, guidance and technical assistance, farmers and ranchers voluntarily adopt, install and maintain conservation practices.

Our mission effectively describes what we do: helping people help the land. Water quality is a primary indicator of our environmental health. And the quality of water reflects what occurs on the land. Water quality concerns from agriculture are generally defined as nonpoint source pollution. This pollution comes from diffuse sources, which makes identification of the source of water quality problems difficult. Often, water quality problems are the result of actions by many landowners, both rural and urban.

Mr. Chairman, if you visit any one of the 3,077 counties in the United States, you would likely find that agricultural producers work with NRCS. Our conservation technical assistance program provides direct conservation planning, specific conservation practices, or systems are developed and farmers and ranchers may utilize our Farm Bill cost share programs and other authorities.

Let me highlight a few of our voluntary programs. First, the Environmental Quality Incentives Program (EQIP) is the flagship of the Working Lands Conservation Program portfolio. Funding for EQIP in the 2002 Farm Bill greatly expanded the program's availability. Sixty percent of these funds are directed to address livestock-related resource concerns. The Department's 2007 Farm Bill proposal recommended consolidating and reauthorizing existing cost share programs into a newly-designed EQIP, which will simplify and streamline activities and includes the creation of a new regional water enhancement program.

The Conservation Innovation Grants (CIG) program stimulates the development and adoption of innovative conservation approaches. In fiscal year 2006, CIG was implemented with three components: national, the Chesapeake Bay watershed, and State. The Wetlands Reserve Program provides funding to landowners to retire cropland from agricultural production if those lands are restored to wetlands and protected with a long-term or permanent easement. Our 2007 Farm Bill proposal seeks to add more than 1 million additional acres to WRP, bringing the overall enrollment to more than 3.5 million acres.

The Conservation Reserve Program, administered by the Farm Services Agency, provides technical and financial assistance to eligible farmers and ranchers. There are more than 36 million acres enrolled in the program and planted to cover crops to stop soil and nutrients from washing into waterways.

Finally, the Conservation Security Program provides assistance on tribal and private working lands which rewards producers who practice good stewardship on their agricultural lands and provides incentives for those who want to do more. NRCS has offered the program in 280 watersheds and rewarded nearly 19,400 stewards on 15.5 million acres.

Every year, NRCS measures the changes of the resource based on private lands through the National Resources Inventory (NRI). The NRI is a statistical survey of natural resource conditions and trends, and it assesses soil erosion, land cover and use, wetlands, habitat diversity, selected conservation practices and related resources. In 2006, the NRI shows a 43 percent reduction in cropland soil erosion between 1982 and 2003. This reduction did not happen by regulation, but through voluntary cooperation at the local level.

Mr. Chairman, we have excellent information about our program outputs, but we still are working to quantify our data on environmental outcomes of our programs. As a result, starting in 2003, in collaboration with USDA and Federal agencies, we initiated the Conservation Effects Assessment Project (CEAP) to scientifically assess the environmental and related outcomes from Farm Bill conservation programs at both the national and watershed scale through 2008.

We believe that farmers and ranchers are making important gains in conservation on working lands. We are sharply focusing our efforts and will work together with our partners to continue to make improvements to water quality.

I look forward to working with you as we move ahead in this endeavor. I thank the Subcommittee and will be happy to respond to any questions.

Mr. BISHOP. Thank you, Mr. Coombe.

Now we would like to welcome Mr. Hooks from the EPA office. Mr. Hooks, we look forward to your testimony.

Mr. HOOKS. Thank you.

Mr. Chairman and members of the Subcommittee, I am Craig Hooks, Director of the Office of Wetlands, Oceans and Watersheds in the Office of Water at the U.S. EPA. Thank you for the opportunity to discuss EPA water quality programs for agriculture.

EPA's 2002 National Assessment Database summarizes State water quality reports and categorizes the quality of the State-assessed waters as good, threatened or impaired. States assessed their rivers, streams, lakes, ponds and reservoirs and found that agriculture was the most frequently identified source of water quality impairment.

The National Nonpoint Source program, under Section 319 of the Clean Water Act, is EPA's primary program to manage nonpoint source pollution. The most significant category of nonpoint source pollution is agriculture, and as such, it deservedly receives more attention than any other nonpoint source category.

The Section 319 program is administered by EPA, but implemented by the States. States develop and implement watershed plans that assesses water quality programs holistically throughout a watershed, analyze and quantify the sources and causes of water quality programs and impairments, estimate the pollutant reductions that will be needed to solve water quality problems, and identify the best management practices that will be needed in various places to achieve the needed pollutant reductions.

In terms of EPA's relationship with USDA, EPA and USDA bring different strengths to solving water quality problems at the local level. USDA conservation programs have built a long history of trust among agricultural producers. EPA and State water quality agencies can provide funding for some activities that may not be funded by USDA programs to help make a watershed project a success. For example, EPA funds can be used to conduct water quality monitoring, to improve understanding of water quality issues and potential solutions, develop watershed plans that enable a community to identify priority needs and priority locations for implementation, hire a dedicated watershed coordinator, often a conservation specialist, who is rooted in a local community, who can educate the community and help design and implement solutions and demonstrative innovative management practices.

EPA water quality programs and USDA conservation programs are most effective when we are able to work together in a concerted and coordinated manner to focus our resources in the same watershed.

I would like to mention water quality trading. One of EPA's tools for supporting agricultural conservation practices is water quality trading. Water quality trading programs allow facilities facing high pollutant costs to meet their regulatory obligations by purchasing environmentally equivalent or superior pollutant reductions from another source at lower cost. Trading programs transform pollutant reductions achieved by implementing agricultural conservation practices into a valuable commodity that a producer can sell to an industrial or municipal facility.

So in conclusion, we have made a major investment in the implementation of programs and practices to protect and restore waters that are impacted or may be impacted by agriculture. However, much more work remains to be done to achieve the program's long-term goals. We will continue to work with this Committee, our Federal colleagues and the many partners, stakeholders and citizens who want to accelerate the pace and efficiency of water quality protection and restoration.

This concludes my prepared remarks and I will be happy to respond to any questions you may have.

Mr. BISHOP. Mr. Hooks, thank you.

We will now proceed to Mr. Stem from Waco, Texas.

Mr. STEM. Good afternoon, Mr. Chairman, members of the Committee. My name is Wiley Stem. I serve as Assistant City Manager for the City of Waco, Texas.

I am pleased to be here today on behalf of the American Waterworks Association and its 60,000 members. AWWA member utilities serve safe water to over 80 percent of the American people and AWWA is both very concerned and very qualified to speak about the subject of this hearing, nonpoint source pollution.

Nonpoint source pollution is a very serious problem, and one that is not effectively addressed by the Clean Water Act. I would like to illustrate this problem by describing the situation we face in Waco over the contamination of our municipal water supply.

Lake Waco is the only viable public drinking water supply for approximately 150,000 central Texas citizens who live in our city and in surrounding communities. In recent decades, Lake Waco has been severely damaged by pollution running off of agricultural lands and our watershed. Numerous studies and peer review publications concluded that high concentrations of phosphorus in Lake Waco are caused by runoff from agricultural operations in the North Bosque River watershed.

More specifically, this runoff occurs as a result of concentrated animal feeding operations, or CAFOs, over-applying cow manure to their waste application fields. The dairies in question, which by the way are industrial scale operations, and not traditional family farms, are applying manure to their fields as a means of waste disposal, rather than for agronomic purposes.

The excessive phosphorus in our watershed has caused algal growth in Lake Waco. These algae, in turn, cause serious taste and odor problems with the water. In addition to phosphorus, animal waste also is a significant source of pathogens. Although Waco takes great care to treat its water to safe levels, in other cities there have been several well documented cases where a chain of events, including breakdowns in water treatment, has resulted in people being killed or seriously sickened by pathogens associated with animal waste.

The City of Waco has both an obligation under the Safe Drinking Water Act and a moral responsibility, which we take very seriously, to make sure that water we deliver to our residents is safe, odor-free and pleasant to drink. In order to meet this obligation, Waco has been forced to spend millions of dollars in recent years for additional water treatment as a direct result of the pollution in our watershed. The cost of upgrades in equipment and facilities which we must employ to deal specifically with this problem is projected to nearly double the cost of a project we are undertaking to ensure that we have adequate water supplies for now and the future. The cost of that project is estimated at approximately $90 million, of which $40 million is attributable to poor water quality caused by animal operations in our watershed.

As described in more detail in my statement, the City of Waco was forced to sue a number of the dairies in our watershed, using Superfund. These suits were not for the purpose of enriching the city, but to force the dairies to adopt better practices that reduce the levels of polluting runoff from their fields. I would note that there are efforts underway in Congress to relax the provisions of Superfund by excluding animal manure and its constituents, such as phosphorus, from coverage under the law. I urge you to strongly oppose such relaxation of Superfund.

I would also note that while Waco had to sue agricultural operators to adopt certain programs in our watershed, those same programs could be adopted voluntarily with support under our Nation's comprehensive farm bill. Congress is expected to pass a new comprehensive farm bill this summer. I urge you to expand the conservation programs in it to at least $7 billion annually, as proposed by representative Ron Kind and several other members of Congress. Protecting drinking water supply should be a top priority for those funds.

Finally, I would be remiss if I did not thank Representative Chet Edwards for his tireless efforts to procure funds for the City of Waco to help us deal with these problems. I hope that you will strongly support the Water Resources Development Act and the funds Congressman Edwards is seeking to assist Waco and upstream agricultural operators in the important work of securing adequate and safe supplies of water for our citizens.

Thank you again for the opportunity to appear today and I will be happy to answer any questions.

Mr. BISHOP. Mr. Stem, thank you very much.

We will now proceed to questions for the first panel. Let me start with a question that will be both for Mr. Hooks and Mr. Coombe. The question has to do with coordination between the USDA and its Federal partners, such as the EPA, in an effort to continue to decrease agricultural runoff.

In what ways is increased cooperation important, in what ways will they be valuable, and how would you suggest going forward to achieve that level of cooperation? We will start with Mr. Coombe.

Mr. COOMBE. Mr. Chairman, I would refer to the Chesapeake, for example. We have a predictive EPA watershed model, which is utilized so much in the press. It measures BMP, best management practices. In our particular program, conservation practices are what we use. Consequently, the jargon is different. So we are working closely to have these two work together.

We have just signed a Memorandum of Understanding (MOU) in October between the EPA and USDA with regard to putting actions in place to deal with the Chesapeake together. At the departmental side, both agencies or both departments have an MOU in the works to improve communication between leadership and focus on financial and technical resources.

We also have in the new Farm Bill proposal of the secretary, of a Regional Water Enhancement Program proposal which would be looking at large watersheds. Last of all, recently the regional directors met in Philadelphia at the request of Don Welsh, Region III Administrator, myself and others. That is an example of where each of us that oversee all of the States within the region of the Chesapeake have met.

Mr. HOOKS. Thank you for your question. I think one of the areas that USDA and EPA can work together really are at the local level. I think there are some examples of us working together in a much more concerted and coordinated fashion. Just recently USDA's NRCS office worked with the Nebraska Department of Environmental Quality to develop a fund in 2007 called the Water Quality Initiative Program that will invest EQIP dollars to fund one on one technical assistance to farmers and landowners at priority sites within a watershed.

One of the key features that we have promoted, that we attempt to promote through our nonpoint source program, is our ability to work cooperatively and through this voluntary program at the local level. So in terms of our ability to again work with the USDA, I would say that we need to take a serious look at some of the programs and identify what priority watersheds we need to work in, and then work closely together with USDA in those areas.

Mr. BISHOP. Thank you.

Mr. Coombe, is there a backlog in the Environmental Quality Incentives Program?

Mr. COOMBE. Mr. Chairman, there certainly is. All of our programs are over-subscribed. And with regard to EQIP contracts, for example, we have a backlog at this time, unfunded applications of over 41,000. There is about an 8.9 percent participation rate, up to 2,128,982 farmers across the Country.

Mr. BISHOP. And what are the implications of this backlog?

Mr. COOMBE. The implications are that with regard to our expenditures since 2002 to 2006, 2,773,159,000—well, I have my digits off, but over $2 billion have gone for water quality programs, parts of programs. EQIP is a major one, WRP, et cetera. I am saying that all of our programs are over-subscribed, and we believe that these are extremely important to watersheds. We take a national view, but realizing all land is in a watershed, and many of the members will have different watersheds they think are important. But we are over-subscribed.

Mr. BISHOP. Thank you.

Mr. Hooks, there is an EPA report entitled the National Water Quality Inventory. It is my understanding that the Clean Water Act stipulates that that report be released every two years. It is my further understanding that there has not been a full report released since the year 2000. So my question is, why is it that we have not had a report since 2000 and when do we think we might see the next report?

Mr. HOOKS. I am actually hopeful that you will see the report within the next few weeks. I think part of the reason for the delay in the report has been to a change in the type of reporting that we are doing. We have moved to an integrated reporting mechanism, combining both our 303(d), our impaired waters list, along with our 303(b) reports. We have moved to a different electronic reporting mechanism. That also caused certain delays in the reporting of the report.

But we are starting to make significant advances and improvements in the reporting. The reports are coming to us electronically and we will be able to get these reports out in a much more timely fashion.

Mr. BISHOP. But you think that report will be available within the next two to three weeks, did you say?

Mr. HOOKS. Probably in the next two to three weeks.

Mr. BISHOP. Okay, thank you very much.

My last question is one that has a local implication for me. I represent a district that includes two estuaries of national significance: Peconic Bay and Long Island Sound. It also is an area where agriculture is one of the more dominant industries. My question is for areas that include estuaries of national significance, particular farm land that borders estuaries of national significance, should the programs that currently exist to curtail runoff that are voluntary, should we be looking to make some of them mandatory when we are dealing with an estuary of national significance? Mr. Coombe or Mr. Hooks?

Mr. COOMBE. May I? I just feel so strongly on this, Mr. Chairman. In 1989, Surface Treatment Rule required all water systems to be filtered. The New York City watershed is one of the largest, 1.45 billion gallons. I own a farm within that particular watershed.

We suggested that the low density land use pattern, 85 percent in ag and forestry, was the preferred land use. The city decided instead to regulate us. The rest is history. They saw their way because in the area of the Croton system, which you are familiar with, highly urbanized and industrialized, they had to filter their water. They would have Croton-ized the Cat-Del if they had done that.

So in my humble opinion, and I feel very strongly on this, when you are dealing with nonpoint source pollution on diffuse sources, from agriculture and forestry, you have to have access. That is one of the things we have had 70 years of experience with, 71, 72 years at NRCS. And that is the trust on the part of the farming community and the forestry community to utilize our science-based technology in order to protect the land. You have to get on that land and you have to win them over.

So I believe that there can be a combination. Sometimes you need the hammer in the regulation. But to get the work done, you need the voluntary, incentive-based program. We have a 43 percent reduction in sediment from 1982 to the year 2003. And that was done on a voluntary basis nationwide.

Mr. BISHOP. Thank you. Mr. Hooks?

Mr. HOOKS. I think one of the hallmarks of the 319 program at this point, it certainly is a voluntary program. One of the things that we focus on is education and training with the farmers and the local communities.

I think one of the central tenets is in trying to promote the watershed approach, it is important that we have a plan that is based on sound management techniques and based on sound science, where we need to go in, assess what the natural resources are, identify what the goals are, determine what sort of priority problems we are going to focus on and then develop a specific management approach to the problem.

Then we need to evaluate, and also bear in mind that we can apply adaptive management after we monitor and see what sort of progress we are actually making over time.

Mr. BISHOP. Thank you.

Mr. Baker?

Mr. BAKER OF LOUISIANA. Thank you, Mr. Chairman.

Mr. Hooks, I am not questioning the underlying assumption about the hearing, but I think it is something that I need to understand better, and that is that agriculture represents a problem with regard to nitrogen runoffs.

Within the agency, has there been significant academic study, either by outside source or within professionals in the agency to, for example, looking at the water in the Mississippi River, which flows by my front door every day, comes from everybody from the Appalachians to the Rocky Mountains? It is utilized by our industry, we have to take it out, treat it and use it for commercial purposes. And when it goes back to the river, it is cleaner than when we took it out. But we still have concerns about water quality, even doing that.

But how much of pollutants, I learned a great deal in this atmospheric deposition here, and as they say, a significant problem, particularly in proximity to coal-fired generators, do we know whether the nitrogen is 100 percent runoff? Is it 50/50? Is it 70/30? And is that based on studies that get us an awareness of where our problems really are?

Mr. HOOKS. Currently, actually, the agency's science advisory board is conducting a study at this point. One of the programs that EPA participates on is the Gulf of Mexico Hypoxia Task Force. They requested the science advisory board to look at actually both nitrogen and phosphorus and the contribution that it makes to the Gulf of Mexico.

The numbers that I have seen, there is an estimate that approximately 74 percent of the nitrogen that is coming down the Mississippi is from agricultural sources.

Mr. BAKER OF LOUISIANA. How did they get to that number? Did anybody do a study or is that modeling, or how did we come to that conclusion?

Mr. HOOKS. I don't know that personally, but I would be more than happy to research that.

Mr. BAKER OF LOUISIANA. My reason for bringing this point up is, there are too few resources to address all the identified problems all at once. So we really need to prioritize. So a very carefully focused scientific analysis of where we believe the best taxpayer benefit would be yielded, for example, I know in high density animal operations, the milking parlor, as it is called in the evening, represents a concentration of animal waste that is pretty considerable. At least in my state, we have had dairies actually put in mini-sewer treatment plants to treat that material before it is disposed of. That is an obvious one.

But I am not altogether convinced, if you are looking at several hundred acres where you have crop rotations of beans in the spring and you go to an alternate crop in the fall, even grassland, that that kind of simple operation represents the environmental threat that I am hearing about. That is my point. My colleagues think I am not sensitive to the environment. We drink the wastewater you send down, that is where we get our drinking water, out of the river. So we are pretty sensitive about it.

The point is, I don't want agriculture just to be plowed under here as the bad guy in all this. There are a lot of good people in business who spend their money to clean this stuff up because they rely on the viability of that land for their future kids' generations to come economic vitality.

So I am just requesting that in our prioritization of where we spend money, let's at first have arms-length professionals take a look at the field and figure out who are the number one violators and how can we help those folks through voluntary programs correct those actions to help us all. But there were wildly varying numbers, as for example, in the Chesapeake Bay, as to whether atmospheric deposition was responsible for 10 percent or as much as 50 percent of the deposition in that lake. We don't know.

So it is hard to rush to a judgment and spend a lot of money when we might find out later we would have been better served somewhere else. How long do you think it is before that scientific study that you say is now engaged would be available to the Committee?

Mr. HOOKS. They are due to release a draft report in July of this year and have a final report, I believe, in October of this year. And I share your sentiments. It is an extremely complex and difficult issue, particularly the Gulf of Mexico issue.

Mr. BAKER OF LOUISIANA. I represent sort of a rural area, and we have a lot of septic tanks that dump a lot of water into a lot of roadside ditches. I hope nobody from the EPA goes down there and checks them, but I have a suspicion that some of those wouldn't quite meet your standards. I think when you aggregate hundreds of thousands of people's activity as opposed to a single farming operator, the equities might need to be readjusted there.

I yield back, Mr. Chairman.

Mr. GILCHREST. Would the gentleman yield just for a quick second?

Mr. BAKER OF LOUISIANA. Yes, sir.

Mr. GILCHREST. The Chesapeake Bay program has actually helped us, through pretty critical analysis, to figure out where all these, where the nitrogen is coming from, where the phosphorus is coming from. And even where the septic systems are contributing nitrogen. In the State overall, there is 5 percent of the nitrogen going into the Chesapeake Bay from septic systems.

But if you take that down a few other notches, in certain areas it is 50 percent. If you look at a little tidal pond to the Chesapeake Bay, it will vary. And it is about 40 percent from agriculture, about 28 percent from air deposition for nitrogen, and about, I am not sure, maybe Mr. Coombe knows. But anyway, we have classified urban, suburban, agriculture, septic tanks, sewage treatment plants and so on.

I do want to buttress one of your comments, and that is, I think my state, my farmers, nothing against Colorado, Pennsylvania, Louisiana, but we really have reached a level of state of the art in best management practices for agriculture to reduce these kinds of runoffs. And it is because of the collaborative effort in the Chesapeake Bay Program, EPA, Chesapeake Bay Foundation, the agricultural community. They have really integrated their cooperation together to move forward.

Mr. BAKER OF LOUISIANA. I thank the learned gentleman.

I would just merely point out that the type of diligence that the Chesapeake Bay groups have exhibited is the kind of diligence I am suggesting ought to be required nationally. Before the Congress spends a bunch of money, we ought to know what the net effect is and are we helping the problem or not. I am merely suggesting, I don't think agriculture generally, at least speaking for my state, is as bad as some folks may think.

I yield back.

Mr. BISHOP. Mr. Baker, thank you.

Mr. Salazar?

Mr. SALAZAR. Thank you, Mr. Chairman.

Ranking Member Baker, I couldn't agree with you more. In Colorado, we have several streams that are impaired. We have the Fountain Creek that flows out of Colorado Springs, through the City of Pueblo and on down the Arkansas River. Probably the largest contaminant of the Arkansas River. And most of the contamination does not come from agriculture, most of it comes from the City of Colorado Springs.

As we build more cities, with more concrete and more pavement, when we have heavy rains it flows into the streams and that becomes a great contaminant. I am just concerned that agriculture is becoming the scapegoat here, and we have to be careful that we don't over-regulate agriculture.

Mr. Stem, you mentioned that in Waco, agriculture contributes, I don't remember the number, but you said somewhere in the neighborhood of 30 or 40 percent of the contaminants to the river. Have you done an assessment as to what the City of Waco actually contributes when you have heavy rains or floods?

Mr. STEM. There have been assessments done. The Texas Institute for Applied Environmental Research at Tarleton State University, which is in Stevenville, in the heart of dairy country, did a study of the watershed. I believe the number, the urban runoff number was around 7 percent. It has been a number of years since I read the study. It was less than 10 percent. I think the waste application field contribution from dairies was in the 30s or 40s.

Mr. SALAZAR. Well, that seems a little optimistic to me, when I look at what has happened in some of the Colorado rivers. I guess I would ask Mr. Hooks, what is your assessment of the mercury issue in our rivers and streams and lakes, based on the pollution by, for example, electric generation power plants? We have a study or a graph here, I have, that was issued by the EPA, which is an inventory of the U.S. greenhouse gas emissions. Thirty-two percent of the greenhouse gas emissions come from electric generation, 28 percent from transportation, our vehicles, 19 percent from industry. Agriculture only represents 7 percent of that contamination.

I understand that these electric generation plants contaminate the water with heavy mercury deposits. Can you address that, please?

Mr. HOOKS. Yes. The mercury contamination is also an extremely difficult issue, particularly in the water program. The majority of the mercury that is deposited into our surface waters, oftentimes the majority of it can come from out of state, which makes it extremely difficult for State regulators to deal with on a case by case basis.

I think the thrust of what we are trying to do is to work with States to develop comprehensive management mercury reduction programs, to the extent that we can. Certainly programs with the Office of Water's purview, we basically have indicated that States have the ability to delay implementation of their TMDLs for mercury impairments.

So to the extent that we can, with the tools that we utilize within the water program, we try to understand the science, we try to understand the States' ability or lack of ability to meet those types of mercury standards.

Mr. SALAZAR. Thank you.

Mr. Coombe, are you aware of the new Greenbelt Initiative that the USDA is working on, and something that has been requested for the Ag Committee to include in the 2007 Farm Bill program, which basically creates greenbelts? I think part of it is to help with noise pollution, part of it is to help with water pollution. Are you aware of that initiative?

Mr. COOMBE. No, I am not.

Mr. SALAZAR. Okay, thank you. This is something that I believe will help, especially with the farms and ranches that are along rivers and streams. We are going to be looking at that with the Ag Committee.

With that, Mr. Chairman, I yield back. Thank you.

Mr. BISHOP. Thank you. Dr. Boustany?

Mr. BOUSTANY. Thank you, Mr. Chairman.

First, let me start off by saying I want to associate myself with the comments of my colleague from Louisiana. I still have this question about, do we really know enough about monitoring and data collection on all this to really have an understanding from a watershed basis on what is the role of agricultural runoff versus suburban and urban runoff in this problem?

First, my younger brother actually is a research scientist with the NRCS at the wetlands center down in Lafayette, Louisiana. I have been with him the center, obviously, seen his laboratory work. I have also gone out in the field with him on occasion. I have been to some suburban developments where there are ponds, they are trying to create beautiful grounds. And the ponds are repetitively overgrown with duckweed. And when you get down there and collect this duckweed, it has the strongest nitrogen smell you can imagine. So we know there is a lot of nitrogenous waste getting into the water.

I have also been out to a number of farms in my district, which is largely a rural district in southwest Louisiana. I haven't seen that same problem. So it seems to me there are farmers that are doing a pretty decent job of approaching the problem. Just anecdotal, but again, I think we really need to make sure we are getting good, clean, accurate data and a full understanding of this.

A couple of questions. One, Mr. Hooks, with the 319 program, you mentioned some success stories in your testimony. I looked through them. Are there any other problems, disparities among the States, in your experience with this as to their effectiveness in implementing the program?

Mr. HOOKS. I think you would almost have to look at that problem on a case by case basis. There are plenty of examples where farmers have done an outstanding job in terms of their conservation practices on their local farms. Then there are ceratin areas where we need to do additional work.

Again, one of the thrusts that we try to promote is looking at the problem from a watershed standpoint, so that we can look at a community of farmers, or a community of even urban potential inputs of nitrogen, phosphorus, what have you, on a watershed basis, so that we are trying to make significant progress and improvements on a watershed downstream.

Mr. BOUSTANY. So are you suggesting that there are many area where there is room for a lot of improvement in the implementation of this program?

Mr. HOOKS. Again, it is probably on a case by case basis.

Mr. BOUSTANY. That is a fair enough answer.

Mr. Coombe, on the Wetlands Reserve Program, you mentioned retiring crop land. Are there other alternatives being looked at, such as strategic planting of wetlands plants to try to get the same result? Are you aware of any research or data along those lines, rather than retiring acreage of crop land?

Mr. COOMBE. Yes, there are a few. A quick comment to your statement before. The discharge of nitrogen and phosphorus is two times higher per acre from urban as opposed to agriculture. That was helpful. And with regard to Mr. Stem's comment, the North Bosque river is a CEAP special emphasis watershed that is the water supply for his community. We are monitoring water quality very closely there, and should have results by 2008.

In terms of riparian areas and the Wetlands Reserve Program in our Farm and Ranchland Protection Program (FRPP) too, we are doing a lot of study through the Agricultural Research Service, which has developed agriculture-based models for crop land. We are also developing models with regard to the value of specific types of plantings along riparian areas.

Mr. BOUSTANY. Thank you. I see my time is about up, so I will yield back at this time.

Mr. BISHOP. Thank you. Mr. Arcuri?

Mr. ARCURI. Thank you, gentlemen, for being here.

Just a couple of questions. I have a district in upstate New York that has very heavy dairy farms. I couldn't agree with my colleagues on both sides of the aisle more. I hear them constantly complaining about the fact that they are being blamed for runoff and they are trying to do the right, but obviously it is very difficult, especially for the small farmers.

My first question is to you, Mr. Stem. When you were speaking, you made a distinction in terms of using the Superfund to go after, I think you said, some of the larger dairy farms. Do you find the same problem coming from the smaller dairy farms? Do you have those in your area?

Mr. STEM. In the North Bosque watershed, which is the watershed that feeds to Lake Waco, I believe there are 64 CAFOs that would be 500 head or more. Last I heard, 10 or 12 what we call FAFOs, which would be less than 500. Generally, we don't have the waste management issues with the smaller ones that we do with the bigger ones.

But the problem in the North Bosque is that it is kind of overpermitted, and many of them just don't have enough land to apply their waste at agronomic rates. So there are some problems with some of the smaller ones. But primarily the over-application is with the larger ones because they have so much waste to deal with.

Mr. ARCURI. Mr. Hooks, does EPA treat the small farmers differently than the large dairy farmers?

Mr. HOOKS. Well, it certainly, the 319 program is a voluntary program. So obviously, the mechanisms that you might employe to educate or to train might be different. But the essential thrust of the program is the same, to provide technical assistance, financial assistance, promote technology transfer and demonstrate projects, both on small scales and large scales. So we try not, I don't think we discriminate between the large and the smaller farmers. But the thrust of our message and our program is the same.

Mr. ARCURI. I would just like to point out, and I have had a series of town hall meetings throughout my district, which again is very dairy-oriented. Most of them are small farmers, but they say the same thing. They want to do the right thing, they want to try to take the right steps. The problem is, the price of milk is so low that they really can't afford to do the things that are necessary to do. So I think that is something that we really need to be cognizant of. These farmers, I think sometimes people tend to demonize them as the cause of this problem. And they are trying to do the right thing, but the economics of it is very difficult for them.

Just one more question. We are finding many more organic farms sprouting up. Do you see any difference in terms of the problem with the organic farms as opposed to the traditional farms?

Mr. HOOKS. Actually, I am not that familiar with the farming practices of organic farming, to give you a decent response right now. But I would be more than happy to obtain some additional research and provide an answer to you on that.

I did want to make one correction in terms of do we treat small farmers and large farmers any differently. For large CAFOs, those industries are regulated by NPDES permitting. So there is a distinction there, based on the size.

Mr. ARCURI. Thank you very much.

Mr. BISHOP. Thank you. Mrs. Drake?

Mrs. DRAKE. Thank you, Mr. Chairman. And thank you all for being here.

The district that I represent borders the Chesapeake Bay. It has been my experience, talking with our farmers on the Eastern Shore, and also farmers I have talked to across Virginia, that they are very supportive of agricultural conservation measures. They understand the importance for the environment, and they know that it also helps them in their own practices.

So my question is, there are so many programs that are out there, but there is confusion and I think limited coordination between agencies. So Mr. Hooks, what is the EPA doing, or Mr. Coombe, what are we doing to make sure that we are better educating our farmers, and the ones who are willing to participate in these programs? How are we making sure we are getting the information to them?

Mr. COOMBE. That is what we are all about. We are helping people help the land. We provide technical assistance. We are in most every county in the Country. As a farmer myself, NRCS is just the place we go for technical assistance, et cetera. Certainly, one of the most exciting things that we do, I think, is that we have State Technical Committees that represent a whole series of groups, and especially the farming community, that helps us set our priorities with regard to how we are spending the dollars in our national programs across the Country. And along with that, in terms of working with the communities, once again, Secretary Johannes in his 2007 Farm Bill presentation has agreed with you. So has the Chief of NRCS, Arlen Lancaster. And they do want to simplify and merge the programs together, so that our cost share program and our conservation programs from the standpoint of easements would be more simplified and yet still directed, in order to put conservation on the ground.

We think that is one of our strongest points. One of the reasons, Mr. Chairman, I go back to your question with regard to the voluntary approach. It is important to change behavior patterns on lands by private individuals. We think this is the best way to do it, and that is what we are all about with our programs.

Mr. HOOKS. I think one of the distinctions from USDA's programs and EPA's is our ability to hire watershed coordinators, which typically USDA does not fund, use its moneys to fund that type of a hire. Right now, we spend approximately about $100 million per year doing the things that I mentioned earlier in terms of education and training. States or other entities below the State level have the ability to bring watershed coordinators on board full-time for that purpose, to basically go out and talk directly to the farmers.

Mrs. DRAKE. Thank you.

Mr. Chairman, I am going to yield back. I know we have a vote. Thank you.

Mr. BISHOP. Thank you very much.

We have a 15 minute vote on the Floor right now. There are about 11 minutes left. I think we will have time at least for one more set of questions.

Mr. Baird?

Mr. BAIRD. I thank the Chairman. Mr. Hooks, as you may be aware, Puget Sound is engaging in a great effort to try and clean up that magnificent waterway. One of our challenges, frankly, is nonpoint source pollution, the subject of today's hearing.

I wonder if you have any knowledge of that or any thoughts you would like to share about the role your agency might play in working with the Puget Sound and trying to improve its water quality, vis-a-vis nonpoint source?

Mr. HOOKS. As you are aware, while I have been focusing my comments primarily on the 319 program, we certainly have the NEP program in Washington, which is one of the hallmark programs for EPA. It is kind of the poster child for partnership and collaboration.

They also are a large part of the solution in dealing with nonpoint source and point source pollution, working in collaboration with the many partners in the region and in the area.

Mr. BAIRD. We appreciate your collaboration.

Another issue that I played a role in has to do with the issue of harmful algal blooms. Many of us have a pretty strong feeling that that may be exacerbated, if not caused, by agricultural runoff, at least in some areas. It is a multi-million dollar threat to shellfish and other fishing industries. I wonder if you could comment on that issue? We tried actually a couple of years ago to include some language, actually ran into some opposition from agricultural interests who didn't really even want us to study the possible contribution, let alone study measures to control this. I wonder if you have any insights into that, what the contributing factor is and what needs to be done?

Mr. HOOKS. In large part, again, it is going to be focusing on education. We are very much concerned about the HABs, or harmful algal blooms, around the Country. They can contribute to red tides, brown tides. Certainly dealing with the whole physteria epidemic on the east coast over the past couple of decades has also raised awareness of this issue.

It is something that we just need to keep after. Again, developing an effective watershed plan that is based on sound science, trying to figure, again, what are the priority areas that we need to develop and work on, what are the best management practices to deal with this nutrient over-enrichment, and do it in a concerted way, do it so that it makes sense. I try to identify what are the high priority watersheds that are contributing most highly to the nutrient, usually nitrogen in the marine environments, what are the highest priority watersheds that we need to focus our energy and attention on.

Mr. BAIRD. Is EPA aware of the economic and health consequences of harmful algal blooms? I know there are powerful interests that might discourage you from attending to the upstream contributors to this. But are you aware of, for example, the impacts on the shellfish industry and other fishing industries and the economic impacts of that and the tourism industry, should harmful algal bloom hit a recreational area?

Mr. HOOKS. We are very aware of that. Hence the pressure to try to deal with this very serious issue. Oftentimes, obviously, the human health impacts associated with particularly some of the toxic blooms that occur on occasion as well.

We are very aware of it. We continue again to work with the local community, work with our local coordinators, and again try to assess the natural resources and develop a plan that is effective that is effective and that is going to work.

Mr. BAIRD. Do any of the other panelists want to comment on either of those issues?

Mr. COOMBE. I would just make two comments. Once again, back to the gentleman from Maryland, the data in the Chesapeake is showing at least two times more nitrogen and phosphorus runoff from urban development and suburban development. We are actually losing the battle, somewhat, because of the urbanization.

Second of all, we in USDA Natural Resource Conservation Service have put forth salmon habitat improvement programs and dollars through the EQIP, the Environmental Quality Incentives Program I alluded to before. So it is a high priority.

Once again, we know agriculture is part of the problem. We also know we are part of the solution. We believe our voluntary incentive-based programs at the local level are helping with the problem.

Mr. BAIRD. I can tell you, some of my agricultural folks, especially the smaller producers, cranberries and others, really appreciate EQIP dollars. They use them very, very well, and very productively to keep the water supply clean. So thank you for that.

I yield back.

Mr. BISHOP. Thank you. We have about six minutes left on the vote on the Floor. So Mr. Gilchrest, take it over.

Mr. GILCHREST. Thank you, Mr. Chairman. Two very quick things, I will take 30 seconds.

One, you can have a CAFO operation as long as you use BMPs, including nutrient management, and you have enough land, that is the big issue. The other thing is, Mr. Hooks, if you could contact my office, I would really appreciate understanding a little bit more about the trading system you described there earlier. And if it is a cap and trade or if it is a trade, I don't think we do it in Maryland, but I sure would like to take a look at it.

Thank you very much, Mr. Chairman. I would like to talk to you further, Mr. Hooks.

Mr. HOOKS. I would be more than happy to do that.

Mr. GILCHREST. Thank you.

Mr. BISHOP. Mr. Gilchrest, thank you.

I think we will now excuse the first panel with our thanks and appreciation for your time and for your expertise. We will recess for about 15 minutes. When we return, we will start with the second panel. Thank you very much.

[Recess.]

Mr. BISHOP. The Committee will reconvene.

We will now move to our second panel of witnesses. The second panel consists of Mr. Roger Wolf, Director of Environmental Programs at the Iowa Soybean Association. Next will be Mr. Scott Faber. Mr. Faber is the Director of the Farm Policy Campaign at Environmental Defense. We will then have Dr. Robert Howarth from Cornell University's Department of Ecology and Evolutionary Biology. Then our final witness will be Dr. James Baker, a Professor Emeritus from Iowa State University, representing the Iowa Department of Agriculture and Land Stewardship.

Again, I will ask that you limit your verbal testimony to five minutes. Your written testimony will be entered in its entirety into our record. Let us begin with Mr. Wolf.

TESTIMONY OF ROGER WOLF, DIRECTOR OF ENVIRONMENTAL PROGRAMS, IOWA SOYBEAN ASSOCIATION; SCOTT FABER, FARM POLICY CAMPAIGN DIRECTOR, ENVIRONMENTAL DEFENSE; ROBERT W. HOWARTH, PH.D, DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY, CORNELL UNIVERSITY; JAMES BAKER, PROFESSOR EMERITUS, DEPARTMENT OF AGRICULTURAL AND BIOSYSTEMS ENGINEERING, IOWA STATE UNIVERSITY

Mr. WOLF. Good afternoon, and thank you.

On behalf of our 6,100 farmer and dues-paying members, I want to thank you for the invitation to talk about our perspective on agricultural nonpoint source pollution and water quality.

The Iowa Soybean Association has the distinction of being the largest State-based row-crop commodity association in the Country. Over the last decade, Iowa Soybean Association has established itself as a leader in helping improve agronomic, economic and environmental performance in agriculture. We believe this is unique.

We believe our programs are a model of what cooperative public and private partnerships with farmer leadership can achieve. In fact, we believe we are providers of solutions to these issues.

Our participants include dozens of partners from the public and private sector, as well as 500 individual farmers working on 1,500 fields across the State. We are currently working in eight sub-watershed efforts that are within four major river basins.

Of course, you mentioned my testimony has been entered into the record. It is quite long and I hope you do look at it. It recognizes that despite the fact that agriculture has made significant investment in conservation applications, challenges do remain. It addresses the question we all must answer, which is how best to achieve water quality the public demands, while also meeting demand for food, fiber and fuel. This is an exciting time in agriculture. If you are a farmer, it is the best time to be in agriculture.

Our recommendations involve system changes as well as policy and program changes, changes that are designed to provide measurable improvements in environmental performance from agriculture. Our specific recommendations for advancing agriculture's environmental performance include: establish an Upper Mississippi River Basin initiative to provide a framework of inter-governmental, multi-jurisdictional and public and private collaboration, and implementing and funding a strategic, performance-based resource center plan for environmental performance. Maybe this could be done as a geographic initiative within EPA, or maybe it could be done as part of a priority area in the upcoming Farm Bill.

We need more support of public-private partnerships, empowering local communities of farmers to work on providing these solutions. We need support, we need a means for diffusing and institutionalizing the innovation. That is one of the things Iowa Soybean has done over the last decade, is this innovation programming, so that we can mature agriculture's capabilities to perform. Frankly, we need to sophisticate our system. We need to go beyond best management practices. That is one of the foundations of our program at Iowa Soybean.

We need increases in funding for technical and financial assistance on farms. That is critical. We need support of applied evaluation involving monitoring and measurement of management providing site-specific and location-specific feedback that can be used to validate performance and incorporate results over time. Farmers benefit first from that information and we believe we can best capture environmental improvements with that kind of information.

We need to incorporate these adaptive management and performance-based approaches into watershed programming. Then we also must define realistic time frames to achieve some progress on these water quality issues.

How did we arrive at these recommendations? They are based on the experience that we have at Iowa Soybean and the fact that we have stepped up to the challenge and embraced opportunities. We have heard about the issues from the other speakers and from your opening comments about nitrogen in the Mississippi River, the Gulf of Mexico. Certainly, the issues in the Chesapeake Bay, we share those issues.

The Iowa Soybean Association, which manages the farmer checkoff, has invested over $2 million of farmer funding to address these issues and leverage that with State and Federal grants, all to work on this issue. Nonpoint source pollution is challenging because it occurs as part of a dynamic, open system. This is also what makes farming challenged. The difference is we have invested significantly in mastering management capabilities driven for profitability. ISA programs are designed to help tune in our management capabilities to address environmental objectives.

Multiple tactics are used to do this. We use precision agriculture technology, we used applied science in fields to collect performance data. Performance data is used to adjust practices. This is all done as a proactive effort, for economic reasons for agriculture and to address water quality issues.

Mr. BISHOP. If you could limit your remarks to perhaps another one minute.

Mr. WOLF. This approach works, because it gets quantifiable results and it is replicable. We are already seeing it evolve into a working model for landscapes across Iowa and beyond. That is why we think that the Upper Mississippi River Watershed and the subwatersheds within should be targeted with a focus on making progress on nutrients.

In closing, members of the Iowa Soybean Association hope you will consider our work to be a touchstone and our people to be a resource as your Subcommittee considers work ahead, and Congress works on the next Farm Bill. Thank you.

Mr. BISHOP. Mr. Wolf, thank you. Now we will hear from Mr. Faber.

Mr. FABER. Thank you, Mr. Chairman. Let me just start by saying how much I appreciate your holding this hearing, and to especially thank Congressman Salazar for his leadership in introducing the Eat Healthy America bill and its proposal to increase conservation spending in the next Farm Bill.

I would especially like to applaud the work of the Iowa Soybean Association. They have done incredible things to help farmers improve the efficiency with which they are applying fertilizers. We are getting real reductions, 10 to 20 percent reductions in the amount of fertilizer that is being applied to farm fields in Iowa. It is proof positive that farmers can significantly increase the efficiency with which they using their nitrogen and it helps all of our water quality problems.

You have already heard that it has been more than 30 years since we pledged to clean up our rivers, lakes and bays, and that it has been more than 20 years since the first deadline to clean up our rivers, lakes and bays was passed. You have heard today also that thousands of our water bodies remain too polluted to meet the goals of the Clean Water Act. Farmers and ranchers manage more than half of the American landscape. So it is no surprise to any of us that agriculture has a significant impact on the environment. We heard that Mr. Hooks earlier today.

To comply with the Clean Water Act, our States have developed thousands of pollution reduction plans, TMDLs, and many of these plans heavily depend upon agriculture to reduce loadings of nitrogen, phosphorus and sediment. One of the questions we heard earlier was about the Chesapeake Bay. About 46 percent of the phosphorus that reaches the Bay comes from agriculture, and about 40 percent of the nitrogen comes from agriculture. So clearly, we are asking our farmers to do a lot to help us meet our Nation's water quality goals.

I think the good news is that our farmers are really eager to help solve these water quality challenges. There are many examples. Let me just provide a couple. About 41 percent of our farmers now employ conservation tillage practices, up from 26 percent in 1990. Farmers are widely employing the installation of buffer strips and grasses to help filter out runoff from our farm land. And overall, literally hundreds of thousands of farmers are implementing scores of different kinds of conservation practices that help us apply our fertilizers with much greater precision and help filter the nutrients that are intended for our crops.

With additional tools and incentives, our farmers could do much more to help address our water quality challenges. Right now, more than 100 million acres of crop land are still eroding at unsustainable rates, despite the great gains we have made in the last 20 years. Most farmers still do not conduct basic soil tests. Less than 40 percent of our crop land is subject to a test for nitrogen before we apply fertilizers. Less than 15 percent of our farmers employ technologies that automatically change fertilizer applications to reflect nutrient needs. This is not a criticism, it is a recognition that our farmers could do much more to apply nitrogen with greater precision and to intercept runoff before it comes off the field and into our surface waters with the right tools and the right incentives.

Congress has many opportunities, including reauthorization of the Clean Water Act, the Energy Bill, but especially renewal of the Farm Bill, to help reward farmers when they help address our water quality challenges. We heard Mr. Coombe talk about the fact that many farmers are unable to get conservation funding when they see it from USDA.

What is really tragic about that is that we have gone from a point where folks like the Iowa Soybean Association and Environmental Defense used to argue about agriculture's contribution to a point where now we are working together to seek those funds. Farmers are bringing their money to the table to share the cost of the installation of the myriad practices that can help address water quality. Every year, we turn away about 50,000 farmers who are putting their money on the table to help solve these significant water quality problems.

Doubling annual conservation spending, as has been proposed in the Eat Healthy America bill and Mr. Kind's Healthy Farms bill would dramatically reduce the amount of nitrogen, phosphorus and sediment getting into our surface waters. We have hired some agricultural economists and other experts. They have estimated, for example, that nitrogen losses would fall by 11 percent nationally if we double conservation spending as you proposed in the Eat Healthy America Act. There would be a significant reduction, far more than we have achieved in the last 30 years, in the time since the Clean Water Act has been passed.

What Congress needs to do much more than simply expand these programs, we agree with ISA that Congress should do more to improve the delivery of these programs by bringing groups of farmers together in small watersheds to help meet local environmental challenges, what the Administration has called cooperative conservation. What we have frequently found is that when farmers work together, neighbor to neighbor, peer to peer in these small watersheds, we can often solve these water quality and wildlife challenges much faster and at less cost and provide far more insights into the benefits of significant practices.

Congress should also take the opportunity with Farm Bill renewal to reform our land retirement and restoration programs, like the Conservation Reserve Programs, to focus more enrollment on lands that are best able to intercept and filter our farmland runoff.

So let me just finish by saying, and reiterating that farmers are eager to help solve these big environmental challenges. Many of the challenges that farmers can implement, such as better nutrient management and better pest management, also help reduce their input costs. Many of them simply require changes in behavior, such as changes in the timing of fertilizer applications. But many of these practices also cost more money, create new risks. Those are costs and risks that should be shared by the taxpayer.

I hope we will take advantage of this Farm Bill to reward, rather than reject our farmers when they offer to help share the cost of clean water. Thank you.

Mr. BISHOP. Thank you very much.

Dr. Howarth?

Mr. HOWARTH. Thank you, Mr. Chairman and members of the Subcommittee, for inviting me today. I am delighted by your interest in this topic, and Mr. Chairman, thank you also for your kind words of introduction earlier this afternoon.

I am going to focus on nitrogen pollution in coastal waters of the United States. I am going to draw heavily on a National Academy of Sciences report that came out in 2000 in a committee that I chaired, but also from more recent reports from the Pew Oceans Commission and from the U.S. Commission on Ocean Policy that came out in 2004.

For context, what human activity has done to the nitrogen cycle and nitrogen fluxes globally is one of the most severe aspects of global change. We are changing the rate of nitrogen cycling much faster than we are changing climate change. It is much more in our face.

To put it in perspective, in the 55 years since I was born, the rate at which human activity creates reactive nitrogen, the nitrogen that can cause water pollution, has increased seven-fold globally, a massive change. There are a lot of local scale, regional scale variations. It plays out differently in different parts of the world.

Agriculture is a big part of that, and the creation of synthetic nitrogen fertilizer is a big part of that. Again, just to get the rate of change, half of the nitrogen fertilizer that has ever been used in this planet has been used in the last 15 years. So we are talking about rapid and massive changes globally.

There was some discussion earlier about various systems and how much nitrogen came from various places. I will tell you that the science on the Gulf of Mexico-Mississippi River is solid enough that I can say with some assuredness that nitrogen is coming largely from agricultural sources in the Mississippi River Basin, certainly more than 60 percent, probably more than 70, 75 percent, possibly more than that. There is uncertainty, but it is agricultural.

Having said that, we look elsewhere and it is not so clear. Chesapeake Bay, agriculture is a big component, as you have heard. I think there is more debate about the exact numbers than you might have heard so far. But atmospheric deposition is also important. And this is nitrogen that comes from car exhaust and from power plants. If you follow the science of that closely, the numbers are changing rapidly. There is a lot of scientific discovery there.

But the consensus at the moment of the scientific community would be that both of those sources are important for the Chesapeake Bay. If we look nationally, we need to deal with both of those. If we want to focus on the Gulf of Mexico, then it certainly is an agricultural issue.

As a result of this increase in nitrogen cycling, over the past few decades in particular, nutrients are now the largest pollution problem in the coastal waters of our Country. They are one of the largest threats to the ecological integrity of these systems. We do not have a nationally consistent monitoring system for what the damages in coastal waters are. We just do not have that. And that severely limits what we can say in a quantitative sense, when we look and say how bad the situation is.

But the best available evidence is that a majority of our coastal and marine ecosystems are degraded. Probably a third of them are severely degraded from nutrient pollution; another third moderately degraded. So it is a big problem.

I have gone into more detail in my written testimony on what some of the issues are. I will say that the best evidence is that there is an increased frequency duration and extent of harmful algal blooms as a result of this nutrient pollution. We certainly have created dead zones as a result of this nutrient pollution. We have lost biodiversity. We are damaging fish and commercial shellfish.

Unfortunately, or perhaps fortunately, there is a lot of regional variation in what the effects of nutrient pollution are. As a scientific community, we partially understand that and we partially don't. Some areas are much more sensitive to the problem than are others. We sort of understand that, we don't entirely understand that.

As a scientist, that leads me to urge you to be very cautious. Because once we hit a tipping point where we severely damage these systems, there is every reason in the world to believe it is going to be more difficult to have them recover. It is not a simple matter of going back to where you are. It is a harder road to go.

So we don't know, system by system, where that tipping point is exactly until we reach it. But that is a reason to be cautious and make sure we don't get too close to those tipping zones.

I can see my light is flashing here. I have a minute to go. Let me jump to what I think is a critical thing for the Congress to consider, and that is the role of monitoring of what is going on. If you turn to page 5 of my written testimony, I have a figure there which is taken from the 2004 U.S. Commission on Ocean Policy, a bipartisan commission. They show the change in surface water monitoring in the United States from the 1970s to 1990s to now. Monitoring is a fraction now of what it used to be. That severely limits our ability to track whether we are making progress or not.

Similarly, the monitoring of atmospheric deposition is far, far less than it was in the past. So the scientific community is unanimous in believing that we really need to restore solid national monitoring programs of nutrient fluxes, of sources of nutrients. And we need to for the first time establish a nationally consistent monitoring program to truly, consistently determine what the effects are.

Thank you very much.

Mr. BISHOP. Thank you, Dr. Howarth. Dr. Baker?

Mr. BAKER. Yes, thank you, Mr. Chairman, and thank you and the Subcommittee for inviting me to testify on this important subject. I am Jim Baker, formerly of Iowa state, now with the Iowa Department of Agriculture and Land Stewardship. I will concentrate on, the emphasis of this will be on nitrogen in the Corn Belt.

I want to start out by making five points, based on research on field plots and watersheds, such as shown in this slide, on the Corn Belt. Before I make the first two points, you need to understand three things. First, that the rate of nitrogen applied to corn has been nearly constant the last 20 years. At the same time, corn yields on average have increased at least 2 percent each year, therefore removing more and more nitrogen.

So we are now at a point that inputs into row crops are generally less than outputs. This is true whether you are looking at fields or a whole State like Iowa. Recently, the Iowa Department of Natural Resources, with inputs from the USDA ARS and Iowa State University, did a nutrient balance for the State, shown in these two graphs. On the left, for nitrogen are the inputs which include fertilizer as well as manure and inputs like atmospheric deposition on the right are outputs, which include of course yields, but also loses to the environment. You will note for both nitrogen and phosphorus the balance is negative.

So the first point is, a negative nitrogen balance means soil organic matter is being lost through a process called mineralization. This is bad because it results in the release of carbon dioxide to the atmosphere, reduces soil quality, sustainability and the soil's ability to produce and also increases water quality problems.

In the second point, given this negative balance, current nutrient water quality impairments in the Corn Belt are not mainly due to the mismanagement or the use of "excess" fertilizers and manures.

On the third point, background you need for optimum corn production, there must be an optimum level of nitrogen in the soil. For the producer, it is very economically advantageous to add nitrogen to this level either in the way of fertilizer or manure. The nitrogen in the soil must be in a form which is nitrate. That is readily available to crops, but it also then means that that form and that nutrient is readily available to be lost with water. So some nitrogen loss is going to occur whenever excess water in the way of precipitation and in some cases irrigation drains from the land, particularly when that water drains through the soil as a sub-surface or tile drainage.

So the third point is that impairments are mainly due to past conversion from prairies and wetlands by our forefathers to intensive grain crops with nutrient inputs and sub-surface drainage where it is needed to produce the productive lands that we have.

And in terms of the fourth point, the background that you need to understand, the level of nitrogen in the soil and the amount of excess water are both much less for sod-based rotations, including alfalfa and CRP ground. Constructed wetlands are a proven technology for removing nitrate from water passing through them. To be effective, though, these wetlands must be carefully sited within areas of significant nitrate loss to remove that nitrogen.

So reductions in impairment, actually they will take substantially reductions in nitrate loss, will come mainly through changes in cropping and/or implementation of off-site practices.

The fifth point, although we have learned a lot from past research, there is still a need for additional research to refine proposed but yet unproven management practices and technology. Likewise, beyond that, there is need for research on totally new or innovative management practices and new cropping systems. And of course, with the new pressures on agriculture to provide energy, this will provide additional water quality challenges that will need to be addressed.

So the fifth point is that there is a need to create and fund a regional nutrient management, environmental research center. Currently this is being proposed through Iowa State. Our agricultural dean, Dr. Wendy Winterstein, that testified at a Farm Bill meeting last week in Council Bluffs, made the point that she is willing to lead that effort with engaging the other land grant universities across the Corn Belt.

I have a few seconds left. Let me make a final point relative to the Iowa Conservation Reserve Enhancement Program. Again, with background Federal USDA and Iowa cost sharing, it was put together to construct wetlands for nitrogen removal in the tile-drained areas of north central Iowa. This program languished for about two years because of initial permitting issues. Even now, current regulations for assessments limits construction of these wetlands to about 20 sites a year, when it is estimated that 8,000 to 10,000 are needed to reduce nitrate losses.

The last point is, regulatory impediments are currently limiting the adoption or efficiency of some of the off-site practices that we think are effective.

And my last slide then is what we would like to have help with. We need research, new information. We need to be able to get help to fund implementation of that new information and we need some regulatory relief. Hopefully we can develop a new landscape that might include more buffers as well as changes in the field itself.

Thank you.

Mr. BISHOP. Dr. Baker, thank you.

We will now move to questions. Let me start with a question for both Mr. Faber and Mr. Wolf. We have heard a lot this afternoon, and in the testimony there was a great deal of talk about good practices, having farmers perform soil tests, installing buffers, restoring wetlands and so on.

What is the best way to encourage more farmers to adopt these and other practices that will help point us towards a solution?

Mr. WOLF. Thank you for the question.

One of the things that our program does in Iowa is we go into a watershed and we ask a fundamental question: can you validate and verify the performance of your practices. First, farmers want to know, do they work agronomically and do they perform economically, because they are driven by bottom line issues. Our programming helps them collect data and the data really, it defuses the whole question. This becomes very compelling. In some of our watersheds, we have 60 to 70 percent of the farm fields enrolled, collecting data. Then the farmers have the data, they can look at it, and all of a sudden you have their attention, because it addresses their bottom line. They want performing solutions.

The other interesting thing that we found is that what one answer works in one watershed, you go right over to the next one and it is a different answer completely. If they hadn't collected the data, they wouldn't be able to take advantage of it. So it is just applied evaluation. It is very compelling. It addresses their bottom line. And if we strategically do some things in the watershed, we think we can provide some water quality solutions as well.

Mr. FABER. What is so unique about what the Iowa Soybean Association has done is that they have really gone beyond what most farmers do, which is use State recommended rates for fertilizer applications, and instead tried to calibrate their applications to fit the needs of that particular farm, in many cases finding they were applying more nitrogen than they need to. So that reduces their costs of their inputs, but also helps improve the receiving waters nearby.

So I think Roger has hit the nail on the head, that in many cases, simply providing more information, more technical assistance to producers. One of the big challenges facing NRCS is that we have doubled the size of their conservation portfolio, but we have not at all increased the number of staff who are available to deliver those programs. So the era when USDA experts used to go out into the field and work with producers to help them think about nitrogen applications, installation of buffers, the myriad practices you can implement, is now over. All those guys are stuck in the office, administering contract applications for EQIP.

So one big challenge is getting more technical assistance in the field. But I think there is also a number of practices, many of the practices you would implement simply require more information. Some of them require an incentive payment, just to get the farmer to try to adopt a new practice, or because he is going to incur a new risk, such as changing the timing of his fertilizer applications from the fall to the spring or splitting his spring applications. A lot of the things that get us the most bang for the buck don't cost the farmer any money out of pocket, but increases the risks, that is that there might be a wet spring and he won't be able to get out there and apply the fertilizer when he would ideally like to. That would ultimately reduce yields.

Then of course there are practices that simply cost money, installing buffers, installing artificial wetlands. Those are things that reduce yields, that take land out of production and that do cost money. So it is a mixture of things that are needed to get farmers to take those steps.

Mr. BISHOP. Thank you very much.

Dr. Howarth, you sort of hand to race through your comments on monitoring. So I thought I would give you an opportunity to go through those thoughts in a somewhat more leisurely fashion.

Mr. HOWARTH. I appreciate that opportunity. Thank you very much.

There are several points here I would like to make. First is there is not, as I said briefly, there is not a nationally consistent monitoring program of what the effects of nutrient pollution are in coastal waters. So we have monitoring that is done in the National Histories Program, we have monitoring that is done through the NOAA Reserve Programs, we have State and local governments doing monitoring.

When our National Academy committee sat down to try to see if we could look at a consistent pattern, or when NOAA has tried to do this before us, what you find is that the measurements are made in different ways, different methodological things, different sampling time periods. As a result, you really are hard pressed to say that what the trends are in particular areas, or in a highly quantitative sense, what the scale of the national problem is.

So I mentioned that there is a consensus that we have two-thirds of our coastal waters degraded from nutrient pollution, a third moderately and a third severely degraded. That is based on NOAA's polling of local expert judgment. They go to estuary by estuary and they sit down with the local government officials and they sit down with the local academic officials and they sit down with the stakeholders and they say, what do you think it is here? When people do that, that is the answer you get, we have a big national problem.

But in terms of objective data, where we contract things and really look at progress or degradation, we cannot do that. There has been a proposal on the books at least since our 2000 committee report, and it was endorsed by the Pew Oceans Committee and by the U.S. Ocean Commission. There is a huge amount of monitoring going on. With a little bit of coordination at the Federal level, it could be done in a nationally consistent way and nationally reported, which it is also is not, and we would have a national data set, which would be invaluable for determining if we are making progress. So that would be one recommendation.

The next is that the U.S. Geological Survey has done historically a great job of looking at nutrient flows and sediment flows in rivers, starting in the early 1970s and going until the mid-1990s. That program, that series of programs, has been severely cut since that time.

So when we develop models or statistical procedures, which would allow me to say what the extent of agriculture's problem is versus car exhaust or other things, we are using those data sets collected from the 1970s and 1990s, and particularly what happened in the 1990s. Since then, we have had climate change, we have different weather patterns. That is going to change the nutrient fluxes. We can model that all we want, but we cannot verify whether or not those changes are real. Because the monitoring data are no longer there. And we need those sorts of data.

The third point is the measurement of what is coming from the atmosphere. For acid rain, but also for this problem of nitrogen pollution, the national atmospheric deposition program has been curtailed slowly over the last several years. It is scheduled to be further curtailed in the budget that the Bush Administration sent forward. Other atmospheric monitoring problems, like CASNA, which also deal with mercury pollution, are being cut back. Those really need to be expanded, not cut back.

I appreciate the opportunity to comment on that.

Mr. BISHOP. I have one final question. You perhaps may have heard me describe my district earlier. It is the eastern half of Long Island, very rural, particularly as you move further east, two estuaries of national significance. An emerging industry is aquaculture. It has been embraced by the Long Island Farm Bureau and the acquaculturists are now members of the Long Island Farm Bureau.

So I guess my question is, how can we best focus on how we could improve aquaculture? Dr. Howarth, this is perhaps best a question for you, or Mr. Faber, I am not sure, or Dr. Baker. Any of you that wish to comment on that.

Mr. HOWARTH. Okay, sure. Aquaculture, as you know, our national fisheries, our world fisheries are depleted. They have been over-fished, they are damaged by pollution, they are being altered by climate change. As I say in my testimony, it is difficult to say exactly how much of a problem is due to each of those in any locality. It is very frustrating as a scientist. Those things interact synergistically and they are damaging our fisheries.

One hopeful response is to try to at least make some of that fish protein back up through aquaculture. There is a huge potential from there. It requires good water quality as the basis of that. You really need to have high quality water to do that. You certainly have that in the Peconic Estuary. Long Island Sound is a little more problematic, but that is okay, we can maybe make it better.

And of course, as with any agricultural activity, aquaculture is the same. It is not entirely free of risks, and we should carefully think about the risks for particular types of aquaculture in particular water bodies and whether they have a long-term sustainable use or not. I don't think that has been adequately done yet.

Mr. BISHOP. Any other panelists wish to comment?

Thank you. Mrs. Schmidt?

Mrs. SCHMIDT. Thank you.

I would like to direct my question to Dr. Howarth, if I could, please. And maybe Dr. Baker might want to comment, or Mr. Wolf or Mr. Faber.

I looked with curiosity at your testimony, and I think that you are making some assumptions here with your data, simply because as I believe you just stated, your data pool is not as nice as you would like it to be. One of the things that I have a concern with is in your end on page 6, when you want to mention the current national expansion of producing ethanol from corn. My question to you is this. We all want to be sensitive to the environment. I think we can all agree that we need to get off of oil for whatever reason, we need to get off of oil.

In getting off of oil, you have to get onto something else. There are folks out there that don't want us to have nuclear power because they have concerns. There are folks out there that don't want us to expand the coal, because they have concerns. There are folks out there that don't want us to use ethanol, because they have concerns.

My question to you is this: how are we going to reduce our reliance on oil, whether it is foreign or domestic, if we don't look at the broad alternatives? Because I don't think, and I think you and I will agree on this, there is going to be one source that is going to replace oil. So maybe you can help me there.

Mr. HOWARTH. Yes, thank you for the question. I did indeed add that at the end of my testimony and I didn't have time to mention it today. It is something I feel is very important to address.

We certainly do not have a sustainable economy based on oil. We need to be developing other energy sources. We need conservation. That is not my expertise. Water quality is my expertise. For background, I have just been asked over the last several months by the International Council of Science and by the United Nations to lead an international effort of scientists to look objectively at what is good and bad in all of the ways of various biofuel alternatives. We are just getting started on that. I am not in a position to give you that analysis yet.

I am in a position to say that every water quality person I have talked to across the Country is really alarmed by the ethanol production from corn, if it grows at the rate that many of us expect that it will, as the President and others would like.

The reason for that is that corn, I think Dr. Baker can comment further on this, he alluded to it in his testimony as well, but corn inherently is going to lose some nutrients downstream. It is a major source of the water quality problems we have from agriculture in this Country. We can improve that. There are a lot of things we can do to make it better. But there are some fundamental limits. In some places, you want to be growing less corn, you want to move towards other sorts of cropping systems, if you really want to deal with Mississippi nitrogen flow, for example.

If we greatly expand corn production without a great deal of care on that, we are taking on high risk. So what I am actually urging is not that, I know what the final answer is, but that we badly need objective science behind that before the Nation goes too much further in policy decisions which will set an economic infrastructure from which it will be hard to pull back, if in fact they are not the best, most sustainable choices.

Mrs. SCHMIDT. A follow-up. One of the other biofuels that you can look at it soy diesel. But we also have a problem, or what I am hearing is that there is a concern with growing too many soybeans, because they also put the nutrients into the water system. So if we can't do corn and we can't do soy diesel, what do we do?

Mr. HOWARTH. I agree with your starting premise, which is there is not a single bullet that is going to solve the problem. We need multiple choices. Again, I will answer your question in a second, but my fundamental premise is that we want to have a good, objective analysis of all the environmental pluses and minuses, so that whatever course we go down is the most sustainable for the long term, economically and environmentally. That analysis has not yet been done, to the best of my knowledge. There is an urgent need for it.

There are alternatives to either soy diesel, which I have not studied that closely, or corn ethanol. We can grow other crops to make ethanol. We can grow other crops to make methanol, which is in fact a lot easier. We can produce methane, and the technology is more available for that. We can directly burn things such as switchgrass and the energetics of that. In my quick analysis, the environmental benefits would be far better.

But I don't think the final answers are in on that. I am just urging that careful analysis be conducted. That needs to be funded.

Mrs. SCHMIDT. Mr. Baker, would you care to comment?

Mr. BAKER. Sure. I think Dr. Howarth makes two points that I would agree with, that first the corn system is a leaky system. We can't retain all the water and all the nutrients there when we grow corn. The second point I would be in agreement on is that we do need to proceed carefully.

But probably not quite as alarmed as he indicated some others might be.

When you look at what we can do, for example, in Iowa, the projections are that this year we will plant 11 percent more corn acres than we did last year. And of course, where will that be planted? Well, in our State that will come from soybean acres, primarily. So these areas are fairly similar in their environmental impact. Actually, in terms of the issue of a negative mass balance or more consumption of organic matter, soybeans, even though they are a legume and produce nitrogen, they don't nearly produce enough to equal what is removed in grain. So on average, we are probably mining the soil about 80 pounds an acre with soybeans.

So switching some of those acres from soybeans to corn may actually help that soil organic matter issue. And of course, the impact in terms of nitrate leaching is very dependent on the rate of nitrogen fertilizer, although given what the high value of corn and the cost of nitrogen, although it has gone up, it hasn't gone up as fast, there is a chance that the new economic optimum rate will bump up, which could enhance the leaching of more nitrogen.

The other point that one does need to be concerned about or think about is, in Iowa, or other States where there are other corps like alfalfa or even CRP, bringing those lands out of those sod-based rotations and putting them into corn could cause some water quality problems, but they wouldn't be nitrate leaching problems. Because those lands are not in tile-drained landscapes. They are in landscapes that aren't nearly as productive and have erosion problems, which is why they are either in CRP or in alfalfa.

So I think again I would totally agree that we need to look at this carefully. I mentioned that as one of the research needs for this research center that we would like to see started.

Mrs. SCHMIDT. Thank you.

Mr. BISHOP. Mr. McNerney?

Mr. MCNERNEY. Thank you, Mr. Chairman.

I certainly appreciate the panel's willingness to come here and testify today. I understand that farmers are anxious to find solutions, as we all are.

I have a couple of basic questions. I see a soybean representative, but no one from the corn community. What is the relative proportion of soybean to corn in terms of adding to the nitrogen build-up in our waterways. Dr. Howarth, do you have an answer to that?

Mr. HOWARTH. I don't have a good answer. Dr. Baker can address it as well. But much of the analysis that has been done looking at corn and soybean in rotation has classically been done over the last decade. And again, the best estimates on what the relative contribution of nitrogen sources is is based on models and monitoring data from the 1990s situation. The way that farming is being done now is differently, quite frankly. So that throws uncertainty into it.

Mr. MCNERNEY. And I certainly appreciate the need for data. That was pointed out several times. It is something that we should be willing to help with. Adding scientific value to the discussion always makes the solution more apparent.

There were some things that I was a little confused about. But what sort of farmer are we talking about? Are we talking about the mega-farmers or are we talking about family farms? What is the market of these farmers? Is it for food or for livestock or for ethanol? What are the sort of general parameters we are looking at here?

Mr. BAKER. In Iowa, of course, the State has about 36 million acres. Ninety-five percent of that is in agriculture. And depending on how you count them, we probably have 90,000 producers. So the average farm size might be 400 acres. But of course, we have a wide range of people within the State.

But by and large, a major part of our corn and soybean production comes from producers that probably at most either work with a relative, son, brother, have one hired man. These are not, at least in terms of row crop production, these are not mega-operations.

Mr. MCNERNEY. Okay. I was a little confused about the nitrogen balance you discussed. It looked like more nitrogen was being put into the system than was leached out through drainage. Is that a proper understanding?

Mr. BAKER. No, what I was showing in the determination balance or mass balance sometimes is confusing. But in the case of my discussion, I was really talking about organic matter in the soil, about 5 percent of which is nitrogen. If you use the analogy that that was a bank account or checking account or non-interest bearing account, if you put money into that account, for example, in the way of fertilizer, and you take money out of that account in the way of yield, if those are equal, your account balance will stay the same. The problem we think we are getting into, again, particularly in a corn and soybean rotation, where soybeans remove probably 80 pounds an acre more than is added. And in the corn situation, depending on where you are in the fertility, you probably are negative as well.

Over time, that bank account is going to go down. In other words, the amount of organic matter in our soil is going to go down. Right now, in many of our soils in Iowa, it is at about 3 percent. It has extreme value. If you have traveled in the Midwest, you see these black soils. The reason they are black is the organic matter. One of the terrific advantages of that organic matter, in addition to buffering nutrients, is its ability to provide structure and to hold water.

We can store about two inches of water per foot of soil that is plant-available. So out of maybe 18 inches that would be transpired through the plant, we can provide a storage, if we are wet in the spring, of 8 of those inches. So we can easily go through a month of no rain and still not impact yields. That is because of that organic matter.

So we are not at a point where it is a “red emergency.” It is just something that we think we need to look at when we are making decisions on using fertilizer to reduce water quality impacts that we aren't at the same time reducing soil quality.

Mr. MCNERNEY. I would like to ask the Chair for one additional minute.

Mr. BISHOP. Proceed.

Mr. MCNERNEY. I am from the San Francisco Bay Area and the Central Valley immediately adjacent to that. Is there relevance to this discussion of the Bay Area, the delta in particular? What is the nitrogen build-up in that area, and how dangerous is it in your opinion, Dr. Howarth?

Mr. HOWARTH. Well, San Francisco Bay certainly has many water quality problems, as I am sure you know. The South Bay in particular does. The relative contribution from agriculture there, I am not familiar. It has been modeled, I have seen studies on it. But I have not looked at those recently. But that information is available. The U.S. Geological Survey has modeled that using their National SPARROW Model. I have a lot of confidence in that model.

Mr. MCNERNEY. Anywhere along the West Coast, do you have any familiarity with that issue, of nitrogen and dead zone activity?

Mr. HOWARTH. Well, there is a newly-described dead zone off of the coast of Oregon. Oregon State University has been working on it for the last couple of years. That is probably not a result of nutrient pollution from land. It is probably a natural phenomenon and it might be aggravated by climate change. That is their hypothesis at the moment. So there are natural things that can go on here as well.

The larger problem, many of the West Coast estuaries do have problems with nutrient pollution. There are problems in San Francisco Bay, as I say. Puget Sound has problems, has been developing a dead zone. I believe there is some discussion and disagreement about the relative contributions of agriculture versus other sources in Puget Sound. I was in a discussion on that just two days ago.

But it is fair to say that the distribution of estuaries that is affected by nutrients is about the same as elsewhere in the Country. The prevalence of dead zones is a little bit less, just because those systems tend to be a little bit less sensitive to that particular response. They are more likely to get harmful algal blooms or other problems.

Mr. MCNERNEY. Thank you.

Thank you, Mr. Chairman.

Mr. BISHOP. Thank you.

Dr. Boustany?

Mr. BOUSTANY. Thank you, Mr. Chairman.

In Dr. Howarth's testimony, he remarks that pollution can be lessened through management practices, such as planting winter cover crops. Are there agronomic issues with this practice? For example, getting cover crops established in the autumn as the growing season is ending, or accomplishing springtime planting when cover crops are already established there? Could each of you maybe comment on that?

Mr. HOWARTH. Although I wrote that in my testimony and I believe the scientific evidence for the use of cover crops is the way to reduce nitrogen pollution is very, very strong, I am not an expert on the economic aspect of that. So I will defer to my colleagues who know more.

Mr. FABER. There has been an enormous success story in the Chesapeake Bay region with the use of cover crops. For a modest payment, I think it is about $10 or $15 an acre, has gotten farmers to now routinely plant cover crops and reduced the loss of nitrogen from soil. It actually just came out, this great desk reference for those of you who really want to know every detail on the environmental benefits of conservation on crop land. One of the issues would cover crops is certainly when you are removing them and the impact on phosphorus and other soil quality issues. But properly managed, cover crops are among the most cost-effective ways to help address some of these water quality challenges.

Mr. WOLF. I would like to add that farmers have lots of questions about how cover crops could be incorporated into their system. It really depends on the individual farmer. There are some farmers that could benefit from the forage that a cover crop could provide. There are a lot of farmers in Iowa, well, I shouldn't say a lot, but some farmers that are experimenting with it.

But there are some questions that need to be answered. So we are just beginning some work with the Sand County Foundation in Iowa that are really going in and applying our evaluation techniques, looking at the questions of cover crops and what impacts they have on the agronomic performance, the economic performance for the farmer. And then ultimately the water quality issues. Because if we are asking farmers to use it as a mitigating practice, we have to address some of the risks that Scott Faber identified earlier. If nitrogen needs to be mitigated and cover crops become a viable strategy, then we may need to incentivize to cover some of those risks.

Mr. BAKER. We have interacted with the agricology group at the University of Maryland, as Scott mentioned. Maryland does pay $15 or $20 an acre, because they work there. Of course, in Iowa, with 25 million acres of row crop, at $20 an acre, you can see that that would be a very big program for us to implement.

The other part of it is the climate differences. You have pointed out very well that the issues that we deal with, we have producers that have considered this and some that have even tried it, and their description is it is a management nightmare. And again, it is not to say that it couldn't work. We really need to figure out how to get around these problems. But you have the problems of establishment in the fall, because of our climates, cold, and after crops are harvested there is not enough time. And then in the spring, with wet and dry soils that a producer has to plant into, getting that cover crop killed and getting the soils warmed up and dried out is a problem. We have yield reductions. In measurements that have been made relative to water quality in limited studies, they have shown to be effective at holding nitrogen against leaching.

Mr. BOUSTANY. What about phosphorus management with regard to winter crops?

Mr. BAKER. With regard to cover crops?

Mr. BOUSTANY. Yes, winter cover crops.

Mr. BAKER. The issue there may be more, when you look at the potential of nutrient loss or phosphorus loss from a soil, at least in our conditions in Iowa and much of the Corn Belt, leaching is not a big issue. We do have, for example, probably 50 parts per billion of phosphorus in our drainage water. But that is probably one-fifth to one-tenth what we have in surface water dissolved. Then a bigger issue is what is in the sediment.

So probably the biggest benefit that you might see from a cover crop is not so much the cover crop taking up and holding phosphorus as much as preventing erosion, wind and water erosion.

Mr. BOUSTANY. Okay. Do any of you want to comment on that?

Mr. HOWARTH. I would concur. The issue for nitrogen loss is, nitrogen is highly soluble. So we are talking about keeping things from moving in groundwater and crops holding it there is the issue. Phosphorus is not highly soluble so it is an erosion issue. Cover crops help for both. Some management practices do not work well for both.

Mr. BOUSTANY. I understand there may be some suggestion that you could increase phosphorus pollution by the use of cover crops.

Mr. FABER. I don't think that is the case. In fact, probably the opposite is true. Because you are reducing erosion and phosphorus binds to the sediment, you are probably reducing phosphorus solution as a result of planting cover crops.

Mr. BOUSTANY. Thank you. I yield back.

Mr. BISHOP. Thank you. This brings our hearing to a close. I thank you very much for your testimony, particularly thank you for your patience. It has been a long afternoon.

Thank you very much.

[Whereupon, at 5:10 p.m., the subcommittee was adjourned.]

STATEMENT OF HON. RICHARD BAKER

HEARING ON
"NONPOINT SOURCE POLLUTION:
THE IMPACT OF AGRICULTURE ON WATER QUALITY"

WATER RESOURCES & ENVIRONMENT
SUBCOMMITTEE

April 19, 2007

Welcome to our hearing on Agriculture and Water Quality.

Our forefathers created an extremely efficient and highly productive agricultural system in our country, which has allowed all of us to eat and live well.

- One of the consequences of this extremely efficient and productive system has been a loss of soil and nutrients from our agricultural system and water quality impairments.

- The agricultural community recognizes these impairments and has been eager to resolve these issues.

- The agricultural community has been engaged in research to understand the science of soils, nutrients, agriculture, and how all of this relates to the impairment of water quality.

The agricultural community also has been busy in the field, trying and adopting many new on and off-site land, crop, animal, water, fertilizer, pesticide, and other management practices to reduce losses from the field, protect water quality, and maintain productivity.

- As a result, agricultural practices have changed dramatically in the past 10-20 years.

  Three things have become clear from these efforts-- agriculture and water quality is not an exact science, the issue is complex, and one-size-fits-all solutions or regulatory schemes to deal with impairments will not work for agriculture. Soil, hydrology, topography, weather, climate, crop, and other conditions vary widely from site-to-site, region-to-region, and over time.

- To be effective and efficient, agricultural management practices need to be tailored to reflect these regional and site-specific conditions and promote long-term sustainability.

- Everyone recognizes that, while substantial progress has been made, more needs to be done to address the remaining issues.

  The scientists and the agricultural community do not have all the answers, so more research is needed to design and refine new management practices that are sustainable with respect to both soil and water quality, and are economically feasible.

- With our ever-growing demands in this country and around the world for food, fuel, and fiber, we need agriculture to meet our nation's food, feed, fuel, and fiber production requirements.

- We cannot go back to pre-settlement conditions and still meet these demands.

  Future solutions need to be science-based, economically feasible, and compatible with regional and site-specific conditions.

- I look forward to hearing from our witnesses today about what the scientific and agricultural communities have learned about agriculture and water quality, what further research is needed to better understand the issue, and how we can optimize between the goals of maximizing agricultural production and protecting water quality.

TALKING POINTS FOR
THE HONORABLE TIM BISHOP

SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
HEARING ON
NONPOINT SOURCE POLLUTION: THE IMPACTS OF AGRICULTURE ON WATER QUALITY
THURSDAY, APRIL 19, 2007 AT 2:00 P.M.

I'd like to welcome today's witnesses to our hearing on the impact of agriculture on water quality. Today we will hear from representatives from federal, state, and municipal governments, as well as from academia and other interested stakeholders.

These diverse perspectives will provide the subcommittee with a much broader understanding on whether, and the degree to which, agricultural activities impact water quality. We also hope to learn more about how the federal government can further assist the agricultural community in reducing runoff.

To begin, let me extend a warm greeting to Dr. Robert Howarth, who hails from my home state of New York. Dr. Howarth, a professor in Cornell University's Department of Ecology and Evolutionary Biology, is one of our nation's preeminent scientists. In addition to many other honors, Dr. Howarth is the President Elect of the Estuarine Research Foundation and was the Chair of the National Academy of Sciences' Committee on Causes and Consequences of Coastal Nutrient Pollution. Dr.

Howarth is one of the leading experts on the sources and impacts of nutrients that reach estuaries and coastal oceans. Members of the subcommittee, we are fortunate to have this eminent researcher here today to help us learn more about this issue.

Thank you for being here Dr. Howarth.

Let me first say that, in large part, this hearing is about protecting our heritage. And a very important part of that heritage is farming. Today, the United States is the bread-basket of the world. And it wouldn't have this role without the important part played by farms and ranches across the land.

But there are other important parts of our heritage, too. And this includes protection of our natural resources – critical among them, protection of the nation's water bodies.

The hearing we are holding today will look at the impacts of agricultural runoff on water quality.

As we will learn, the promotion of agriculture and the protection of the nation's waters are not exclusive concepts. Indeed, the federal government is actively working to promote both. The question is, however: *Is the federal government doing enough?*

Let me be very clear: Any suggestion that we want to end farming, and return farmland to its natural state in order to protect our waters is nothing but a red herring. We seek agricultural practices that make sense – environmental sense and economic sense.

Agricultural runoff consists of pollutants from farming and ranching that are picked up by rainfall and snowmelt and eventually deposited into water bodies. These pollutants can include nutrients, pesticides, sediment, and animal waste.

Why is agricultural runoff important? - - Because these pollutants can lead to water body impairments, as well as threats to human health. In fact, the EPA tells us that the states have reported that 45% of rivers and streams across the country are impaired - and that agricultural runoff is the leading culprit.

Water body impairment is not just a box on a scientific report somewhere that's just checked off: impaired or not impaired. No, there are very real world implications that impact our communities – making it harder for ordinary working folks to make a living, and harder for municipalities to provide basic services. Let me provide just a few examples. As we will learn today from our witness from Waco, Texas, the City of Waco has had to spend literally millions and millions of dollars to upgrade its drinking water facilities as a result of water contamination from upstream dairies. Through relatively simple dairy farm management reforms – that would have been far cheaper to implement, mind you - these upgrades wouldn't have been necessary. This money could have been spent on schools in Waco, it could even have been returned to the tax payers of this community through lower taxes. Similarly, blue crabs are in decline in the Chesapeake Bay, and commercial oyster harvesting is nothing compared to what it once was. And in the Gulf of Mexico – one of the nation's greatest natural resources – fishermen are suffering because shrimp and commercial fish populations are in decline due to the infamous 'dead zone.' This 'dead zone' is, in part, the result of nutrient runoff hundreds of miles upstream along the Mississippi River.

The federal government has a number of programs that provide opportunities for the farming community to receive funding and assistance to decrease this runoff. These programs are largely voluntary and entail farmers and landowners adopting best management practices.

Many of these programs make both economic and agronomic sense. For example, water body impairment through excess nutrient runoff is often the result of too much nutrient being applied to fields. Precision agriculture means fewer nutrients which mean that farmers have to spend less on buying fertilizer. At the end of the day, this leaves a bigger paycheck. Erosion control programs help keep valuable topsoil on the fields. And, as any farmer will tell you, healthy, abundant topsoil is critical to success.

These programs are just further examples of what makes economic sense makes environmental sense too.

The trouble is that not enough farmers are receiving benefits from these programs. Given that some of these practices have been proven to work – the onus is on us to work out why there's not more enrollment in these federal programs. Part of the reason is that the programs just aren't big enough – there's not enough funding for conservation programs that provide grants to farmers. In fact, funding is so low, the backlogs of applications are so long, that there are currently 195 farmers in Iowa who have chosen to take out conservation loans - not grants, but loans – through Iowa's Local Water Protection Program. This just goes to show that farmers want to do what makes environmental, economic, and agronomic sense – it's just that the federal government just doesn't seem to be there for them.

Today I hope to learn more about what the federal government is doing with these programs; whether it's doing enough; and – if we all work together, the federal government, the states, farmers, and conservationists – what more needs to be done.

I welcome the witnesses to today's hearing, and I look forward to their testimony.

STATEMENT OF
THE HONORABLE JERRY F. COSTELLO
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
HEARING ON NONPOINT SOURCE POLLUTION: THE IMPACTS OF AGRICULTURE ON WATER QUALITY
THURSDAY, APRIL 19, 2007

Thank you, Madame Chairwoman, for holding this hearing on the nonpoint source pollution and the impacts of agriculture on water quality.

Prior to the 1987, the Clean Water Act focused primarily on controlling pollution from "point" sources. Yet, as the Clean Water Act greatly decreased pollution from point sources, uncontrolled nonpoint sources have become a relatively larger portion of remaining water quality problems.

As we know from Tuesday's hearing, nonpoint pollution is rainfall or snowmelt runoff from farm and urban areas, as well as contruction, forestry, and mining sites. At issue today is what progress is being made to manage nonpoint source pollution and what additional efforts may be needed.

Many have argued that the types of individual land management decisions that are needed to manage nonpoint source pollution from the agriculture community cannot be regulated in the same ways that industrial sources are controlled. I am interested in hearing from our witnesses on this point.

Another important component of mitigating nonpoint source pollution is funding for grants and other programs. Without adequate funding to implement state management plans and other important initiatives to reduce nonpoint source pollution, we are shortchanging our states and local communities with the tools needed to control nonpoint source pollution. I would ask that our witnesses also comment on the adequacy of funding.

With that, I welcome the witnesses here today, and look forward to their testimony.

Doris O. Matsui

Statement by Doris O. Matsui
Subcommittee on Water Resources and Environment
Hearing on
"Nonpoint Source Pollution: The Impacts of Agriculture on Water Quality"
2:00 p.m.
Thursday, April 19, 2007

Thank you Chairwoman Johnson for calling this very important hearing.

In my district of Sacramento, we are part of the greater Sacramento River Watershed which emanates from the Sacramento River.

The Sacramento River Watershed has some of the most pristine and bountiful farmland in the world. It is also some of the most sought after land for development. Every year more and more farm land is being taken out of production.

This means that agriculture and urban communities are moving closer and closer together.

How we manage the agriculture run off becomes even more important to a city like Sacramento.

In the case of my district, agriculture communities share the same river—the Sacramento River--- with urban areas.

The Sacramento River stretches over 350 miles through the heart of northern California and it collects water from over a dozen counties between Sacramento and Oregon in an area of more than 27,000 square miles.

We need to look at best practices on how we manage agricultural run off and take a more comprehensive approach. I am interested in hearing from today's witnesses and look forward to exploring ways that mitigate agricultural run off and its impact on urban areas.

I look forward to hearing from today's witnesses. Thank you Chairwoman Johnson.

 Harry E. Mitchell

Statement of Rep. Harry Mitchell
House Transportation and Infrastructure Committee
Subcommittee on Water Resources and Environment
4/19/07

--Thank you Madame Chairwoman.

--Since 1972, the Clean Water Act has gone a long way toward helping us improve our nation's water quality. It has helped us identify countless "point sources" of pollution, such as drainage from municipal and industrial facilities, and helped us take important steps to improve them.

--But point sources are only part of the problem, and today's challenges are more complex.

--The sources are less obvious.

--Today's water pollution results from the combined effect of multiple pollution sources, as well natural processes like snowmelt and rain runoff.

--According to the U.S. Environmental Protection Agency, this kind of nonpoint source pollution ("NPS") is now the single largest cause of water pollution.

--Agricultural activities can be a major cause of nonpoint source pollution, particularly when such activities are improperly managed.

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--Animal feeding operations, grazing, plowing, pesticide spraying, irrigation, fertilizer application, even planting and harvesting can all adversely impact water quality.

--In arid regions like Arizona, inefficient irrigation can concentrate pesticides, nutrients, disease-carrying microorganizsms and salts in the top layer of soil.

--There are steps we can take to limit the negative impact these agricultural activities have on our water supply, but we need to ensure that these steps do not impede the continued successful operation of an agricultural industry that grows so much food so efficiently that it is the envy of the world.

--I look forward to today's hearing, and yield back the balance of my time.

STATEMENT
THE HONORABLE JAMES L. OBERSTAR
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
HEARING ON
NONPOINT SOURCE POLLUTION: THE IMPACT OF AGRICULTURE ON WATER QUALITY
THURSDAY, APRIL 19, 2007 AT 2:00 P.M.

Chairwoman Johnson, thank-you for holding today's hearing on the impact of agriculture on water quality. The role played by agricultural runoff in harming the nation's waters is large. And while the situation is serious, there are many innovative options available to the agricultural community. I look forward to learning more about this important topic, the wider issue of nonpoint source pollution, and new ways forward for the federal government and its partners.

Being from a state that is heavily dependent on agriculture, I truly appreciate the role farming communities play in American life. They literally provide the bread on which this country survives. In so many ways, agriculture is the backbone – it always has been – of this nation. Whether it is food, commerce, culture, or history – farming families have played an important role.

Throughout the country, crop yields remain plentiful. Agricultural advances – especially with regards to crop use for alternative energy sources – have reached the point that we now have what some call a bio-economy. In fact, the Department of

Agriculture recently announced that in 2007 the United States will plant the largest corn crop since 1944!

Our agricultural successes are not without their costs, however. Water quality has declined in recent decades as a result of some agricultural practices. Improper or excessive application of pesticides and fertilizer, the buildup of salts and minerals due to evaporated irrigation water, poorly managed animal feeding operations, and improper plowing can result in water body impairments.

How? These pollutants are picked up by rainwater or melting snow and carried into water bodies – ultimately leading to impairments.

The results of this agricultural nonpoint source pollution are grave. Today, our EPA witness will tell us that in its most recent National Assessment Database analysis, the States report that agriculture was the most frequently identified impairment source for 37% of impaired rivers and streams, and 30% of impaired lakes, ponds, and reservoirs.

And what are the effects of this? Well, it's not just aesthetic. This impairment results in water pollution, habitat destruction, decimated fisheries, and human health threats.

Society wants affordable food, successful farms and healthy waters. It is important to emphasize that these things are not mutually exclusive. A variety of federal programs exist to provide opportunities for the agricultural community to receive funding and assistance to limit agricultural runoff pollution.

These federal programs are generally not regulatory in nature. Instead, they encourage landowners to adopt best management practices to reduce agricultural runoff NPS pollution. For example, grants and technical assistance from these programs provide opportunities for farmers to create vegetated buffer strips, adopt integrated pest management programs, and protect riparian corridors. Implementation of nutrient management plans can result in the efficient application of agricultural nutrients – resulting in dramatic cost savings for farmers.

For example, in Iowa, soybean farmers are already making significant cost savings through decreased use of nitrogen fertilizers through precision application processes. In other words, they're only using the nutrients they actually need. That means cost savings for the farmers, more money in their pockets at the end of the day – and cleaner waterways.

These federal programs help to keep agricultural production efficient as well as prevent the loss of valuable topsoil. A key to the success of these programs is that individual farmers have taken ownership of these environmentally and economically friendly practices.

But therein lies the rub. The ultimate factor in the success of these programs is farmer enrollment in them. And I fear that this administration is not doing enough to facilitate that.

For example, the USDA Environmental Quality Incentives Program for Iowa has a backlog of over 1,500 applications of farmers who want to apply these conservation practices but will not be funded. And, even more significant, less than 6% of Iowa farmers are actually enrolled in these federal programs. I would be very surprised if these percentages were the same for other similar states.

We know that these programs encourage management changes on individual farms. These changes result in agronomic successes and result in economically sustainable farms that yield greater profits. Farmers know this. So the question is, why aren't more farmers enrolling in these programs? I hope to learn from our witnesses today why this remains the case.

In my view, the low levels of enrollment and the lack of available funds are a large reason that we continue to have major water quality problems today.

Our witness from the Natural Resources Conservation Service will tell us that since 1982 there has been a 43 percent reduction in cropland soil reduction. Well, that's all well and good. But let me note that we have not been told how much sediment continues to enter our nation's water bodies. Nor have we been informed the level of nutrients, the level of pesticides, or the levels of animal wastes that continue to runoff and impair our waterways.

What we do know is that our water bodies remain impaired at very high levels – due, in large part, to these very pollutants. And we do know from the USDA and EPA Offices of Inspector General, that the USDA and EPA are not coordinating very well to solve these issues, in economically and environmentally vital regions like the Chesapeake Bay watershed.

So now is the time when we begin a process of trying to determine – what are the problems that still exist with agricultural runoff and water quality? Why do they continue to exist? And – most importantly – what are federal agencies doing to change directions and begin the process of cleaning up the nation's waterbodies faster than they currently are. Along these lines, I hope that we leave this hearing with a better understanding of how our various agencies and federal programs can become more focused, and can better encourage the agricultural community to adopt some of these worthwhile practices that make both environmental and economic sense.

I believe that this hearing will help lead us down the path to answer some of these questions, and I am pleased that we have such a diverse range of experts on today's panels. I welcome each of the invited witnesses, and look forward to hearing their testimony.

Opening Statement
Congressman John T. Salazar
T&I Subcommittee on Water Resources
Hearing on Nonpoint Source Pollution: The Impact of Agriculture on Water Quality
April 19, 2007

Thank you, Madame Chair.

I appreciate that we are addressing the topic of water pollution, and specifically the issue of nonpoint source (NPS) pollution.

There is no question that having a clean and safe water supply is important to all of us.

Ecosystems work together: healthy wildlife populations, vibrant plant systems, and clean water each contribute to the overall wellbeing of our environment.

America's farmers and ranchers are the best stewards of our nation's land and water resources.

Their production and profitability can only be as good as the land from which it comes, so appropriate care for land and water resources makes both environmental and economic sense for them.

As a farmer and rancher myself, I fully appreciate the importance of a healthy and functioning ecosystem, and I firmly believe that we can have agriculture **and** clean water in this country.

It is important to recognize that agriculture is a regulated industry.

Extensive new regulations were put in place in the 109th Congress to control discharges from concentrated animal feeding operations (CAFOs).

SALAZAR

In fact, there has been a significant shift over the past several years in federal efforts to regulate and prohibit production area discharges from CAFOs.

In addition, CAFOs must utilize and comply with strict nutrient management plans when land applying manure to agricultural fields to ensure that manure is applied at agronomic rates.

Any violation of these requirements can result in substantial penalties and, in certain situations, imprisonment.

We should consider these new regulatory requirements that ensure protection of our waters and give them time to work.

There are also several programs in place under the Clean Water Act that specifically address nonpoint source pollution.

This Congress should consider increasing funding of these programs to levels that will enable states to address nonpoint pollution as intended.

Agriculture producers are also taking measures to be as environmentally friendly as possible in their operations.

Just one example is the implementation of projects through USDA's Farm Bill conservation programs that work to improve water quality.

From 2002 to 2006, NRCS dispersed over 2.7 billion dollars to agriculture producers for projects to improve water quality—most of those projects were through the Environmental Quality Incentives Program.

In the same time period, they spent almost 1.2 billion dollars conserving and improving wetlands, mainly through the Wetlands Reserve Program.

Family farmers and ranchers are excellent stewards of their land, natural resources, and water—their livelihoods depend on it.

We should enable them, through programs like these, to continue to produce our nation's food and fiber in an environmentally sound and sustainable way.

It is the responsibility of this committee—and this Congress—to ensure that we preserve and protect our water sources for today's use, as well as for future generations.

But it must be done so in a way that does not negatively impact our family farmers and ranchers.

I look forward to today's hearing. Thank you.

addendum to Mr. Salazar material.

Hidden View Dairy

1684 P.R. 1401 Dublin, TX 76446- (254)445-3272- FAX (254)445-3668- dejong@our-town.com

April 18, 2007

The Honorable James L. Oberstar
Chairman
Committee on Transportation and Infrastructure U.S. House of Representatives
2165 Rayburn House Office Building
Washington, D C. 20515

The Honorable John L. Mica
Ranking Republican Member
Committee on Transportation and Infrastructure U.S. House of Representatives
2165 Rayburn House Office Building
Washington D.C. 20515

Re: Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA" or "Superfund") Applicability to Agricultural Operations

Dear Chairwoman Johnson and Ranking Member Baker:

My father and I manage a 2,000 head dairy farm in Erath County, Texas, which our partnership acquired in 1994. Since that time, we have consistently and substantially upgraded the animal and waste handling facilities at great expense. We have also implemented a series of innovative and environmentally protective practices at our dairy, which is generally recognized as one of the leading farms in Erath County. Other than our overzealous construction of a storm water control basin in 2001 (*i.e.*, environmentally protective, but not preauthorized), our dairy has not been the subject of any federal or state regulatory enforcement action. My family resides on this farm, and we are unquestionably committed to doing the right thing. We are very proud of our accomplishments and openly welcome visitors and dialogue about our operations.

All of this having been said, my father and I were personally and individually sued by the City of Waco in 2004 under the federal Superfund statute. We were subjected to nearly two years of bitter, humiliating and expensive federal litigation. Do we operate a large industrial dairy? No. Do we demonstrate very poor regulatory compliance? No. Do we exhibit an unwillingness to resolve issues? No. Yet, these are the very reasons being cited by critics of your Committee's consideration of statutory amendments to curb abuses of CERCLA.

Salazar etc.

Hon. James L. Oberstar
Hon. John L. Mica
April 18, 2007

From what I understand, the Superfund statute was originally intended to address the cleanup of abandoned industrial facilities outside the ordinary reach of existing regulatory programs. However, because of the allure of 'joint and several' liability and the broad classes of persons potentially liable under CERCLA, plaintiffs through their lawyers are trying to pound square pegs into round holes. Our nation's agricultural producers are the latest targets In our particular case, the City of Waco was alleging that the naturally-occurring orthophosphate compound found in cow manure is the hazardous substance 'phosphorus' as listed under CERCLA; and that because some quantity of 'phosphorus' must have left our farm and contributed to some algae growth downstream, my father and I were somehow potentially liable for 100% of Waco's past and future costs of improving the aesthetic quality (taste and odor) of the city's drinking water – this, despite Waco's own releases of 'phosphorus' in the watershed and the responsibility of numerous other municipal, industrial and commercial entities not named in the suit We eventually settled our case, but any suggestion that this was an appropriate use of our federal court system or sound public policy is severely misplaced, particularly in its application to my family and our dairy farm.

The U.S. Environmental Protection Agency and the Texas Commission on Environmental Quality – under the federal Clean Water Act and the Texas Water Quality Control Act – have more than ample permitting and enforcement authority to address any issue associated with our dairy farm. In fact, the State of Texas has promulgated some of the most stringent design, operating and permitting requirements in the nation for dairies. The dairy operations are routinely and thoroughly inspected. Statutory citizen suits are also available to potentially affected persons under the Clean Water Act, with the potential of recovering attorneys' fees and costs of litigation. Under these circumstances, it is not necessary or reasonable to extend CERCLA's draconian liability scheme to agricultural producers like Hidden View Dairy.

Congress should give very strong consideration to protecting agricultural producers from these grossly inequitable law suits under the Superfund statute. Please do not hesitate to contact me should you desire any further information or wish to tour our dairy farm.

Respectfully yours,

William N. De Jong

William N. De Jong

CC: Honorable Eddie Bernice Johnson
Honorable Richard H. Baker

Hearing, Subcommittee on Water Resources & Environment
April 19, 2007
2167 Rayburn House Office Building

Testimony of Dr. James Baker
Professor Emeritus, Department of Agricultural and Biosystems Engineering, Iowa State University
Representing the Iowa Department of Agriculture and Land Stewardship
Wallace State Office Building
Des Moines, Iowa
(515-268-1797; jlbaker@iastate.edu)

Good afternoon to you, the Honorable Eddie Bernice Johnson, Chairwoman, and members of the Committee; thank you for the opportunity to appear before you today to testify regarding "The impact of agriculture on water quality." My name is Jim Baker, recently retired from the faculty at Iowa State University, and currently working part-time for the Iowa Department of Agriculture and Land Stewardship. There I am involved with nutrient water quality issues related to both local fresh waters and hypoxia in the Gulf of Mexico. Today I want to present the six points listed below; I have also included a short written summary at the end of my written testimony.

- **Current nutrient water quality impairments in the Corn Belt are not mainly due to mismanagement of fertilizers and manures.**
    - Significant agricultural research in the last 35 years has led to a good understanding of nutrient crop uptake, versus the loss in surface runoff water and sediment and in subsurface ("tile") drainage.
    - Improved crop genetics and management have increased yields while limiting nitrogen inputs such that inputs are often less that outputs removed in grain plus losses, depending on the weather and crop rotation.
    - If the nitrogen balance is negative, soil organic matter is being mineralized, releasing carbon, reducing soil sustainability, and negatively impacting soil, air, and water quality.

- **The impairments are mainly due to the conversion from a prairie/wetland landscape to intensive grain crops with additional nutrient inputs, and installation of subsurface drainage where needed.**
    - Even with the best management practices, row-crops are leaky systems requiring significant amounts of soil nutrients be present for economic optimum growth, but which are susceptible to loss whenever excess water drains from the land
    - However, this historic land conversion by our forefathers has created a very productive system for growing food, feed, and fuel.

- **Reductions in impairments will come mainly through changes in cropping and/or implementation of off-site practices.**

    - More sod-based rotations could reduce nutrient losses significantly, but these management changes would likely lead to significant swings in the supplies of food, feed, and fuel.
    - Cover crops may have potential in the Midwest, but they are currently a "management nightmare" for producers.
    - Wetlands and vegetated filter/buffer strips, as off-site practices, require site-specific design and need to be strategically located in order to reduce field-to-stream transport of nitrogen and phosphorus, respectively.
    - But these different options are not "win-win" situations for the producers economically, and require incentives to encourage implementation.

- **Even with widespread adoption of the best available technologies, guidance federal nutrient criteria for standing and flowing water are not attainable in row-cropped areas of the Corn Belt.**

    - EPA's guidance criteria for nitrogen and phosphorus for the Corn Belt ecoregions are so low they are not always met by concentrations in today's rainwater.
    - Returning to pre-European settlement conditions of land cover is not realistic (former Iowa Secretary of Agriculture, Patty Judge, has said: "Not farming Iowa is not an option.").

- **Regulatory impediments are limiting the adoption and/or efficiency of off-site practices.**

    - Regulations requiring site-by-site assessment/permitting are not practical for landscape-scale application to the hundreds and thousands of sites that will be needed in each State.
    - Environmental regulatory frameworks that allow categorical and regional regulatory decisions are needed.
    - To be efficient, off-site practices must be allowed to be targeted to watersheds with the greatest need, and sited within those watersheds at locations where they can have the most impact.

- **What is needed for the future:**

    <u>Research funding</u>

    - To answer critical questions of soil fertility needed to assure future productivity and soil quality, develop new technologies on nutrient utilization for possibly new as well as existing crops, and evaluate potential and management needs of perennial and annual cover crops.

- For an Upper Mississippi River Nutrient Environmental Research Center being proposed at Iowa State University, engaging other land-grant universities across the Corn Belt.

Funding for States, Special Project Area Pilots, and Demonstrations
- To develop state water quality strategies, targeting on a local and regional basis tailored to the specific landscape and water quality issues.
- To engage existing local watershed management agencies, such as Iowa's 3000 drainage districts, in transforming agricultural landscapes to achieve water quality goals.

Regulatory frameworks
- To foster broad ecosystem and landscape-wide analyses and decision-making on a categorical basis for the large number of implementation sites needed for off-site management practices.

General Summary

Research in the Corn Belt over the last 35 years has quantified nutrient losses associated with erop production and the use of fertilizers and manures. Hydrology of the land, management practices and systems that affect land use and drainage, and weather play dominant roles in the transport of nonpoint pollutants in general, and different forms of nutrients in particular. The properties of the different forms, primarily in their adsorption/interaction with soil, also play a major role.

Drainage from agricultural lands dominates water flows in most parts of the Corn Belt because agriculture occupies a major portion of the land area. In tile-drained landscapes, nitrogen (N) losses, dominated by nitrate (NO_3) leaching, are of most concern and usually occur with sustained subsurface flows in spring and/or fall, at times with little row-crop water use/nutrient uptake. In contrast, in "rolling" landscapes with good surface drainage, phosphorus (P) losses with runoff water and sediment are of more concern, and occur with rainfall-runoff events that can happen year around, but that are generally greater in spring when the soil has less cover.

The most important "natural" factors affecting nutrient losses are soil properties and weather (the Corn Belt is fortunate to have fertile soils and generally ample precipitation, but both lead to nutrient losses). For N losses, the most important management factor is land use. The conversion to row crops, with installation of artificial subsurface drainage where needed, has created a productive system, but has also increased the potential for nutrient loss. For P, land use in conjunction with tillage is generally the most important management factor affecting hydrology and especially the erosion potential. The combination of rate, method, and timing of nutrient additions generally is of lesser importance (weather patterns often have more effect on nutrient losses than nutrient management). One concern for N rates is that if they are too low, N must be supplied by the soil, depleting organic matter and causing soil, air, and water quality problems.

Because inorganic forms of N and P must be present in the soil at concentrations ample for crop production, whenever excess water moves over and/or through the soil, nutrient losses occur. Controlling these losses by a prescribed amount will be difficult for several reasons. The number of alternative systems available to producers is fairly limited due the lack of economically viable technologies; our ability to accurately predict the nutrient reduction expected for a given practice even under a standard set of homogenous conditions is limited; and the highly variable nature of weather, soil properties, and hydrological response times makes impact assessment of management change extremely difficult.

In terms of a "viable vision" for future water quality improvements, there are no easy answers and improvements will be incremental (but returning the Corn Belt to pre-settlement conditions is neither socially nor economically feasible, nor in the best interest of maintaining our nation's food, feed, and fuel production infrastructure). The potential and limitations of in-field and off-site management practices/systems need to be considered relative to their costs and acceptance for implementation. Off-site management systems that include structural practices will need to be implemented at a large number of sites to achieve landscape-level environmental improvement, and regulatory frameworks need to be compatible with this scale of implementation. Actions taken must be science-based; promotion of any wrong actions must be avoided.

In summary, emerging science indicates that current nutrient impairment problems are not mainly due to mismanagement of fertilizers and manures (certainly some improvement in management can and should be made). Overall, the majority of our nutrient impairments are due more to historic changes in land use and hydrology that came with the conversion of prairie and wetlands to cropland. In many areas this was done using artificial subsurface drainage; it should be noted that with the exception of NO_3-N leaching, the existence of subsurface drainage reduces the losses of other pollutants (i.e. those transported with surface runoff). Given this new perspective, and that these historic changes have created a very productive system critical to our country's food security, new, broader approaches to solving water quality problems will be needed. Further research is needed to design/refine new management practices and develop cropping system alternatives, possibly with more sod-based rotations. However, these new approaches must be sustainable with respect to both soil and water quality, and must also be economically feasible.

“The impact of agriculture on water quality”

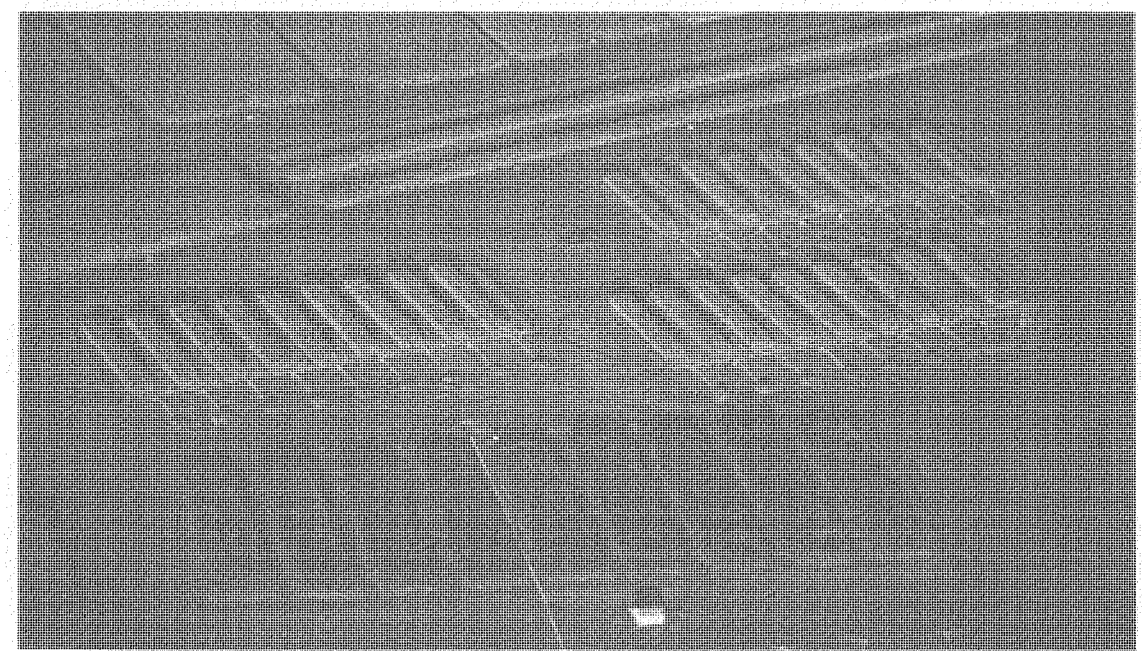
(with particular emphasis on nitrogen in the “Corn Belt”)

Jim Baker

Professor emeritus, Iowa State Univ.

Currently with the Iowa Dept. of Agriculture and Land Stewardship

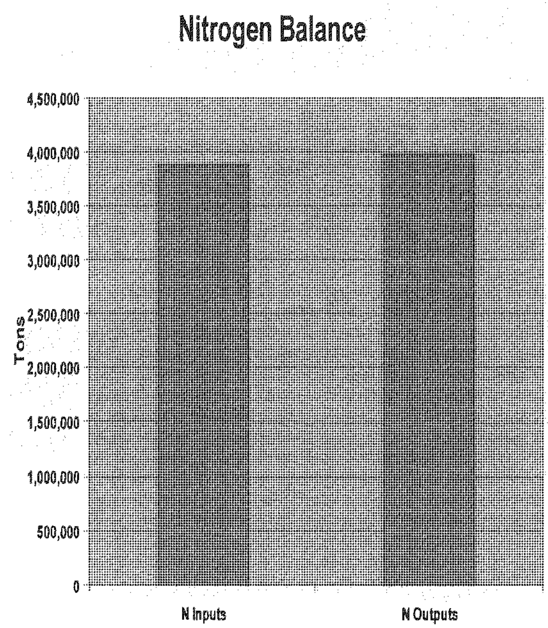
I want to start out by making five points based on research on fields and plots like these as well as on watersheds in the "Corn Belt"

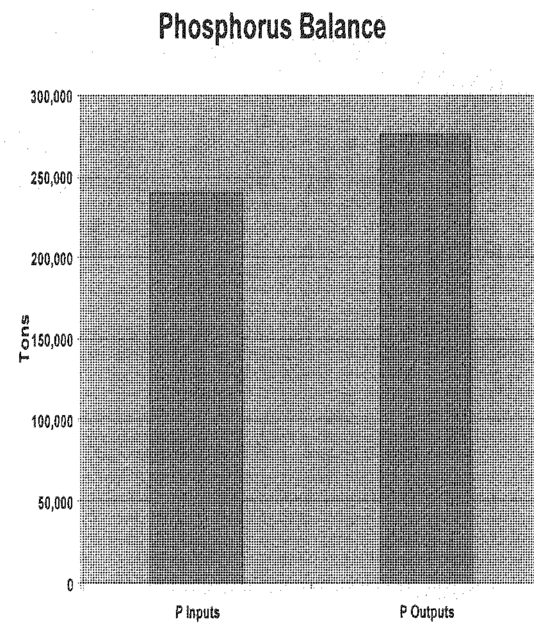


But before I state the first two points, you need to understand that:

- The rate of nitrogen (N) applied to corn has been nearly constant the last twenty years.
- Corn yields on average have increased about 2% each year for that same time, removing more and more N.
- We are now at a point that N inputs into row-crops are generally less that outputs – this is true whether you are considering fields, or a whole state like Iowa.

N and P Budgets for Iowa and Iowa Watersheds





Point 1. A negative N balance means soil organic matter is being lost through mineralization; this releases more carbon dioxide to the atmosphere, reduces soil quality/sustainability, and increases water quality problems.

and Point 2. Given this negative balance, current nutrient water quality impairments in the Corn Belt are <u>not</u> mainly due to mismanagement or ”excess” fertilizers and manures.

Before I state the third point, you need to understand that:

- For optimum corn production, there must be an optimum level of N in the soil.
- It is economically very advantageous to add N as fertilizer and/or manure to reach the optimum level.
- Soil N must be in a form (mostly nitrate) that is available to crops, which means it is available to be lost with water.
- Some N loss occurs whenever "excess" water drains from the land; particularly as subsurface drainage.

Point 3. Impairments are mainly due to the past conversion from prairie/wetlands to intensive grain crops with nutrient inputs and subsurface drainage where needed.

Before I state the fourth point, you need to understand that:

- The level of N in the soil and the amount of "excess" water are both much less for sod-based rotations, including alfalfa and CRP ground.

- Constructed wetlands are a "proven technology" for removing nitrate from water passing through them.

- To be effective, wetlands must be carefully sited within areas with significant nitrate loss problems.

Point 4. Reductions in impairments will come mainly through changes in cropping and/or implementation of off-site practices.

And before I state the fifth point, you need to understand that:

- Although we have learned a lot with past research, there is still need for additional research to refine proposed, but unproven, management practices/technologies.

- Likewise there is need for research on totally new/innovative management practices and cropping systems.

- New pressures for fuel/energy crops will present additional water quality challenges that will need to be addressed.

Point 5. There is need to create and fund the regional Nutrient Management Environmental Research Center being proposed by Iowa State University (Agricultural Dean, Dr. Wendy Wintersteen), engaging other land-grant universities across the Corn Belt.

I want to end by making one last point based on the Iowa Conservation Reserve Enhancement Program (CREP) experience.

But before I state the sixth and last point, you need to understand that:

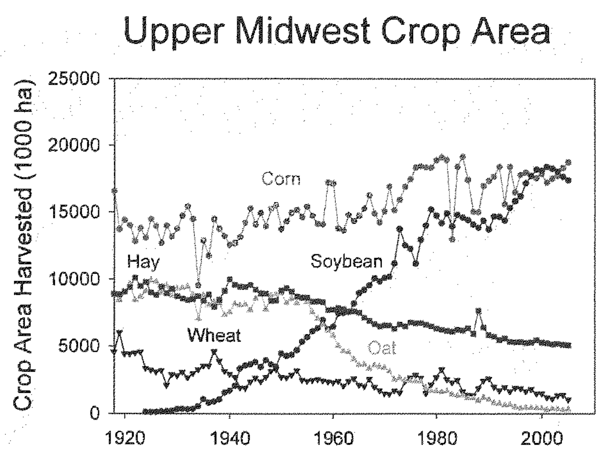
- With federal (USDA) and Iowa cost-sharing, constructed wetlands for nitrate removal were targeted to the tile-drained areas in north-central Iowa in the CREP.

- The program languished for about two years because of initial permitting issues.

- Current regulations for assessments limits construction to about 20 sites/year; it is estimated that 8 to 10 thousand are needed in Iowa to reduce nitrate losses 25%.

Point 6. Regulatory impediments are limiting the adoption and/or efficiency of off-site practices.

A "new landscape vision" of new crop rotations in association with carefully designed and sited wetlands and buffers has considerable potential.



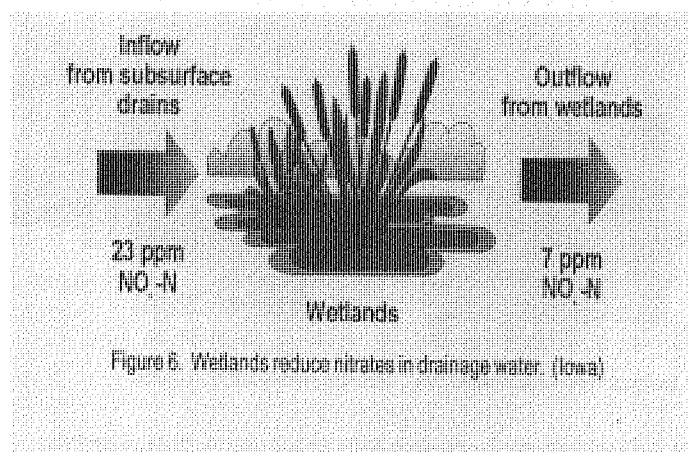


Figure 6. Wetlands reduce nitrates in drainage water. (Iowa)

**STATEMENT OF RICHARD COOMBE, REGIONAL ASSISTANT CHIEF
NATURAL RESOURCES CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEE ON WATER RESOURCES AND THE ENVIRONMENT**

April 19, 2007

Madam Chairwoman and Members of the Subcommittee:

Thank you for the opportunity to appear before the Subcommittee to describe the relationship between water quality and agriculture and the activities of the Natural Resources Conservation Service (NRCS) to provide assistance on this issue. My name is Richard Coombe, and I serve as the Regional Assistant Chief of NRCS for 23 eastern States including Puerto Rico. The topic today is of special interest to me as I served as the Chief Executive Officer of the Watershed Agriculture Council, Inc. of the New York City Watershed. The New York City watershed project was a showcase example of how agricultural forest landowners took successful proactive steps to protect the water supply for the City of New York. That work laid the foundation for my interest and work on a regional level with NRCS. Through the technical assistance and program delivery NRCS administers, our employees work in partnership with private landowners to take proactive steps to improve on water quality across the Nation.

Helping People Help the Land

For over 70 years, NRCS has been committed to working with America's private landowners through a locally led, voluntary cooperative conservation approach. Because of this "ground-up" approach to helping people, we describe our mission as "helping people help the land." The phrase is succinct and it effectively describes what we do, so our Agency has adopted "helping people help the land" as our mission statement. And even though the words help others understand what we do as an agency, the concept of working closely with America's agriculture producers remains the same commitment to providing quality service with improved environmental benefits and a healthier landscape.

Importance of Clean Water

Water quality is a primary indicator of the health of our environment and the quality of water reflects what occurs on the land. NRCS helps farmers improve their land in an environmentally sound manner. Below are a few examples of recent activities we have undertaken that demonstrate our commitment to addressing water quality issues:

- Developed United States Department of Agriculture (USDA) policy on market-based incentives
- Signed Memorandum of Understanding with the U.S. Environmental Protection Agency
- Assisted landowners in treating over 42 million acres with conservation measures
- Landowners have applied over 5,000 Comprehensive Nutrient Management Plans (CNMP) in fiscal year (FY) 2006 for livestock manure management with financial and technical assistance from NRCS
- Landowners have applied approximately 28,400 CNMPS, since FY 2002 with financial and technical assistance from NRCS

The result is better water quality for drinking, recreation, wildlife, fisheries and industry. Water quality concerns from agriculture are generally defined as non-point source (NPS) pollution. NPS is pollution that comes from diffuse sources. This can make identification of the source of a water quality problem difficult. Often a water quality problem from NPS is the result of actions by many landowners, both rural and urban. Consequently, solutions to NPS water quality problems can be difficult to determine and contentious to implement. While other sources of NPS such as urban runoff can be significant, agriculture's effect is magnified by the large percentage of land in agriculture use, about 41 percent in the continental United States. Fortunately, there are many changes agriculture producers can and have made voluntarily with technical and financial assistance available through a variety of sources. Farmers in many parts of the country are using these programs to implement reduced tillage and other forms of residue management, develop and implement CNMPs, and install conservation buffers.

Farmers and ranchers know that sound, profitable farming and maintaining clean water supplies go hand in hand, and through our technical assistance, cost-share, conservation use, and stewardship programs, we are assisting the agriculture and forestry sectors to realize their tremendous potential to provide increasing positive environmental benefits.

Working Lands and Conservation Planning

The focus of NRCS's conservation efforts is squarely centered upon working lands and upon ensuring that these lands continue to produce valuable agricultural commodities and contribute to local economies, while at the same time protecting our national treasure of soil, water, fish and wildlife habitat and other related natural resources. For NRCS, this has always meant voluntary, incentives-based conservation activities. This approach has proven time and again that when given sound information, guidance, and technical assistance, farmers and ranchers voluntarily adopt, install, and maintain conservation practices. Locally-led conservation that is developed cooperatively with farmers and ranchers produces more effective, long-lasting, and economically viable results than regulation and other mandatory approaches.

Madam Chairwoman, if you visit any one of the 3,077 counties in the United States, you would likely find that agricultural producers have a relationship with NRCS local staff founded upon the technical knowledge and resources that are available through our local field offices. This technical assistance is funded through the Conservation Technical Assistance (CTA) Program which provides direct conservation planning and implementation assistance. This program provides the infrastructure and technical capability for our agency to assist program participants to apply conservation on the land. In addition, funds from the CTA Program also support many other priority activities including provision of the initial planning and resource information used by landowners to access all conservation programs and the development, transfer and maintenance of the NRCS Web-based electronic Field Office Technical Guide (e-FOTG), which supports all NRCS programs.

With CTA Program assistance, the producer then identifies the unique resource concerns of his/her operation as a starting point and develops a conservation plan. This conservation plan is the foundation of locally-led cooperative conservation. In essence, a producer's conservation plan is a roadmap and decision-making tool for the future management of his/her operation. The plan is dynamic, providing different options for different situations (eg, weather, cropping patterns) and can be modified as conditions change, or as the producers establish new production or conservation priorities.

Once the conservation plan is developed and individual farmers or ranchers decide to adopt specific conservation practices or systems, they may utilize assistance from the suite of cost-share, conservation use, or stewardship programs that NRCS offers through Farm Bill and other authorities. NRCS administers 23 conservation programs. While each program provides important and demonstrable natural resource improvements, the specific programs with a priority for improving water quality are as follows:

Working Lands Cost-share Programs

Environmental Quality Incentives Program

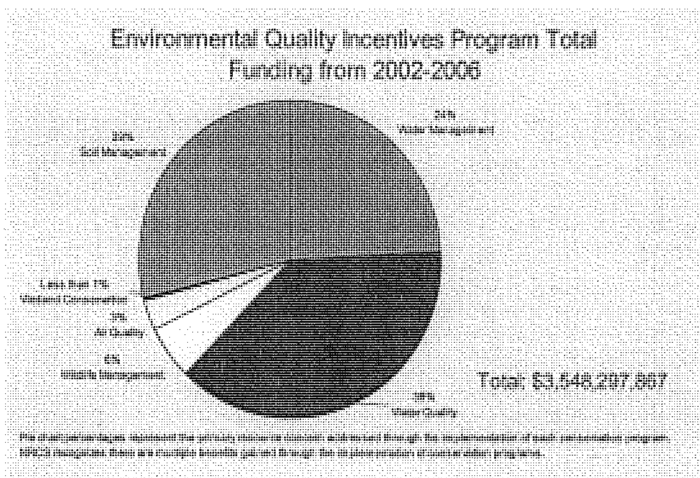
The Environmental Quality Incentives Program (EQIP) is the flagship of the working lands conservation program portfolio. Funding for EQIP in the 2002 Farm Bill greatly expanded the program's availability. Including funding obligated in FY 2002 through FY 2006, totaling almost $3.1 billion, EQIP will benefit close to 185,000 participants. In addition, EQIP leverages additional funding from landowner match requirements and State and local cost-share programs. For individuals, the Federal share can be up to 75 percent, and up to 90 percent for limited resource farmers. 60 percent of total EQIP funds are directed to address livestock-related resource concerns.

The objective of EQIP is to optimize an environmental benefit which begins with addressing five national priorities including reduction of nonpoint source pollution, conservation of ground and surface water resources, reduction of emissions, reduction of soil erosion and sedimentation from agricultural lands, and promotion of at-risk species habitat. The program provides flexible technical and financial assistance to landowners that face serious natural resource challenges in their management of cropland, grazing lands, wetlands, and fish and wildlife habitat.

We have also been able to increase program flexibility and improve program features to make EQIP one of the most popular and effective conservation efforts in the Federal Government.

Figure 1. demonstrates the broad range of natural resource issues that EQIP addresses, including 38 percent of funding going toward water quality improvement practices.

Figure 1.



In the Department's 2007 Farm Bill proposal, it is recommended to consolidate and reauthorize existing cost-share programs such as the Environmental Quality Incentives Program, the Wildlife Habitat Incentives Program, the Agricultural Management Assistance Program, the Forest Land Enhancement Program, the Ground and Surface Water Conservation Program and Klamath Basin Program into a newly designed EQIP which will simplify and streamline activities, reduce redundancies and produce more cost-effective environmental benefits. The Department's 2007 proposal also includes the creation of a new Regional Water Enhancement Program within EQIP that focuses on cooperative approaches to enhancing water quality and/or quantity on a regional scale.

- **Conservation Innovation Grants**

Authorized under EQIP in the 2002 Farm Bill, NRCS also offers the Conservation Innovation Grants (CIG) program. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies for agricultural production while leveraging Federal investment in environmental enhancement and protection. Under CIG, competitive grants are awarded to eligible entities, including State and local agencies, non-governmental organizations, tribes, or individuals. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with Federal, State, and local regulations.

In FY 2006, CIG was implemented with three components: National, Chesapeake Bay Watershed, and State. The grants stimulated the development and adoption of innovative technologies and approaches through pilot projects and conservation field trials.

One example of the kind of project funded through this program that benefits water quality in the Chesapeake Bay is a study of the effects of Precision Dairy Feeding to Reduce Nutrients by the Chesapeake Bay Foundation. The goal was to reduce agricultural non-point source pollution, due to excessive loadings of sediment and nutrients from livestock manure. Precision dairy feeding was identified as a critical component to reduce non-point agricultural water pollution. Through this project, the Chesapeake Bay Foundation and its partners worked with Pennsylvania dairy producers to bring about significant changes in the dairy industry's standard feeding practices to reduce phosphorus intake through feeding and to improve water quality.

- **Chesapeake Bay Efforts**

An example of a regional approach to address water quality issues through our conservation programs can be seen in the Chesapeake Bay watershed. The Chesapeake Bay watershed has the highest land-to-water ratio of any estuary in the United States, giving land-based activities significant influence over the condition of the Bay. Crop and pasture lands together comprise approximately 25 percent of the watershed, second only to forest land (47 percent). Between 1985 and 2005, agriculture achieved substantial reductions of nitrogen, phosphorus and sediment discharges, according to the Chesapeake Bay watershed model. Basin-wide, agricultural lands reduced nitrogen discharges by approximately 43.5 million pounds per year, phosphorous discharges by 3.2 million pounds per year and sediment discharges by 1.1 million tons per year.

These estimated reductions in pollutants, however, have been insufficient to support sustainable populations of the Bay's living resources. Excess inputs of nutrients and sediment from a variety of sources continue to flow from tributaries into Bay waters. NRCS and its partners are committed to ensuring that agriculture continues to do its part to restore the Chesapeake. Here are some highlights of recent activities:

- In FY 2006, NRCS provided more financial and technical assistance funding for agricultural conservation in the Bay watershed than any other federal agency, approximately $80 million.
- NRCS, through the Environmental Quality Incentives Program (EQIP), is working in Bay watershed states to increase the adoption by producers of precision animal feeding practices.
- NRCS is working with the Chesapeake Bay Program to improve data collection and modeling for agriculture.
- USDA and EPA signed a Memorandum of Agreement to enhance cooperation on nutrient reduction activities in the Bay watershed.
- USDA and EPA signed a Memorandum of Agreement to improve coordination of water quality trading activities. The MOA includes a commitment to support a trading pilot project in the Bay watershed.

Our partners are likewise stepping up efforts.

- The Maryland Department of Agriculture provided $8 million in cover crop funding in 2006.
- The State of Pennsylvania passed water quality credit trading regulations, providing for innovative means of meeting water quality goals.
- The nonprofit Chesapeake Bay Foundation has aggressively moved to fund agricultural conservationists that work directly with farmers.
- Scientists in the Choptank watershed are researching the environmental impacts of agricultural conservation practices.

The rapid pace of development in the watershed threatens to overwhelm the positive actions undertaken by all sectors. Stakeholders in the Chesapeake Bay understand that a viable and vibrant agricultural forestry sector is critical to the future of the Bay, and have coalesced around an effort to increase the financial and technical assistance funding available to farmers in the Bay watershed.

Working Lands Conservation Use Programs

Wetlands Reserve Program

The Wetlands Reserve Program (WRP) is a voluntary program through which landowners are paid to retire cropland from agricultural production if those lands are restored to wetlands and protected, in most cases, with a long-term or permanent easement. Landowners receive fair market value for the rights they forgo associated with protecting the land, and are provided with cost-share assistance to cover the restoration expenses. The goal of WRP is to maximize wildlife benefits and wetland functions and values. One of the important functions and values of wetlands is improved water quality and quantity. WRP is the principle USDA program to help meet the President's Wetlands Initiative goal to create, restore and enhance 3 million acres of wetlands by 2009. Properly functioning wetlands have a tremendous positive impact on water quality. Private landowners have enrolled over 1.9 million acres in this program through FY2006.

Our 2007 Farm Bill proposal seek to add more than 1 million additional acres to WRP, brining the overall enrollment to more than 3.5 million acres or the size of the State of Connecticut.

Conservation Reserve Program

The Conservation Reserve Program (CRP), administered by the Farm Service Agency, provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. There are more than 36 million acres enrolled in the program and planted to cover crops to stop soil and nutrients from washing into waterways. Through January 2007, CRP has restored 2 million acres of wetlands and 2 million acres of buffers. CRP reduces soil erosion across the Nation by 454 million tons each year.

Working Lands Stewardship Program

Conservation Security Program

The Conservation Security Program (CSP), as authorized by the 2002 Farm Bill, is a voluntary program that provides financial and technical assistance for the conservation, protection, and improvement of natural resources on tribal and private working lands. This working lands program provides payments for producers who practice good stewardship on their agricultural lands and incentives for those who want to do more.

In the almost 4-year period this program has been in operation, NRCS has offered the program in 280 watersheds and has rewarded nearly 19,400 stewards on 15.5 million acres of working agricultural land.

A typical CSP contract was recently awarded to a New Castle County grain operator in Delaware. This landowner then worked cooperatively with NRCS to improve water quality in the Chesapeake Bay. The landowner created and restored wetlands, installed conservation buffer strip, developed wildlife habitats for waterfowl, and utilized irrigation water management, filter strips and no-tillage to protect both soil and water resources.

Working Lands Future Based Incentives

Using the market to promote conservation is an important part of our future. For example, the Natural Resources Conservation Service strategic plan draws on three closely linked, overarching strategies that support one another: Cooperative Conservation, the Watershed Approach and the Market Based Approach. The goal is to broaden the use of voluntary market mechanisms for the provision of environmental and ecosystem services. These mechanisms include water quality credit trading, mitigation banking, competitive offer-based auctioning and eco-labeling. New market based approaches will compliment our existing programs, while broadening the opportunities for conservation.

Let me give you an example of a project involving water quality trading by agriculture producers who live and farm in the New York City Watershed. Instead of building a multi-billion dollar filtration plant, the city worked with local landowners and agribusiness to address water quality issues on nearly 500,000 acres of farm and forest land in the watershed that provides the residents of New York City with drinking water. The NRCS provided the technical assistance for this project and the City of New York provided the financial assistance. This collaborative effort between local, State and Federal stakeholders resulted in improved water quality in the basin and the avoidance of filtration, saving the City $4 to$ 8 billion in capital costs.

Working Lands Information Tools

Part of our role at USDA is to help provide information and the tools necessary for our customers and partners, so they can make good land use decisions. We're continually working on new tools. Every year NRCS measures the changes of the resource base on private lands through the National Resources Inventory (NRI). The NRI is a statistical survey of natural resource conditions and trends and it assesses soil erosion, land cover and use, wetlands, habitat diversity, selected conservation practices and related resources. In 2006, the NRI shows a 43 percent reduction in cropland soil erosion between 1982 and 2003. The NRI, in cooperation with Iowa State University, found that total tons of soil eroded declined in all major river basins. This remarkable reduction did not happen by chance, or by regulation. Rather, it was achieved through extraordinary efforts and voluntary cooperation at the local level.

We also offer soil data through our web soil survey, which provides basic, fundamental information to guide land use decisions. It is part of our ongoing effort to make sure the latest information is available and easily accessible over the Internet.

Measuring Success

Madam Chairman, we have made significant progress in helping people help the land by providing technical and financial support to the Nation's agricultural producers. But while we have excellent information about our program outputs, we still are working to quantify our data on the environmental outcomes of our programs.

As a result, starting in 2003, NRCS, in collaboration with other USDA and Federal agencies, initiated the Conservation Effects Assessment Project (CEAP) to scientifically assess the environmental and related outcomes from Farm Bill conservation programs at both the national and watershed scale through 2008.

The national assessment initially focuses on water quality, soil quality, and water conservation benefits from cropland programs, including the Conservation Reserve Program. Using the Natural Resources Inventory (NRI), supplemented by farmer surveys and verified by USDA computer models, CEAP will estimate national benefits from conservation practices and programs. In addition to the cropland component, the CEAP includes wetlands, grazing lands and wildlife components in the assessment of conservation benefits from Farm Bill programs.

We believe that farmers and ranchers are making important gains in conservation on working lands. They have applied conservation systems to over 57 million acres of cropland and over 108 million acres of grazing lands, and improved 56 million acres of fish and wildlife habitat. We are excited to capture these data and more precisely measure the real results we are helping our customers achieve.

Summary

As we look ahead, it is clear that the challenges before the Nation to protect and improve water quality will require the dedication of all available resources – the skills and expertise of the NRCS staff, the contributions of volunteers, and continued collaboration with partners including local, State and Federal agencies.

I am proud of the work and the conservation ethic our people exhibit day in and day out as they go about the job of achieving conservation on the ground. Through Cooperative Conservation, we have achieved a great deal of success. We are sharply focusing our efforts and will work together with our partners to continue to make improvements to water quality. I look forward to working with you, as we move ahead in this endeavor.

This concludes my statement. I will be glad to answer any questions that Members of the Subcommittee might have.

U.S. House of Representatives
Committee on Transportation and Infrastructure
Questions
for the Natural Resources Conservation Service from the Hearing on
Non-point Source Pollution: The Impacts of Agriculture on Water Quality
April 19, 2007

1. What are current participation rates in the following agricultural runoff reduction programs? (Please provide rate information in both farm units and acreage; rates in terms of universe of potential applicants versus enrolled applicants.)

a. EQIP (Environmental Quality Incentives Program);

Response:

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM
PARTICPATION RATE *

	Potential Participants**	**Enrolled Participants**	**Participation Rate (No.)**	**Potential Acres *****	**Enrolled Acres**	**Participation Rate (Ac.)**
2004	2,128,982	46,413	2%	1,230,796,542	18,631,625	2%
2005	2,128,982	49,406	2%	1,230,796,542	18,080,499	2%
2006	2,128,982	41,190	2%	1,230,796,542	21,115,275	2%
Total	2,128,982	137,009	6%	1,230,796,542	57,827,399	5%

* - Based on EQIP information from NRCS Protracts database
** - Based on number of farms from the 2002 Census of Agriculture
*** - Based on data from the 2003 National Resources Inventory

b. The 'nonpoint source pollution' part of the EQIP program. (The EQIP program covers 5 priority areas including: 1) nonpoint sources pollution; 2) conservation of water resources; 3) emissions reductions; 4) erosion reduction; and 5) promotion of at-risk species habitat.)

Response:

The ratio of contracts that address nonpoint source pollution compared to all EQIP contracts is about one out of every three (2.91) contracts. Data is not available on the number or acres of farms with nonpoint source pollution resource concerns.

c. **The CSP (Conservation Security Program) program.**

Response:

CONSERVATION SECURITY PROGRAM
PARTICIPATION RATE *

	Potential Participants	Enrolled Participants	Participation Rate (No.)	Potential Acres	Enrolled Acres	Participation Rate (Ac.)
2004	27,300	2,188	8%	14,000,000	1,885,400	13%
2005	235,000	12,780	5%	235,000,000	9,877,603	4%
2006	75,000	4,323	6%	25,000,000	3,648,131	15%
Total	337,300	19,291	6%	274,000,000	15,411,134	6%

* - Based on CSP information posted to NRCS web site 5/4/07

2. What is the extent of the EQIP (Environmental Quality Incentives Program) backlog? (Please provide numerical information to describe this.)

Response:

		EQIP			**17-Oct-06**
		Unfunded Applications			
		FY2006			
State Name	**Applications Unfunded**	**Average Cost Share $ Per Application**	**Total Cost Share $ Unfunded Applications**	**Average Size of Application (Acres)**	**Total Acres Unfunded Applications**
ALABAMA	1,188	$12,011	$14,269,317	100	118,907
ALASKA	36	$82,721	$2,977,960	72,042	2,593,530
ARIZONA	69	$86,064	$5,938,410	9,948	686,429
ARKANSAS	1,039	$18,423	$19,141,871	137	142,239
CALIFORNIA	938	$37,996	$35,640,426	297	278,886
COLORADO	449	$25,830	$11,597,495	558	250,511
CONNECTICUT	4	$63,867	$255,469	23	92
DELAWARE	73	$26,931	$1,965,968	220	16,072
FLORIDA	220	$25,107	$5,523,573	202	44,493
GEORGIA	1,343	$13,709	$18,410,784	100	134,730
HAWAII	11	$36,338	$399,717	64	708
IDAHO	354	$36,322	$12,858,158	315	111,379
ILLINOIS	704	$30,760	$21,654,822	164	115,160
INDIANA	193	$18,064	$3,486,406	137	26,435
IOWA	1,693	$13,442	$22,756,561	108	182,455
KANSAS	1,067	$14,345	$15,306,072	285	304,127
KENTUCKY	486	$8,736	$4,245,749	64	30,992

LOUISIANA	496	$14,682	$7,282,456	149	73,666
MAINE	589	$22,885	$13,479,177	141	83,061
MARYLAND	104	$6,510	$677,088	132	13,723
MASSACHUSETTS	94	$34,162	$3,211,199	70	6,568
MICHIGAN	231	$50,226	$11,602,160	256	59,113
MINNESOTA	567	$17,438	$9,887,624	273	154,899
MISSISSIPPI	1,040	$6,529	$6,790,191	62	64,459
MISSOURI	3,583	$19,237	$68,926,350	132	473,063
MONTANA	489	$29,137	$14,248,081	1,367	668,258
NEBRASKA	1,915	$16,940	$32,440,981	368	704,701
NEVADA	38	$74,505	$2,831,199	841	31,960
NEW HAMPSHIRE	153	$30,447	$4,658,423	100	15,240
NEW JERSEY	1	$44,176	$44,176	83	83
NEW MEXICO	48	$37,914	$1,819,891	3,197	153,459
NEW YORK	305	$36,623	$11,170,152	409	124,861
NORTH CAROLINA	716	$18,020	$12,902,363	100	71,342
NORTH DAKOTA	310	$24,529	$7,604,012	779	241,406
OHIO	1,200	$9,190	$11,027,748	127	151,944
OKLAHOMA	1,590	$12,440	$19,779,457	315	501,534
OREGON	461	$33,647	$15,511,101	341	157,090
PENNSYLVANIA	561	$39,780	$22,316,748	105	58,871
RHODE ISLAND	18	$60,241	$1,084,342	32	584
SOUTH CAROLINA	296	$13,309	$3,939,366	125	36,953
SOUTH DAKOTA	252	$41,245	$10,393,836	1,785	449,800
TENNESSEE	1,235	$10,439	$12,891,819	60	74,495
TEXAS	3,853	$13,489	$51,974,889	530	2,042,552
UTAH	507	$41,610	$21,096,103	379	191,965
VERMONT	126	$79,225	$9,982,319	256	32,246
VIRGINIA	244	$27,036	$6,596,801	160	38,959
WASHINGTON	400	$33,398	$13,359,168	431	172,208
WEST VIRGINIA	772	$22,347	$17,251,537	95	73,626
WISCONSIN	155	$14,818	$2,296,754	167	25,891
WYOMING	319	$28,571	$9,114,111	2,638	841,579
PACIFIC BASIN	5	$28,887	$144,437	8	39
CARIBBEAN AREA	93	$16,550	$1,539,173	60	5,573
GRAND TOTAL	32,633		$636,303,990		12,832,916
Source: Protracts 10 07 2006. Unfunded applications include preapproved, deferred, eligible, pending, and disapproved					

a. What are reasons for the backlog?

Response:
The underlying reasons for the large number of applicants applying include their need to: meet regulatory requirements, address environmental concerns such as water quality, and apply good stewardship of natural resources. The demand for EQIP assistance has always been greater than available funding. The backlog also includes those requesting EQIP funding but that may ultimately not qualify for the program.

b. What are the environmental and water quality implications of the backlog?

Response:
The main environmental and water quality implication of the backlog is the delay in implementing conservation practice to improve water quality and the environment. Moreover, some applicants become frustrated by the lack of funds and no longer pursue a funded contract.

3. Is improved coordination needed between USDA and its federal partners, like EPA, in major watersheds, estuaries and regions across the country? Or, were the issues highlighted in the USDA OIG Report titled "Saving the Chesapeake Bay Requires Better Coordination of Environmental and Agricultural Resources" (USDA OIG Report No. 50601-10-Hq) isolated to the Chesapeake Bay watershed alone?

Response:
There could be better coordination between federal partners in the Chesapeake Bay as well as in other watershed. The Administration has made great gains in furthering the efforts of Agencies to work together with a Cooperative Conservation focus. There are many examples of USDA and its Federal partners working jointly to restore, protect, and improve our Nation's natural resources.

A few examples include an agreement that USDA and the Environmental Protection Agency (EPA) signed May 9, 2007, to improve interagency coordination specific to the Chesapeake. This agreement establishes a framework for coordination and cooperation among the two agencies in prioritizing and implementing nutrient reduction activities in the Chesapeake Bay watershed. In addition, every two months USDA and EPA hold a bi-monthly coordination meeting. Senior leadership and support staff attend these meetings. The purpose of these meetings is coordination and information sharing. Numerous interagency initiatives have grown out of these meetings, including the Memorandum of Understanding on interagency coordination for the Chesapeake Bay Project and the Partnership Agreement between the agencies on Water Quality Credit Trading. These meetings also resulted in a conference on water quality credit trading, sponsored by the two agencies in May of 2006. It was attended by over 400 people in both the public and private sectors.

EPA and USDA regularly consult with each other on their rulemaking. Two recent examples are the revised rule for Concentrated Animal Feeding Operations (CAFO) and the Spill Containment and Control rule. EPA has been responsive to the counsel and suggestions given by USDA. EPA invited USDA to attend and participate in four outreach meetings held during 2006 on the CAFO rule.

Another mechanism in place for Agencies to coordinate efforts on watershed issues throughout the Nation is through the NRCS State Technical Committees. State Technical Committees are established under the authority of Section 1261 of the Food Security Act of 1985 to provide advice for technical considerations and technical guidelines necessary to implement resource conservation. Technical Committees are composed of individuals and groups who represent diverse interests in a variety of natural resource sciences and occupations. Members typically include a diverse cross-section of Federal, State and local agency representatives, Tribes, agricultural producers, non-profit organizations with conservation expertise, agribusiness, and persons knowledgeable about the economic and environmental impacts of conservation techniques and programs. EPA and their constituent state agencies are members of most State Technical Committees and fully participate in recommendations on technical and programmatic issues.

4. **What specific steps have USDA and NRCS taken to comply with the recommendations highlighted in USDA OIG report "Saving the Chesapeake Bay Requires Better Coordination of Environmental and Agricultural Resources" (USDA OIG Report NO. 50601-10-Hq)?**

Response:
The Secretary of Agriculture implemented Recommendation 4, which requested the Department to designate the Under Secretary for Natural Resources and Environment as the official designated leader for all activities related to the Chesapeake Bay Coordination. In addition, per the Secretary's memorandum signed on February 8, 2007, leadership for coordination on bay issues has been assigned to the Under Secretary for Natural Resources and Environment (NRE). The Under Secretary of NRE, in turn, assigned individuals to a number of key positions: a Deputy Under Secretary for NRE has been designated as the Department of Agriculture's (USDA) representative to the Chesapeake Executive Council, Natural Resources Conservation Service's (NRCS) East Regional Assistant Chief represents USDA on the Executive Council's Principals' Staff Committee, and the NRCS Maryland State Conservationist is a member of the Federal Agency and Implementation Committees.

In response to Recommendation 5, which requested a review of the feasibility of targeting or redirecting USDA funds on a regional and/or geographical basis to coordinate with the environmental restoration of the Chesapeake Bay, USDA has developed and continues to monitor and improve a transparent natural resource based funding formula for its major programs that benefit the Chesapeake Bay. USDA also works with local groups and State Technical Committee to obtain programmatic advice and funding priority recommendations in each State. USDA recently contracted with an independent third party selected competitively to examine the efficacy of its program allocation formula. USDA anticipates that the results of this independent review will yield information valuable to the further refinement of the allocation formula in future years.

Recommendation 6 directed USDA agencies to expedite the development and implementation of outcome-based performance measurements for evaluating the effectiveness of their conservation efforts and programs. In response, USDA provided information on the Conservation Effects Assessment Project (CEAP) which is a multi-agency effort designed to quantify the benefits of conservation practices implemented by private landowners participating in selected USDA conservation programs. The agencies expect that CEAP will provide much needed data, methods, and information to improve measurement of program performance, and will also assist in development of improved measures that better reflect desired environmental outcomes. Five USDA agencies are collaborating in leading the national, regional, and watershed effects assessments. Another seven USDA and external agencies, including EPA are participating in various CEAP activities as well.

Recommendation 7 instructed USDA to develop a tracking system for maintaining a list of technical assistance and financial assistance requests from landowners and agricultural producers that cannot be completed due to limited funding. Unfunded applications for financial assistance are already tracked by specific program. USDA intends to develop a tracking system for technical assistance requests in fiscal year 2008.

Testimony of Scott Faber
Farm Policy Campaign Director
Environmental Defense

Before the Water Resources and Environment Subcommittee of the
House Transportation and Infrastructure Committee

April 19, 2007

Thank you for the opportunity to appear before the Water Resources and Environment Subcommittee of the House Transportation and Infrastructure Committee.

More than 30 years have passed since our nation pledged to make our rivers, lakes and bays clean enough to support fishing and swimming, and more than 20 years have passed since the first deadline for this ambitious goal. Today, thousands of rivers, lakes and bays still remain too polluted to meet the goals of the Clean Water Act. A recent assessment of small streams by EPA found 42 percent of our streams in poor condition.

Our farmers and ranchers can produce far more than food and fiber – they can also produce clean water and wildlife habitat. Farmers and ranchers manage more than half of the American landscape, so it should be no surprise that agriculture is a leading source of water pollution. While there are many sources of water pollution, agriculture remains among the leading reasons that many of America's rivers, lakes and bay remain too polluted to meet state water quality goals. According to state assessments, agriculture is the leading source of pollution among rivers and lakes unable to support designated uses such as fishing and swimming and agriculture is a major reason so many of America's bays feature low-oxygen "dead zones" and face other water quality challenges.

To comply with the Clean Water Act, states have developed thousands of plans to clean up America's remaining polluted rivers, lakes, and bays. It should also be no surprise that many of these plans rely upon significant contributions by agriculture. For example, pollution reduction goals our region set for the Chesapeake Bay in a 2000 consent decree presume that agriculture will by 2010 dramatically reduce the loss of nitrogen and phosphorous. But, the Clean Water Act does not generally grant to EPA or the states the power to regulate agriculture, and very few states direct farmers to install land management practices that reduce the loss of nutrients, sediment, and other pollutants from farms. Unless we provide farmers with the right tools and incentives, we cannot hope to meet the goals we have set for our rivers, lakes and bays.

In general, farmers are eager to solve the nation's water quality challenges. For example, many farmers have adopted tillage practices that reduce soil erosion. About 41 percent of farmers employed "conservation" tillage practices in 2004, up from 26 percent in 1990. The number acres where "no-till" was employed tripled during the same period, from 17 million acres to 62 million acres. As a result, annual soil erosion from cropland fell by more than 600 million tons between 1982 and 1997, according to USDA's Natural Resources Inventory.

Farmers have also expanded the use of buffers of grasses and trees to intercept and filter runoff from farmland, and have expanded the protection and restoration of wetlands. For example, farmers have installed more than 3 million acres of buffers over the last decade. Overall, tens of thousands of farmers are implementing scores of different land management practices that help apply fertilizers with greater precision and that intercept and filter sediment and nutrients intended for crops.

Nevertheless, more than 100 million acres of cropland are still eroding at unsustainable rates, according to the NRI, and significant soil erosion gains have not been in the last decade. Most farmers still do not conduct the basic soil tests that Chairman Oberstar would have mandated a decade ago in H.R. 550, the Nonpoint Source Pollution Prevention Act of 1997. According to USDA, less than 40 percent of cropland is subject to a test for nitrogen, including just 26 percent and just 24 percent of corn and soybean acres, respectively. Less than 15 percent of farmers have employed "variable rate" technologies that automatically change fertilizer applications to reflect nutrient needs. USDA surveys demonstrate that farmers have made great strides but also demonstrate that agriculture could do much more with the right tools and incentives.

Agriculture is not only a major source of pollution for many of America's rivers, lakes and bays; agriculture also offers the best opportunities to make significant progress on our water quality goals. Adopting soil-conserving tillage practices, applying nitrogen with greater precision, planting cover crops, installing buffers of grasses and trees, rotating crops, building terraces, restoring lost wetlands, adding soil amendments, and scores of other proven land management practices are far less costly and provide many more benefits per dollar expended than upgrading waste water treatment plants or other point sources and can offer other environment benefits, such as habitat for wildlife. Although the benefits of these practices can vary widely – depending on design, location, management and other factors – such practices remain the most cost-effective water quality tools available to policymakers.

Percent of acreage with recommended practice, by crop

Practice	Corn	Soybeans	Wheat	Cotton
	Percent of crop acreage			
Crop rotation	80	84	57	27
Conservation tillage	43	69	33	11
Scouted for pests	55	58	83	92
Soil test for nitrogen	26	24	30	37

Source: USDA's Agricultural Resource Management Survey

The benefits of these practices are well understood, in part, because of the addition of Section 319 to the Clean Water Act in 1987. As you know, practices implemented through the Section 319 Program have contributed to the restoration of more than 30 water bodies. For example, installing riverside buffers and removing a small dam with 319 funds allowed Pennsylvania officials to remove 22 miles of Manatawny Creek from the state's list of "impaired" waters. Simply installing a fence with 319 funds to exclude cattle from a four-mile stretch of Furlong Creek in Michigan was enough to rejuvenate the creek's aquatic life. Installing buffer strip and improving animal waste storage has reduced phosphorous levels in Minnesota's Sauk River by nearly 50 percent. There are many other 319 success stories, but the single most important lesson learned from the program's 20-year history is that the tools to reduce nonpoint source pollution are readily available and are cost-effective.

Congress has many more opportunities to expand the use of these basic practices and to improve our understanding of their benefits. In particular, renewal of farm and food policies this year provides a rare opportunity to reward farmers when they take steps to improve water quality. Increasing annual USDA conservation assistance to $8 billion by 2012 would dramatically reduce nitrogen, phosphorous and sediment loadings to surface waters. We estimate that national soil losses would fall by 17 percent, phosphorous losses would fall by 16 percent, and that nitrogen losses would fall by 11 percent if Congress made the investments proposed in H.R. 1551, the Healthy Farms, Fuels and Foods Act and H.R. 1600, the EAT Healthy America Act. Expanding conservation programs would also help many more farmers and regions receive a fair share of federal farm spending.

Congress should expand and improve voluntary working lands incentives programs like the Section 319 Program and USDA's Environmental Quality Incentives Program, which shares the cost of land management practices, and the innovative new Conservation Security Program, which links conservation payments to a producer's level of environmental performance. Congress should also improve the delivery of these federal working lands programs to provide "cooperative conservation" grants to groups of farmers working together in small watersheds to meet local water quality goals. When farmers work together, they frequently solve our water quality challenges faster, at less cost, and provide new insights into the benefits of different practices.

Renewal of the Farm Bill also gives Congress the opportunity to reform our land retirement and restoration programs, the Conservation Reserve and Wetlands Reserve programs, to focus greater enrollment on lands that are best able to intercept and filter farmland runoff. The installation of buffers and the use of Conservation Reserve Enhancement Program (CREP) agreements to target federal and state land restoration funds have been among the most effective ways to address polluted runoff and should be expanded in the 2007 Farm Bill.

Recommendations:

1) Expand Section 319 of the Clean Water Act -- Congress should accelerate efforts to address polluted runoff from farmland through expansion of Section 319 of the Clean Water Act.

2) Expand and improve the Environmental Quality Incentives Program – Congress should expand annual funding for the EQIP program to $2 billion, and should improve the program by rewarding states that identify the most innovative and cost-effective producers of environmental benefits. Congress should also expand the Conservation Innovation Grants program, and should accelerate the transfer of innovative new technologies and practices that improve water quality.

3) Expand and improve the Conservation Security Program – Congress should make the Conservation Security Program available to all farmers meeting high levels of environmental performance and should restructure CSP to require new performance and to better reflect local environmental priorities.

4) Target Land Reserve Programs – Congress should expand the Wetlands Reserve Program to 5 million acres, and should improve the program by making water quality a program purpose; and, Congress should improve the Conservation Reserve Program by enrolling more marginal, environmentally sensitive lands, such as riverside corridors.

5) Promote Cooperative Conservation – Congress should reserve 20 percent of all USDA working lands conservation programs to provide grants to groups of farmers working together to meet local environmental challenges. Conservation districts, cooperatives, water utilities, local governments, producer groups, and others should be encouraged to aggregate groups of farmers to seek multi-year grants to address local challenges, such as cleaning up "impaired" rivers and lakes.

6) Link Income Support to Stewardship – Congress should link farm income support to environmental stewardship. For example, Congress could provide a bonus to a producer's direct payment in exchange for the adoption of basic conservation practices, such as soil testing, stalk testing, and changes in the timing of fertilizer applications.

7) Link Renewable Energy Investments to Environmental Goals – Congress should expand USDA grants and loans to farmers developing renewable energy but should use an environmental benefits index to rank energy development proposals.

Farmers and ranchers are eager to address the nation's water quality challenges. Many conservation practices that improve water quality also reduce input costs, such as better nutrient and pest management. And, many conservation practices are simply changes in behavior that merely require an incentive payment, such as changes in the timing of fertilizer applications. But, many conservation practices pose new costs and risks that should be shared by the taxpayers. Unfortunately, more than 50,000 farmers are annually rejected by USDA when they offer to share the cost of clean water because of our misplaced spending priorities. The 2007 Farm Bill is an opportunity to reward – rather than reject – farmers and ranchers when they seek conservation assistance.

Thank you for the opportunity to testify.

TESTIMONY OF
CRAIG HOOKS
DIRECTOR, OFFICE OF WETLANDS, OCEANS, AND WATERSHEDS
OFFICE OF WATER
U.S. ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
UNITED STATES HOUSE OF REPRESENTATIVES

I. Introduction

Madam Chairwoman and members of the Subcommittee, I am Craig Hooks, Director of the Office of Wetlands, Oceans, and Watersheds in the Office of Water at the United States Environmental Protection Agency (EPA). Thank you for the opportunity to discuss EPA's water quality programs for agriculture. Agriculture is our Nation's primary non-point source of water quality impairments, and I welcome the opportunity to discuss this important issue with the Subcommittee.

II. Significance of Agriculture as a Source of Water Pollution

EPA's 2002 National Assessment Database summarizes State water quality reports ("Section 305(b) reports") and categorizes the quality of the state's assessed waters as good, threatened, or impaired. States identified 45% of the assessed miles of rivers and streams as impaired, and agriculture was the most frequently identified source, contributing significantly to 37% of all impaired miles of assessed rivers and streams. States similarly identified 47% assessed of lakes, ponds, and reservoirs as impaired, and agriculture was again the most frequently identified source, contributing significantly to 30% of all impaired acres of assessed lakes, ponds, and reservoirs.

Finally, in the case of estuaries and bays, States identified 32% of assessed bays and estuaries as impaired with the leading sources identified as industrial discharges, municipal discharges, resources extraction, urban runoff/stormwater, and atmospheric deposition; and in many estuaries, agriculture is also a dominant source of impairments. For example, in the Gulf of Mexico, which in recent years has experienced significant hypoxia (insufficient oxygen) throughout a large area, about 74 percent of the nitrate load is estimated to be contributed by agriculture. This is believed by the experts to be the primary cause of Gulf hypoxia. Agriculture is similarly understood to be a major factor causing water quality impairments in the Chesapeake Bay, the Neuse River, and many other significant bays and estuaries. About 19% of rivers and stream miles, 37% of lakes and ponds, and 35% of bays and estuaries have been assessed. Impairment in non-assessed waters may be lower, since States often focus assessments on waters with known or suspected problems.

III. EPA's National Nonpoint Source Program

The National Nonpoint Source Program, established by Congress in 1987 under Section 319 of the Clean Water Act ("CWA"), is EPA's primary program to manage nonpoint source ("NPS") pollution. This program manages a very broad range of nonpoint sources, including urban runoff, forestry, hydromodification, and habitat modification. However, the most significant category of NPS pollution is agriculture, and as such it deservedly receives more attention than any other NPS category.

Agriculture can affect water quality adversely in a myriad of ways, and both the problems and solutions to these problems are well summarized in EPA's guidance document, "National Management Measures for the Control of Nonpoint Pollution from Agriculture." This document segments agriculture-based water quality issues into six categories: nutrient management, pesticide management, erosion and sediment control, confined animal feeding operations, grazing management, and irrigation water management. For each category, the document explains the pollution problems that may result from improper practices; describes broad "management measures" that represent the best available, economically achievable measures to reduce pollution; and gives more detailed information on the most effective practices that are available to implement the management measure, together with a summary of available information on the effectiveness and cost of these practices. Leading examples of practices that can help improve water quality include:

- Using conservation tillage, no-till, or other practices to help keep the soil on the land and out of the water;
- Developing and implementing both nutrient management plans and integrated pest management plans to assure that nutrients and pesticides are used at the right time and place and in the amount needed to achieve production goals without causing runoff of nutrients and pesticides that could harm water quality;
- Managing manure to prevent runoff during rainfall events;
- Developing and implementing grazing management systems (e.g., herding) to reduce physical disturbance of streams and stream banks, and;
- Efficiently transporting and applying irrigation water to minimize water loss to evaporation, deep percolation, and runoff.

The Section 319 program is administered by EPA but is implemented by the States. This means that States develop plans that assess water quality problems holistically throughout a watershed (most typically an area ranging between 10 and 100 square miles, depending on a variety of factors); analyze and quantify the sources and causes of water quality problems and impairments; estimate the pollutant reductions that will be needed to solve water quality problems; and identify the best management practices that will be needed in various places to achieve the needed pollutant reductions. Typically, there are multiple means to solve a water quality problem, and EPA encourages States to choose one that is the most cost effective and feasible.

Section 319 does not provide any regulatory authority to EPA or the States. State 319 programs are implemented primarily on a voluntary basis. To promote broad and active participation by local producers in the protection and restoration of their local waterbodies, EPA requires that every Section 319-funded watershed project include an outreach component along with the technical aspects of the project. EPA and the States have long recognized that projects only succeed when stakeholders understand their local water quality issues and are actively involved in fashioning and implementing solutions to these problems.

The watershed-based approach to defining and implementing water quality solutions has resulted in a growing list of "Section 319 Success Stories", which are documented at www.epa.gov/nps/success. There, one can read numerous examples of collaborative, watershed-based efforts that have resulted in great progress in restoring water quality. Here a few examples of successful 319-funded projects:

1. Aquilla Reservoir, Texas: Aquilla Reservoir is an important source of drinking water and recreation but was found to contain excessive levels of the herbicide atrazine beginning in 1997. Project partners initiated efforts to reduce agricultural atrazine sources—and to a lesser extent, urban sources—in the watershed. As a result of technical assistance to corn and sorghum producers, the use of agricultural best management practices (BMPs), and education for urban residents, atrazine concentrations in Aquilla Reservoir declined by 60 percent. The reservoir now contains levels of atrazine that are below the maximum contaminant levels for drinking water.
2. Lower Yakima River, Washington: Erosion from irrigated agricultural lands has caused the waters of the lower Yakima River to become impaired by suspended sediment, turbidity, and the cancelled pesticide DDT. As a result of better irrigation practices through the conversion from furrow to sprinkler or drip systems, area farmers

have met interim targets for reducing turbidity at three of the four primary irrigation water return drains, and made significant progress meeting targets at all other sites.

3. Bass Lake, Wisconsin: Livestock operations and other agricultural activities contributed to nutrient pollution and fish kills in Bass Lake in northeastern Wisconsin. The Marinette County Land and Water Conservation Department (LWCD) led an effort to reduce polluted runoff by installing state-of-the-art barnyard control practices in combination with in-lake treatment techniques. The Bass Lake restoration project reduced the average phosphorus concentration by 98%. The lake will be removed from the state's next list of impaired waters, in 2008.

An additional source of funding that EPA brings to the table is its State Revolving Loan Fund under Title VI of the CWA. This fund is used by many States to provide loans to agricultural producers for a host of BMP's, such as the replacement of inefficient irrigation systems with water saving devices that help protect water quality; the installation of animal waste BMP's; and the provision of conservation tillage equipment that can be shared by various producers within a watershed.

IV. EPA-USDA Cooperation Helps Producers Solve Water Quality Problems

A key feature of many of the success stories I mentioned above is that they involve collaboration among a broad set of key water quality and agricultural agencies. This is the hallmark of successful agriculture-based watershed projects that are funded by EPA. Typical partners include State water quality, agriculture, and soil and water conservation agencies; local conservation districts other local units of government, local watershed associations and farm organizations; and EPA and the U.S. Department of Agriculture (USDA).

EPA and USDA and our partners bring different strengths to solving water quality problems at the local level. Many USDA conservation programs are authorized through the Farm Bill, and USDA, through the conservation district system, has built a long history of trust among agricultural producers. EPA and State water quality agencies can provide funding for some activities that may not be funded by USDA programs to help make a watershed project a success. Over the past several years, in agricultural regions, EPA has focused the 319 program on such areas to ensure funds are targeted to critical activities not funded through other means. For example, EPA funds can be used to 1) conduct water quality monitoring to improve understanding of the water quality issues and potential solutions; 2) develop watershed plans that enable a community to identify priority needs and priority locations for implementation; 3) hire a dedicated watershed coordinator (often a conservation specialist who is rooted in a local community) who can educate the community and help design and implement the solutions; and 4) demonstrate innovative management practices, such as dairy manure composting in Erath County, Texas.

EPA water quality programs and USDA conservation programs are most effective when we are able to work together in a concerted and coordinated manner to focus our resources in the same watersheds. For example, the Nebraska office of USDA's Natural Resources Conservation Service (NRCS) has worked cooperatively with Nebraska's Department of Environmental Quality to develop and fund in 2007 a new "Water Quality Initiative Program" that will invest Environmental Quality Incentives Program (EQIP) funds in one-on-one technical assistance to farmers and landowners at priority sites within watersheds that have completed Section 319 watershed plans. EQIP is a voluntary conservation program from the USDA, which provides financial and technical assistance to farmers for structural and management conservation practices. A number of other States have developed similar programs or projects where agricultural programs are being coordinated with Section 319 funding to achieve water quality improvement in local watersheds.

The Administration's proposal for the forthcoming reauthorization of the Farm Bill will help promote effective collaboration between water quality and agricultural agencies to solve local water quality problems. In addition to providing additional funds for conservation programs, the proposal would increase the focus of EQIP on cooperative approaches to enhancing water quality on a regional scale. In addition, it would modify the Conservation Security Program to emphasize incentives for implementing higher levels of conservation practices. These and other features would help producers restore impaired waters more rapidly.

V. Water Quality Trading to Promote Cost-Effective Agricultural Solutions

One of EPA's tools for supporting agricultural conservation practices is water quality trading. Water quality trading programs allow facilities facing high pollutant control costs to meet their regulatory obligations by purchasing environmentally equivalent (or superior) pollutant reductions from another source at lower cost. Trading programs transform pollutant reductions achieved by implementing agricultural conservation practices into a valuable commodity that a producer can sell to an industrial or municipal facility. The benefits can be numerous: more income for farmers; less cost and more flexibility for wastewater dischargers to meet their permit limits; and additional benefits to the environment, such as improved habitat and pollutant reduction.

Perhaps the best way to understand water quality trading is by example. In Barron County, Wisconsin, the city of Cumberland pays agriculture producers about $18.50 per acre for converting to no-till farming. The city saves money because paying producers for this conservation practice is a cheaper way to reduce phosphorus pollution than is upgrading the city wastewater treatment plant and paying higher operating costs. Not only does this trade save the city money, but in addition to reducing pollutant loading, it also provides environmental benefits, such as increased wildlife habitat. Upgrading the city's treatment plant would not have necessarily provided the city with this added benefit.

EPA provides a number of tools to help agricultural producers participate in trading programs, many of which are implemented in collaboration with USDA.

- On August 13, 2006, EPA signed a Partnership Agreement with USDA's NRCS to promote collaboration on water quality trading efforts.
- EPA funded the Conservation Technology Information Center's efforts to publish an important guide to help agricultural advisors understand the benefits to producers of participating in water quality trading and how water quality trading works. The guide is entitled, *Getting Paid for Stewardship: An Agriculture Community Water Quality Trading Guide.*
- EPA is working with NRCS to support a water quality trading pilot involving agricultural producers in the Chesapeake Bay.
- In summer of 2007, EPA will publish a request for grant proposals to support water quality trading and other market-based tools in the Mississippi River Basin. We anticipate that $3 million will be available through Targeted Watershed Grants.
- In 2008, EPA will train agricultural advisors and other stakeholders in areas of the Mississippi River Basin that have conditions that may be ripe for water quality trading.

VI. Water Quality Criteria and Standards to Address Nitrogen and Phosphorus Pollution

Water quality criteria and standards are used to establish specific objectives and expectations for our waterways. They operate to measure and guide federal, state, and local efforts to maintain and promote water quality under the CWA and provide an essential link between science, state and community goals, and environmental results. Nutrient pollution ranks as one of the top causes of water quality problems in our Nation's waters, affecting both human health and aquatic life. Numeric nutrient water quality criteria and standards address nutrient (nitrogen and phosphorus) pollution.

EPA is providing leadership and working in partnership with States, Territories and authorized Tribes to establish quantitative endpoints for addressing nitrogen and phosphorus pollution. Numeric nutrient criteria and standards drive water quality assessments and watershed protection management. They create state and community-developed environmental baselines that allow us to manage more effectively, measure progress, and support broader partnerships. Numeric nutrient criteria and standards support faster and easier development of nutrient Total Maximum Daily Loads, assist in writing protective DPDES permits, provide quantitative targets for water quality trading, and supply a baseline to evaluate Best Management Practices (BMPs) for agriculture. The Agency has developed a strategy to target technical assistance where it will be most effective and helpful in the numeric nutrients standards adoption process. More specifically, EPA will:

- <u>Provide direct assistance to states close to adopting numeric criteria by</u> providing implementation and policy support;
- <u>Build capacity of states that are further from adopting numeric criteria</u> by providing technical assistance; and
- <u>Develop a science-based foundation for future criteria and standards development in estuaries, wetlands, and large rivers.</u>

VII Pesticides

EPA's Office of Water and the Office of Pesticide Programs are collaborating closely to enhance consideration of water quality impacts of pesticides in the implementation of both the water quality and the pesticide registration programs. We are coordinating on the development of pesticide water quality criteria, and identifying opportunities for pesticide monitoring through the pesticide registration process. We are working to ensure that water quality data from States, USGS, and other sources is considered in the pesticide registration review process. We have also helped to provide training for State pesticide and water managers to foster coordination at the State level.

Conclusion

We have made a major investment in the implementation of programs and practices to protect and restore waters that are impacted or may be impacted by agriculture. However, much more work remains to be done to achieve the program's long-term goals. We will continue to work with this Committee, our Federal colleagues, and the many partners, stakeholders, and citizens who want to accelerate the pace and efficiency of water quality protection and restoration. This concludes my prepared remarks; I would be happy to respond to any questions you may have.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CONGRESSIONAL AND
INTERGOVERNMENTAL RELATIONS

The Honorable Eddie Bernice Johnson
Chairman
Subcommittee on Water Resources
and Environment
U.S. House of Representatives
Washington, DC 20515

Dear Madam Chair:

Thank you for the opportunity to respond to questions for the record that followed an April 19, 2007 hearing on the impacts of nonpoint source pollution and agriculture on water quality. I hope this information will be useful to you and the members of the Committee.

If you have any further questions, please contact me or your staff may contact Christina J. Moody in my office at 202.564.0260.

Sincerely,

Stephanie N. Daigle
Associate Administrator

Enclosure

NONPOINT SOURCE POLLUTION:
THE IMPACTS OF AGRICULTURE ON WATER QUALITY
HEARING: APRIL 19, 2007
QUESTIONS FOR THE RECORD

Question 1: Is improved coordination needed between USDA and its federal partners, like EPA, in major watersheds, estuaries and regions throughout the country? Or, were the issues highlighted in the USDA/EPA OIG Report titled "Saving the Chesapeake Bay Requires Better Coordination of Environmental and Agricultural Resources" (EPA OIG Report No. 2007-P-00004) isolated to the Chesapeake Bay alone?

Answer: The OIG report mentioned above identified issues regarding the quality of coordination between USDA's and EPA's resources in the context of our activities to protect and restore the Chesapeake Bay. EPA and USDA have worked cooperatively to address these issues and, on May 9, 2007, signed a Memorandum of Understanding to sharpen our focus to carry out activities to help Chesapeake Bay Program partners meet their nutrient reduction goals. Under this Memorandum of Understanding, EPA and USDA intend to use their complementary authorities and programs to work cooperatively on nutrient reduction activities in the Chesapeake Bay watershed.

It will always be a huge challenge for EPA and USDA to coordinate our programs and the activities of the 50 State agencies that implement the national nonpoint source program in each of 50 States; 50 State conservationists who similarly implement USDA's conservation programs in 50 States; approximately 3,000 conservation districts; and all of our many partners in the public and private sectors. A quick perusal of EPA's "Section 319 Success Stories" web site, at www.epa.gov/nps/success, reveals the complexity of almost every nonpoint source project funded under Section 319. Virtually every project is planned, organized, and implemented by a number of groups, typically including such partners as EPA, USDA, other Federal agencies; State water quality, agricultural, and conservation agencies; conservation districts and local governments; and myriad watershed groups.

While this complexity is daunting, it becomes easier to overcome when the respective organizations focus their attention on the watershed level, where most water quality problems are created and solved. As discussed in the testimony of Craig Hooks, Director of EPA's Office of Wetlands, Oceans, and Watersheds, EPA water quality programs and USDA conservation programs are most effective when we are able to work together in a concerted and coordinated manner to focus our resources in the same watersheds. Mr. Hooks explained further the relative strengths of each agency's programs and how these strengths are complementary.

A great strength of EPA's nonpoint source program is its ability to focus on water quality issues on a watershed scale, thereby enabling a holistic analysis that takes into account all stressors in the watershed, analyzes their relative significance, and devises an appropriate set of technical solutions that can solve the water quality problem. Coupled with

USDA's technical knowledge of agricultural practices, relationships with local producers, and significant financial and technical assistance resources, the agencies collectively have the capacity, working together, to accomplish far more than we can operating alone. For this reason, most Section 319 projects in agricultural settings are implemented in concert with, and often in fact led by, USDA staff or by local conservation districts.

Although most of the "action" occurs at the local level, we also coordinate closely at the national level. Top-level officials of USDA and EPA meet bi-monthly to discuss a range of common issues and provide direction to staff to promote close coordination on both policy development and program implementation. We also cooperate on analytical work, such as USDA's CEAP (Conservation Effects Assessment Program), and the development of tools that can assist producers in protecting water quality. Finally, at the Regional/State level, EPA's Regional offices and USDA's State conservationists meet periodically to discuss specific opportunities for coordination in particular watersheds of mutual interest. As discussed in Mr. Hooks' testimony, this approach has yielded specific results in a number of States through agreements to focus portions of our resources on resolving water quality problems in jointly selected watersheds.

Question 2: The EPA report titled National Water Quality Inventory (otherwise known as the 305(b) report) is critical to understanding the state of the nation's water bodies. As you know, the Clean Water Act stipulates that this should be released every two years. Please explain why the last time this report was released was in 2000? As you also know, the information available on the internet (from the National Assessment Database you cited in your testimony) is not as complete as the published version and does not contain the aggregated information found in Part I of the published report. When will the next published report be released?

Answer: EPA agrees that the National Water Quality Inventory is critical to understanding the state of the nation's water bodies. As you know, EPA has been publishing this report for many years, and the information that it has provided has been a critical informational tool in helping EPA and the public understand water quality status and trends and in indicating future program needs. Over time, we have worked to improve the report by providing more specific information in a format that can be easily accessed online by the public.

Each Report is based on electronic assessment information submitted by states that must be migrated into a national database, geo-referenced and then provided back to the states for review and approval to ensure accuracy before the agency can tally the state findings into a national report. We anticipate being able to streamline this process in the future as more and more states adopt a consistent electronic format that allows expeditious processing into EPA's assessment database.

We are pleased to inform this Committee that on March 23, 2007, OMB approved the 2002 National Water Quality Inventory Report. We are currently preparing the Report for printing and transmittal to Congress.

Cornell University

Department of Ecology and Evolutionary Biology

Robert W. Howarth, Ph.D.

Hearing on Non-point Source Pollution: The Impacts of Agriculture on Water Quality
2165 Rayburn House Office Building

April 19, 2007

Contact information:

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Professional qualifications and experience:

Howarth is a biogeochemist and aquatic ecosystem scientist. He is an expert on the global alteration of nutrient cycles, climatic influences on nutrient fluxes from large river basins, the sources of nutrients that reach estuaries and coastal oceans, and the consequences of coastal nutrient pollution. Howarth earned a BA in biology from Amherst College (1974) and a Ph.D. in biological oceanography jointly from MIT and the Woods Hole Oceanographic Institution (1979). He was on the staff of the Marine Biological Lab in Woods Hole, MA, from 1979-1985, and has been on the faculty of Cornell University since 1985. Since 1993, he has held an endowed professorship at Cornell: the David R. Atkinson Professor of Ecology & Environmental Biology. Since 2000, Howarth also has served as an Adjunct Senior Scientist at the Marine Biological Lab in Woods Hole.

Howarth is President Elect of the Estuarine Research Federation, the largest professional society in the world for scientists and managers who work in estuaries and coastal oceans; he will serve as President for 2 years beginning in the fall of 2007. Howarth also represents the State of New York on the Science and Technical Advisory Committee of the Chesapeake Bay Program. He is serving on the EPA Hypoxia Advisory Panel (a group charged with determining what new science has become available since the CENR "dead zone" assessment of 1999, and how this new science should influence policy). From 1998-2000, Howarth chaired the National Academy of Sciences' Committee on Causes and Consequences of Coastal Nutrient Pollution. He was the lead author on the nutrient pollution chapter of the 2005 Millennium Ecosystem Assessment. From 1994-2002, Howarth co-chaired the International SCOPE Nitrogen Project, and just this winter has been appointed chair of a new international SCOPE project on the environmental impacts associated with biofuels such as ethanol; both of these are efforts of the International Council of Science (ICSU), and both in part address nutrient pollution. Howarth runs an active research program on coastal nutrient pollution, with funding from NSF, NOAA, EPA, and the USDA. He directs the Agricultural Ecosystems Program at Cornell, a program working to identify sources of and solutions for nutrient pollution in the Chesapeake watershed. He is the Founding Editor of the journal *Biogeochemistry*, and served as Editor-in-Chief from 1983-2004. Last fall, Howarth gave an invited briefing to White House staff in the Office of Science and Technology Policy and Office of Management and Budget on coastal nutrient pollution.

Testimony of Robert W. Howarth:

Thank you for the opportunity to address you today, and I am delighted by the Committee's interest in agricultural impacts on water quality. My statement, which focuses on nutrient pollution in estuaries and other coastal marine waters of the United States, is based heavily on several national reports over the past 7 years, including the National Academy of Sciences (2000) Clean Coastal Waters report, the Pew Oceans Commission report (2003), and the report of the US Commission on Ocean Policy (2004). I will particularly focus on nitrogen pollution, since this is generally the larger problem in coastal waters, although phosphorus pollution is also of concern. My testimony represents my best professional judgment. It should not be considered an official position of Cornell University or any other institution or organization with which I am affiliated.

Human alteration of the nitrogen cycle is one of the most dramatic aspects of global change. During my lifetime, the rate at which human activity creates reactive nitrogen – the nitrogen that can lead to water pollution – has increased 7-fold. Synthetic fertilizer is the biggest component of this increase globally, and half of the synthetic nitrogen fertilizer that has ever been used on Earth has been applied in the last 15 years. Fertilizer use and agricultural sources are by far the largest problem contributing to the nitrogen flux down the Mississippi River to the "dead zone' in the Gulf of Mexico. Thus, it is appropriate that this hearing today focus on agricultural sources of pollution. However, agriculture is only part of the story of change in the nitrogen cycle. Municipal wastewater plants are significant sources of nitrogen pollution to some coastal ecosystems, such as Long Island Sound. More importantly in many areas, deposition of nitrogen from the atmosphere can also play a role in polluting coastal waters. This nitrogen, which also contributes to acid rain, comes from burning fossil fuel for transportation, electric power generation, and other uses, and also from volatilization from agricultural sources, particularly animal wastes. Overall in the United States, my research has suggested that 40% of the nitrogen pollution reaching coastal waters comes from atmospheric deposition, an amount almost equal to the direct runoff from agricultural fields (municipal wastewater contributes 16%). The most recent estimates for the input of nitrogen to Chesapeake Bay also indicate roughly equal contributions from agriculture and from atmospheric deposition, although there is tremendous uncertainty in such estimates.

The global alteration of the nitrogen cycle has been uneven, and some regions have seen much greater changes than others. Human activity has probably increased nitrogen fluxes down the Mississippi River by 5-fold or more. The change has been even greater in the northeastern United States, and coastal systems such as Chesapeake Bay have likely seen nitrogen increases of up to 10-fold due to human activity.

As a result of this increase in nutrient inputs over the past few decades, nutrients are now the largest pollution problem in the coastal marine waters of the United States, and one of the greatest threats to the ecological integrity of these ecosystems. Unfortunately, there is no national monitoring program for this problem, and so we have significant uncertainty over the full magnitude and consequences. Nonetheless, the best available evidence is that one third of the nation's coastal rivers and bays are moderately degraded from nutrient pollution; another one third are severely degraded. This finding by a team of NOAA-led scientists was endorsed by the Clean Coastal Waters report in 2000 from the National Academy of Sciences Committee on Causes and Management of Coastal Eutrophication. That Academy report also stressed the urgent need to develop a national monitoring system, but that has not yet happened.

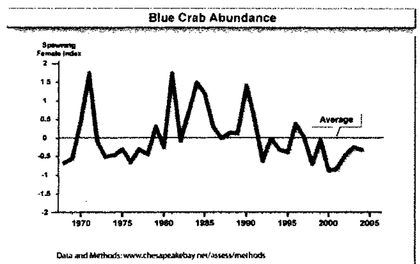
What are the effects of nutrient pollution? Nutrients are defined as substances that nourish, and so carry a positive connotation. But just as excessive consumption of food leads to obesity and a host of health issues, excess nutrients over-fertilize coastal waters and can lead to a variety of deleterious effects. These include:

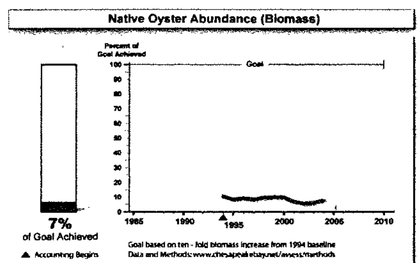
- Creation of "dead zones," or regions of the ocean where bottom waters are devoid of oxygen (anoxic) or have levels of oxygen so low as to not support the ability of most animals to live (hypoxic);
- Loss of biodiversity;
- Change in ecological structure and degradation of habitat quality, potentially leading to loss of fish and shellfish resources and damage to endangered species such as sea turtles even where "dead zones" do not develop;
- Increased cloudiness of water, and greater odors from water;
- Loss of seagrasses and other ecologically valuable submerged aquatic vegetation;
- Decline of coral reefs;
- Decreased production of commercially important fish and shellfish;
- Increased frequency, duration, and extent of harmful algal blooms, with risk to human health and great damage to marine mammals;
- Increased transmittance of some human diseases such as cholera.

Not all of the consequences of nutrient inputs are bad, and at low to moderate levels, increased nutrient inputs to marine ecosystems can lead to increased fish production and little deleterious effects. However, further inputs lead to degradation and loss of resources. The sensitivity of ecosystems to nutrient pollution – that is the amount of nutrient input necessary to cause serious ecological damage -- varies greatly among systems, for reasons we only partially understand. For example, Chesapeake Bay is far more sensitive than is New York Harbor, and San Francisco Bay has an intermediate sensitivity to nutrient pollution. Unfortunately, we do not yet know how to recognize the tipping point for any particular coastal ecosystem, where further nutrient inputs lead to serious ecological and economic damage, until we reach that point in that particular ecosystem. We also do not know how reversible damage is, once it occurs, although the best available evidence suggests that recovery may be difficult once we push an ecosystem beyond the tipping point. Given our current level of uncertainty, good management calls for caution to avoid even approaching these ecosystem tipping points.

Determining the full impact of nutrient pollution on fish and shellfish resources and on economic value has proven difficult, even for highly impacted ecosystems such as Chesapeake Bay.

Chesapeake Bay is the largest estuary or semi-enclosed bay in the United States, and also one of the most productive. Economists struggle to put value on ecosystems such as Chesapeake Bay, including the value of "clean water" and a healthy environment as well as the direct and indirect values of commercial and sport fishing. According to Rebecca Hanmer, the director of the Chesapeake Bay Program, the last attempt at a comprehensive economic analysis of Chesapeake Bay was made almost 20 years ago and put the value at $678 billion (1986 dollars). How has nutrient pollution affected the Bay's resources and value? As the figures below from the web site of the Chesapeake Bay Program illustrate, blue crabs have been in decline for at least the last 15 years, and the native oyster is in serious trouble with populations only a tiny fraction of what they once were. In the past, these were the most valuable harvests from Chesapeake Bay.



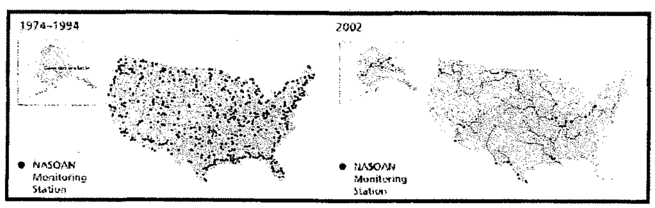


These declines undoubtedly are due in part to nutrient pollution, but other factors such as over-fishing and shellfish diseases have also played a role. Increasingly, climate change may also contribute to degradation of resources in ecosystems such as Chesapeake Bay. Teasing apart the relative contribution of these factors to ecological decline is not an easy task, and has not been done successfully in Chesapeake Bay. A growing number of scientists believe that rather than trying to isolate the causes of decline, we should be examining how the various causes interact in ways that may aggravate one another. For example, decline of oyster populations from over-fishing probably aggravates the problems of nutrient pollution, leading to further decline of oysters. And stress from nutrient pollution may well make oysters more susceptible to diseases.

What can we say about the fishery and economic consequences of the "dead zone" in the Northern Gulf of Mexico off the mouth of the Mississippi River? I know of no attempt at a full economic valuation of this region, but the direct value of the commercial harvest is huge. According to the most recent data from NOAA, the direct landing value of the commercial fish harvest in the Gulf of Mexico is approximately $670 million per year, with more than half of this due to shrimp harvests. In Louisiana alone the shrimp landings in 2004 were worth $140 million. The multiplier effect through the economy greatly increases these values. Further, the Gulf has a very valuable recreational fishery. In 2004, almost 5 million person-days of recreational fishing occurred in the coastal waters of Louisiana. The evidence for damage to these resources from nutrient pollution is not strong, although fishing on brown shrimp appears to have been adversely affected. A non specialist may conclude that lack of strong evidence for adverse affects indicates a clean bill of health for the Gulf, but this is far from the case. Confounding factors in the analysis include the lack of adequate monitoring, the inherent natural variation in fish and shellfish populations over time and space, and other stresses such as climate change and over-fishing that can lead to population declines. A further complication is that "dead zones" may actually make it easier to commercially fish for a while, as fish and mobile shellfish congregate at the edges of the oxygen-depleted waters and become easier targets for fishing vessels; this practice is not sustainable, and the increased vulnerability of fish and shellfish populations from the targeted fishing may further aggravate an eventual population decline. What we definitely can conclude is that a large area in the Northern Gulf of Mexico – over 20,000 km^2 in most recent summers – is severely impacted from nutrient pollution from the Mississippi River. The effects include oxygen depletions, excessive algal growths, and loss of bottom-dwelling animal populations in this region. If the area has not yet experienced large fishery losses as a result, we have every reason to believe we are moving towards that tipping point where this could occur. The question is, how close are we to that point? We lack the science base to answer this question. Clearly the conservative approach would be to follow the recommendations of the 1999 CENR Assessment and move towards significantly lower nutrient fluxes down the Mississippi River.

Some general recommendations on critical research and monitoring needs:

- As recommended by the 2000 Clean Coastal Waters report of the National Academy of Sciences, the nation should develop a nationally consistent approach to monitoring the consequences of nutrient pollution in coastal marine ecosystems. No such system exists, which greatly limits our ability to understand the extent, trends, or likelihood of ecological damage, including damage to commercially valuable resources. Good management requires the support of a strong monitoring program to determine if policies and practices are actually working as intended.
- National monitoring programs on nutrient fluxes in surface waters have been curtailed dramatically over the past decade, as illustrated in the figure below from the US Commission on Ocean Policy (2004) for one key USGS program. These programs must be rebuilt, strengthened, and extended into tidal waters if we are to understand whether or not the nation is making progress in reducing nutrient pollution in coastal waters.



- •• National monitoring programs for sources of nutrient pollution in the landscape have also been greatly curtailed over the past decade. Key programs measuring trends in atmospheric deposition such as the National Atmospheric Deposition Program and CASTNet have seen their funding cut consistently, and are now faced with further drastic cutbacks. These programs too should be rebuilt and expanded, if we are to better understand the relative contribution of various sources such as atmospheric deposition and agriculture to the nation's water quality problems.
- •• We have a sufficient knowledge base to move forward as a nation more aggressively in solving our water pollution problems. However, improved understanding through focused research can lead to better targeting of problems and more cost-effective solutions. Building on the National Academy of Sciences 2000 Clean Coastal Waters report, an interagency research program towards this end was designed in 2003 by NOAA, EPA, USGS, NSF, and USDA with significant engagement of the academic community (Howarth, R. W., R. Marino, and D. Scavia. 2003. Priority Topics for Nutrient Pollution in Coastal Waters: An Integrated National Research Program for the United States. National Ocean Service, NOAA, Silver Spring, MD). The program was endorsed by many scientific societies, which together had 230,000 members. The plan should be fully implemented.

A critical issue cross cutting all monitoring is the need for sustained effort over long periods of time. The variability of process and fluxes in nature is great from year-to-year, and only by evaluating data collected over periods of many years can we adequately detect trends – either positive or negative – in nutrient fluxes and in the consequences of water pollution. The need for continued high-quality monitoring becomes even greater as we move into the future, since long-term trend data are <u>essential</u> to evaluate how climate change is interacting with other stresses to affect water quality and ecological health.

Finally, I feel compelled to mention the current national expansion of producing ethanol from corn. Much of the problem with agriculture as a source of nutrient pollution comes from growing corn, and while this pollution can be lessened through management practices such as planting winter cover crops, corn is essentially a "leaky" crop when it comes to nitrogen. Thus, an increase in acreage growing corn to try to meet the needs of ethanol plants is of concern. Further, the brewers grain waste from ethanol plants can be used as an animal feed, and due to the economics of transporting this waste, ethanol plants can serve as magnets for new confined animal feedlot operations. These operations can also create significant water quality problems. All of the water-quality scientists I know across the country are greatly disturbed by the rush for this corn-ethanol expansion. Producing more ethanol from corn needs much more analysis and careful consideration of the full range of environmental and economic impacts before the country proceeds further down this potentially dangerous path.

Cornell University

Department of Ecology and Evolutionary Biology

May 8, 2007

The Honorable Eddie Bernice Johnson
Chairwoman, Subcommittee on Water Resources
and Environment
Committee on Transportation and Infrastructure
U. S. House of Representatives
Washington, DC 20515

Dear Madam Chairwoman:

Thank you for your letter of April 30 requesting written responses to additional questions for the record to augment my testimony before your subcommittee on April 19. Below, I paraphrase your questions and provide brief answers.

Question 1: *In my testimony I stated that evidence is not as complete as we might want. Given this, why do I recommend that we "move forward as a nation more aggressively in solving our water pollution problems?"*

I will elaborate further below on issues related to monitoring (in response to your third question). Briefly, though, the nation has no nationally consistent monitoring system for evaluating the consequences of nutrient pollution in our coastal waters. As a result, we cannot readily track trends of either improvement or deterioration in water quality, and it is difficult to fully assess the damage nationally or to rigorously compare damage across different regions and states.

Nonetheless, there is abundant evidence that nutrient pollution has caused widespread damage to the coastal waters of the United States. In an extensive analysis of the nation's major coastal rivers and bays (based in large part on local expert opinion), a 1999 report from NOAA (the "Bricker" report) concluded that one third of these ecosystems are severely degraded and another one third moderately degraded from nutrients. In our 2000 report from the National Academy of Sciences' Committee on Causes and Management of Coastal Eutrophication (a committee I chaired), we reviewed and endorsed this assessment by NOAA and stated further that nutrients are now the largest pollution problem in the coastal waters of the United States. See National Research Council, 2000, Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution, National Academies Press. Both the Pew Oceans Commission

(2003) and the US Commission on Ocean Policy (2004) also endorsed this view and argued for moving ahead aggressively to reduce nutrient pollution, particularly from non-point sources.

Question 2: *How do I recommend we move forward? What does the federal government need to do to this end?*

The Clean Coastal Waters (2000) report from the National Academy of Sciences has extensive chapters on how to proceed, including chapters on the role of monitoring and modeling, on setting water quality goals, and on source reduction and control. The Pew Oceans Commission (2003) report also addressed how the nation could best move forward in addressing non-point source nutrient pollution. Based on these reports and background documents behind the reports, I summarized an approach that the United States could follow -- with an emphasis on what the federal government could do – and presented this at the 3rd International Nitrogen Symposium in Nanjing, China. This was published as: *Howarth, R. W. 2005. The development of policy approaches for reducing nitrogen pollution to coastal waters of the USA. Science in China, Ser. C Life Sciences 48 (special issue): 791-806.*

The abstract for this paper summarizes the approach: "Two-thirds of the coastal rivers and bays in the United States are degraded from nutrient pollution, and nitrogen inputs to these waters continue to increase. The nitrogen comes from a variety of sources, including runoff from agricultural fields, concentrated animal feeding operations, atmospheric deposition from fossil fuel combustion, and sewage and septic wastes. Technical solutions for nitrogen pollution exist at reasonable cost. That most of these solutions have not yet been implemented to any significant extent across the United States suggests that new policy approaches are necessary. The best solution may involve a combination of voluntary and mandatory approaches, applying different approaches to different sources of nitrogen pollution. A watershed-based approach that relies heavily on voluntary mechanisms (such as crop-yield insurance to reduce over-fertilization) is likely to be the most effective for some sources of nitrogen (such as runoff from agricultural fields), while a uniform national regulatory approach may be better for others (such as NOx emissions from fossil fuel combustion). Implementation of management strategies should be carefully coupled to monitoring programs to assess the effectiveness of these strategies. While both nitrogen and phosphorus are important to control, the focus should be on nitrogen management, in part because nitrogen is more generally the causal agent of coastal eutrophication. Also, while nitrogen-control practices tend to also reduce phosphorus pollution, phosphorus-control practices often have little effect on nitrogen. Although current scientific and technical knowledge is sufficient to begin to make substantial progress toward solving coastal nitrogen pollution, progress will be made more quickly and more cost effectively with increased investment in appropriate scientific research."

The nation could make rapid progress towards reducing nutrient pollution from agricultural sources by modifying the Farm Bill, which is due to be renewed in 2007. I urge that payments to farmers be tied to participation in programs for reducing nutrient pollution. The new Farm Bill could require approaches such as planting winter cover crops, reducing fertilizer use, and substituting perennial grass crops for row crops on those lands most sensitive to nutrient losses.

Rapid progress could also be made on reducing nitrogen pollution from fossil fuel emissions by more tightly regulating power plants grand-fathered under the Clean Air Act and by tightening up on NOx emission standards for SUVs and trucks. NOx is the only pollutant regulated under the Clean Air Act that has not seen substantial reductions in emissions over the past few decades. Tightening up on NOx emissions would also have benefits in reducing ground-level ozone pollution and acid rain.

The nation could also do much more in reducing nutrient pollution from municipal wastewater treatment plants. Currently, most plants are held only to a standard of "secondary treatment," which reduces biological oxygen demand but has little effect on discharge of nutrients. I urge that the national standard instead be based on reducing nutrient discharges. The technology for meeting such a standard has long been available at reasonable cost.

Question 3: *In my testimony, I spoke of the need to improve the nation's water quality monitoring systems. Can I expand on this? What are the implications of the current state of monitoring systems?*

Three types of monitoring efforts are critical to better understanding and managing the problem of coastal water pollution from non-point sources of nutrients: a) monitoring effects in coastal rivers and bays; b) monitoring the fluxes of nutrients in the nations streams and rivers that flow to the coast; and c) monitoring the deposition of nitrogen from the atmosphere to the landscape.

Coastal Monitoring: Currently, there is no nationally consistent effort for monitoring the consequences of nutrient pollution in coastal rivers and bays. Substantial monitoring effort occurs, but this largely is conducted by local or state agencies or their contractors. Different methods and approaches are used at different sites, making comparisons across sites difficult at best. This greatly limits our ability to understand the extent, trends, or likelihood of ecological damage, including damage to commercially valuable resources. A key recommendation of the Clean Coastal Waters (2000) report from the National Academy of Sciences was the establishment of a nationally consistent approach to coastal monitoring. As noted in that report, the extra cost of coordinating monitoring in a consistent way would be small, and the benefits to the nation great. The improved understanding of trends and extent of damage would lead to more cost effective targeting of efforts to reduce nutrient pollution.

River and Stream Monitoring: From the 1970s through the early 1990s, the US Geological Survey ran a series of national monitoring programs on surface water quality in the nations streams and rivers. Nutrients were among the parameters measured in many of these programs. The resulting knowledge base is indispensable in determining the sources of nutrient pollution from non-point sources, in evaluating trends in nutrient pollution across the country, and in estimating how climate variability and climate change affect nutrient pollution. Unfortunately, these monitoring programs of the US Geological Survey have been slashed over the past decade. Consequently, we are now crippled in our efforts to evaluate whether nutrient pollution is growing worse or getting better over time. Are management strategies for reducing nutrient pollution working? Too often, we simply cannot tell because of this inadequate monitoring. The US Commission on Ocean Policy (2004) highlighted the drastic reduction in monitoring by the US Geological Survey as an issue of national concern. The earlier programs should be rebuilt and continued into the future as a critical component of managing the nation's surface water quality.

Monitoring Atmospheric Deposition: Nitrogen pollution in the atmosphere is a major source of nitrogen pollution to surface waters in many parts of the United States. When the nitrogen is deposited onto the landscape, a portion is exported downstream where it contributes to coastal degradation. The nitrogen in the atmosphere is also a major component of acid rain.
This nitrogen pollution in the air originates both from agricultural sources and from burning fossil fuels for transportation, electricity generation, and other uses. Some of the nitrogen from the atmosphere is deposited as "wet deposition," or nitrogen in rain and snow. Wet deposition is monitored nationally through the National Atmospheric Deposition Program (NADP), and individual monitoring stations are funded by a variety of agencies. Monitoring by the NADP has been steadily eroded over the past many years, and while the Program is intact, it is weakened. The budget proposal from the White House for fy2008 called for further massive cuts. The data collected by the NADP are essential to tracking progress in reducing acid rain and are critical to understanding trends in the sources of coastal nutrient pollution.

In addition to "wet deposition," nitrogen pollution from the atmosphere is deposited onto the landscape in "dry deposition." This deposition of nitrogen particles and reactive nitrogen gases also contributes to downstream nitrogen pollution in coastal waters. Monitoring efforts for dry deposition have lagged far behind those for wet deposition, and this leads to great uncertainty in determining the importance of this deposition. Estimates for the input of nitrogen to Chesapeake Bay from atmospheric deposition range from one quarter to one half of the total nitrogen inputs, and most of this uncertainty stems directly from our poor understanding of the magnitude of dry deposition in the Chesapeake watershed. Two national programs (CASTNet and AirMon-Dry) have some limited monitoring of dry deposition, but only some components of deposition are measured. These limited programs also face huge cuts. An improved and expanded monitoring program for dry deposition is essential if we are to better understand the magnitude of this deposition. Without this improved understanding, our knowledge base for targeting nitrogen reductions in regions such as the Chesapeake Bay watersheds is extremely limited. The expanded monitoring should include more sites in space; currently, there are only 5 monitoring stations in the entire 6-state region of the Chesapeake Bay watersheds, and 3 of these are on the DelMarVa peninsula. The expanded monitoring program also should measure all of the nitrogen forms of interest: to date, the major gases that are deposited in urban areas and along transportation corridors have never been measured in the deposition monitoring networks.

I hope my answers are clear and help the Subcommittee in your important task. Again, thank you for the opportunity to elaborate on my testimony before your Subcommittee.

Sincerely,

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The development of policy approaches for reducing nitrogen pollution to coastal waters of the USA

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Abstract Two-thirds of the coastal rivers and bays in the United States are degraded from nutrient pollution, and nitrogen inputs these waters continue to increase. The nitrogen comes from a variety of sources, including runoff from agricultural fields, concentrated animal feeding operations, atmospheric deposition from fossil fuel combustion, and sewage and septic wastes. Technical solutions for nitrogen pollution exist at reasonable cost. That most of these solutions have not yet been implemented to any significant extent across the United States suggests that new policy approaches are necessary. The best solution may involve a combination of voluntary and mandatory approaches, applying different approaches to different sources of nitrogen pollution. A watershed-based approach that relies heavily on voluntary mechanisms (such as crop-yield insurance to reduce over-fertilization) is likely to be the most effective for some sources of nitrogen (such as runoff from agricultural fields), while a uniform national regulatory approach may be better for others (such as NO_x emissions from fossil fuel combustion). Implementation of management strategies should be carefully coupled to monitoring programs to assess the effectiveness of these strategies. While both nitrogen and phosphorus are important to control, the focus should be on nitrogen management, in part because nitrogen is more generally the causal agent of coastal eutrophication. Also, while nitrogen-control practices tend to also reduce phosphorus pollution, phosphorus-control practices often have little effect on nitrogen. Although current scientific and technical knowledge is sufficient to begin to make substantial progress toward solving coastal nitrogen pollution, progress will be made more quickly and more cost effectively with increased investment in appropriate scientific research.

Keywords: development of policy approaches, reducing nitrogen pollution,coastal water of the USA.

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Two-thirds of the coastal rivers and bays in the United States are moderately to severely degraded from nutrient pollution[1,2], and nutrients are now considered the largest pollution problem in the coastal zone of the country[3−5]. Recognition of this issue — and particularly the critical role played by nitrogen — has been growing steadily over time[3,6]. However, despite some early important studies[7], there was little public awareness of the problem of nitrogen pollution at the time the Clean Water Act was passed in 1972[8]. While the United States has made great progress in reducing pollution from toxic substances and phosphorus over the past 30 years, nitrogen pollution in coastal ecosystems has actually grown worse[3,9,10].

The inputs of nitrogen to coastal waters in the United States grew rapidly during the 1960s and 1970s, were relatively stable during the 1980s, and grew again during the 1990s (Fig. 1). Major drivers behind this increase are population growth, an intensification of agriculture, and increased emissions of oxidized nitrogen pollutants to the atmosphere (NO_x) from fossil fuel combustion. The patterns of both inorganic nitrogen fertilizer use and of NO_x emissions over the past 40 years closely parallel the estimated trend in riverine flux of nitrogen to the coast[10]. Historical data for nitrate in major rivers such as the Mississippi River, the Susquehanna River (the major tributary of Chesapeake Bay), and the Connecticut River (the major tributary input to Long Island Sound) show trends to those illustrated for total nitrogen in the entire United States[11−14]. If current trends in population growth, agricultural practices, grain exports, diet, and NO_x emissions continue, the flux of nitrogen to the coast is likely to continue to grow at the same rate as over the past decade[10]. By 2030, nitrogen inputs to coastal waters in the United States may be 30% more than at present and more than twice what they were in 1960 (Fig. 1).

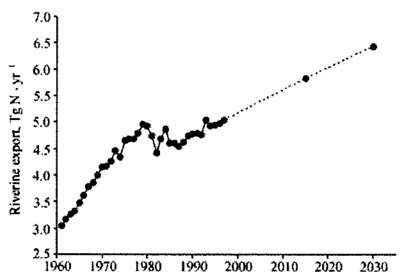

Fig 1 Estimated flux of nitrogen to coastal waters from the entire United States in rivers and from sewage treatment plants in Tg N·yr^{-1}. Future projections assume continued growth in export of cereal grains and population growth as predicted by the FAO and the US Census Bureau, respectively, and no major changes in diet, agricultural practices, or regulation of NO_x emissions Reprinted from ref. [11].

In the United States, to date there has been insufficient progress in reversing the problem of coastal nitrogen pollution[3]. Nitrogen-removal technology for sewage treatment has led to improvement in water quality in Tampa Bay, and to a lesser extent, in Chesapeake Bay. However, for both of these systems, nonpoint sources are the dominant input, as is true for the coastal waters of the United States as a whole[3,15,16]. Reducing nonpoint sources of nitrogen anywhere in the country has proven problematic[3,5]. In the 1980s, Maryland, Virginia, and Pennsylvania together with the US EPA agreed to reduce the inputs of nitrogen from controllable sources to the Chesapeake by 40%[17]. Despite significant efforts in these states, however, the target was not met and nitrogen inputs remain high[3,18,19]. That the nitrogen reduction goal was not met was probably in part because management strategies for nonpoint sources were less effective than had been assumed[20]. Management decisions for nitrogen reductions have been based on the Chesapeake Bay Model[19], a highly complex and largely unverified model[3]. There has been insufficient monitoring to determine the effectiveness of the various nutrient reduction approaches implemented. A generally wetter climate with greater freshwater inputs into the Bay during many years in the 1990s compared to earlier decades may also have partially counteracted management strategies to reduce nitrogen inputs[20]. In 1990, the US Congress for the first time explicitly recognized non-point-source nitrogen pollution of coastal waters as an issue, in the Coastal Zone Act Reauthorization Amendments[8]. However, this involved mostly a planning exercise, with states mandated to submit plans for nitrogen reduction to EPA and NOAA by 1995. Implementation of the first phase of reduction under the 1990 Amendments was not scheduled until 2004[8], and this implementation has generally not yet begun.

Worldwide, the most successful reversal of nitrogen pollution from nonpoint sources has been inadvertent. The collapse of the former Soviet Union led to economic collapse of agriculture in Eastern Europe, and fertilizer use plummeted. As a result, nitrogen loading to the Black Sea was greatly reduced, and the Sea began to recover from the eutrophication that had grown steadily worse from 1960 until 1990[21].

Many technical solutions for reducing nitrogen pollution exist, but few of these have been implemented in any systematic way. In part, this is because nutrient management in the United States has tended to concentrate on phosphorus control rather than nitrogen. Phosphorus is the bigger pollution problem in freshwater ecosystems, and the management community has been slow to recognize that nitrogen is the larger problem in coastal marine ecosystems and that different management practices may be required[3,4]. Nitrogen is far more mobile in the environment than is phosphorus, and flows readily both through groundwater and the atmosphere. This difference in biogeochemical behavior calls for different management practices. Unfortunately, water-quality managers and extension agents often assume that management practices that reduce phosphorus pollution are equally effective for nitrogen[3]. This is often not the case (Table 1), and more attention needs to be directed towards the management practices that work best for nitrogen. In general, management practices for reducing nitrogen pollution are also effective for phosphorus control, but the converse is not true (Table 1).

Table 1 Relative effectiveness of some representative "best management practices" (BMPs) for reducing nitrogen and phosphorus pollution of surface and groundaters

	Effect on reducing phosphorus	Effect on reducing nitrogen
Agricultural systems		
No-till agriculture	very effective	not effective
Winter cover crops	effective	very effective
Perennial cropping systems	effective	very effective
Buffer strips along streams	effective	Effective only if groundwater flows are intercepted by rooting zone
Wastewater treatment		
Conventional septic Systems	very effective	not effective
2° treatment plants	little effect	little effect
Chemical precipitation advanced wastewater treatment plants	very effective	little effect
Denitrification advanced wastewater plants	effective	very effective

Management of nitrogen pollution in coastal waters also faces many policy challenges. Coastal ecosystems vary greatly in their sensitivity to nutrient pollution, because of differences in the sizes of the watershed, different physical mixing regimes, and differences in ecological structure[3]. Thus, the same level of nitrogen inputs will cause much greater harm in some locations than in others. For instance, San Francisco Bay and Delaware Bay are far less sensitive to the problem than are Chesapeake Bay and Long Island Sound[1,3]. Further, there is regional and local variation in the relative importance of nitrogen sources to coastal waters. Agricultural sources dominate the input to the Mississippi River and are the primary cause of the hypoxic zone in the Gulf of Mexico[3,12,22,23]. Atmospheric deposition of nitrogen from fossil fuel combustion is the major input to several marine ecosystems in the northeastern United States, largely as runoff after deposition onto the terrestrial landscape[11,15,24]. Wastewater from sewage is the largest single input to the Hudson River estuary and to Long Island Sound, although atmospheric deposition is also significant in these systems[3]. And on Cape Cod, MA, leakage from septic systems is the largest nitrogen input to many coastal lagoons[25]. For many coastal rivers and bays, there is substantial uncertainty over the relative importance of various inputs of nitrogen because a variety of different models are used to estimate inputs, many of which are highly uncertain and largely unverified[3].

In this paper, I briefly summarize some of the technical solutions that exist for nitrogen control and then outline policy approaches for implementing these technical solutions. The paper relies heavily on the analysis of the National Research Council's Committee on Causes and Management of Coastal Eutrophication[3] but also uses more recent information, when available. I focus on nitrogen rather than phosphorus, both because nitrogen is the larger pollution problem in most coastal ecosystems[3], and because nitrogen has traditionally received less attention from water quality managers (Howarth and Marino, submitted). However, phosphorus pollution can also be a problem in coastal systems, and phosphorus pollution in freshwater lakes and rivers can influence the delivery of nitrogen to the coast[26]. Thus, the best approach for managing water quality in the United States is for a coordinated effort to manage both nitrogen and phosphorus[3].

1 Overview of technical solutions

1.1 Leaching and runoff from agricultural fields

Fertilizer use in the United States grew rapidly from 1961 until 1980, declined somewhat after1980, and has been rising steadily since 1985[3,10]. Since 1961, total new nitrogen inputs to agricultural fields in the United States (including nitrogen fixation by leguminous crops) have doubled, from 8 million metric tons per year in 1961 to 17 million metric tons per year in 1997[10].

On average for the United States, about 20% of the new nitrogen inputs to agricultural fields leach to surface or ground waters[10,15,27]. The variability among fields is great, though, ranging from a low for leaching loss of 3% for grasslands with clay-loam soils to 80% for some row-crop agricultural fields on sandy soils[15]. Climate is also important, and nitrogen losses are greater in areas of high rainfall and in wet years[28]. These differences indicate that great strides in reducing nitrogen pollution to aquatic ecosystems can be obtained by targeting the particularly leaky types of agricultural fields.

Management practices for reducing nitrogen loss to downstream ecosystems are reviewed in two reports from the National Research Council[3,27] and in part of the report on the assessment of hypoxia in the Gulf of Mexico[23,29]. It is important to emphasize that best management practices for reducing nitrogen pollution may not be the same as those for reducing phosphorus pollution, due to the much higher mobility of nitrogen in ground waters[3]. For instance, no-till agriculture reduces erosion and therefore phosphorus losses from fields unless phosphorus inputs are very high, but has little or no effect on nitrate loss[28]. Particularly promising approaches for reducing nitrogen leaching from agricultural fields include:

(i) Growing perennial crops such as alfalfa or grasses rather than annuals such as corn and soybeans; the perennials maintain nitrogen in the rooting zone and greatly reduce losses to groundwater; for example, fields planted to perennial alfalfa lost 30- to 50-fold less nitrate than did fields planted in corn and soybeans in Minnesota and Iowa[28,30].

(ii) Planting winter cover crops; these greatly reduce the leaching of nitrate into groundwater during winter and spring, when most leaching occurs in many climates; an experimental study in Maryland showed the long term effect of winter cover-crop plantings was a 3-fold reduction in nitrate loss[31].

(iii) Applying nitrogen fertilizer as near as possible to the time of crop need; application of fertilizer in the fall is a common practice in many areas, even though significant losses will occur during the winter, since the cost of the fertilizer is relatively low and the farmer has time for application in the fall; much of the fall-applied fertilized is leached to ground waters before crop growth begins in the spring; in an experimental study in Minnesota, fall application of fertilizer increased nitrogen leaching by 30%—40%[28].

There is also great opportunity to simply use less nitrogen fertilizer (Fig. 2). Up to a point, adding more fertilizer increases crop yield, but after some level of input, the crop's need for nitrogen is saturated and further fertilization has no effect on production[27]. Extension agents for land-grant universities in most states provide recommendations to farmers on appropriate rates of fertilizer application for maximum economic return on profit from crop production for the conditions found in that state. In practice, these recommendations are on average exceeded by farmers to a significant extent. The reasons for this are many, and include an underestimation of nitrogen available to the crops from other sources such as residues from previous crops, overly optimistic yield expectations that do not fully consider climate variation, the relatively low cost of the inorganic nitrogen fertilizer, and the tendency of some farmers to apply extra fertilizer as "insurance" to make sure they maximize yield[10]. As a result, 20%—30% more nitrogen probably was applied on average to fields in the upper mid-west of the US (the dominant source of nitrogen to the Mississippi River) during the 1990s than would have been indicated for optimum economic return.

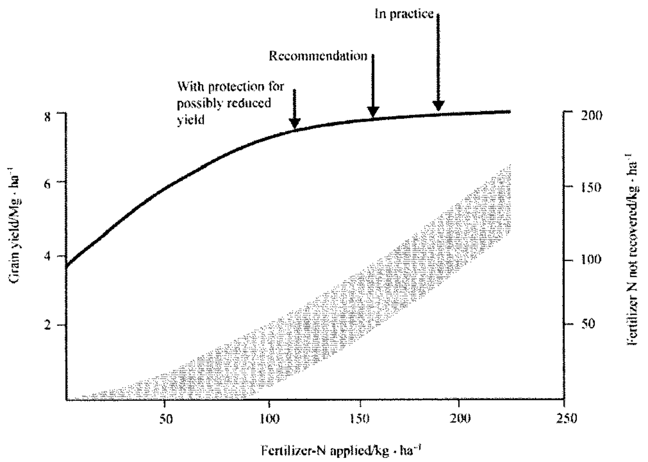

Fig. 2. Crop production and leaching of nitrogen to surface and ground waters as a function of increased inputs to agricultural fields[32]. Shown are typical values for row-crop agriculture in a corn-soybean rotation in the upper mid-western US as of the mid 1990s. Farmers typically fertilize at rates above those that would optimize their economic return, and significant water-quality improvements could be obtained if extension-agent recommendations were followed. Even further improvements in water quality could be obtained by further reducing fertilizer use, and accepting the slight decrease in yield and economic return. Farmers could be compensated for following such a policy.

Nitrogen not taken up by the crop is available for leaching to surface and ground waters, and this increases exponentially as nitrogen inputs are increased beyond the point at which crop production is saturated. Thus, reducing fertilizer use by 20%—30% would substantially reduce the downstream pollution from nitrogen, and probably by far more than 20%—30%[10,14]. Such a reduction would save farmers some money, as they would by buying less fertilizer yet achieving essentially the same yield. There would be a perception of increased risk by the farmers, but insuring crop production through other means could offset this perception (see Subsection 1.2, below). Note that even further reduction in fertilizer use could also be made with only modest loss of production (Fig. 2). This would cost the farmers some income, but would bring large environmental gains, and farmers could be subsidized for their lost income.

Agricultural lands in much of the United States are artificially drained with tile drains. This drainage is necessary for the growth of most row crops, but it also facilitates the leakage of nitrogen from the fields. It may be possible to raise the level of drains in fields, which would still provide adequate drainage for crop production but would lessen nitrogen export from the fields. It is also possible to build artificial wetlands that intercept the tile drainage and provide a nitrogen sink, if the landscape has enough topography that this does not cause the tiled fields to become flooded. Such wetlands can substantially reduce the flux of nitrate to surface waters[32]. Note that buffer strips, while effective for trapping phosphorus (which is largely particle bound), are not effective at trapping nitrogen from drainage systems unless the drained water is fully intercepted by the buffer. Artificial wetlands are further discussed below as a general approach for reducing the flux of nitrogen from the landscape.

1.2 Animal production and concentrated animal feeding operations (CAFOs)

Animal wastes are a major contributor of nitrogen to coastal waters in the United States. Over half of the crop production of the country is fed to animals, mostly in feedlots; most of these crops are transported long distances before being fed to the animals, making it expensive to transport the animal wastes back to the site of the original crop production[3,10]. The production of animal protein continues to increase, in part driven by a steady and continuing increase in the per capita meat consumption of Americans[10]. The trend for production to occur in more concentrated facilities also continues. During the 1990s, production of hogs, dairy cows, poultry and beef cattle all rose while the number of operations in each of these segments declined[3]. That is, more protein was produced by fewer but larger operations.

Wastes from concentrated animal feeding operations (CAFOs) in the United States tend to be handled in one of two ways: they are spread onto agricultural fields, or they are held in lagoons. Some operations are also beginning to compost animal wastes[3]. Animal manure can of course be considered a fertilizer, and the recycling of this organic waste back to agricultural fields can be seen as desirable. However, in practice it is difficult to apply manures at rates appropriate to crop needs, due to the uncertainty in time of nutrient release and the difficulty in uniformly distributing the manure[3]. Also, most manure in the United States is transported less than 10 miles, resulting in heavy over fertilization of fields near animal feeding operations, with concomitant pollution of groundwater and downstream aquatic ecosystems[3].

Lagoons are commonly used for animal wastes. The effectiveness of these as treatment systems for nutrient reduction has received little study, but it appears that there is significant leakage of nitrogen to groundwater, and considerable volatilization of nitrogen (as ammonia) to the atmosphere where it eventually contributes to the flux of nitrogen to coastal waters[3]. This ammonia also contributes to acid rain, to the production of fine particles in the atmosphere, and to loss of biotic diversity in forests and grasslands[33]. An estimated 40% of all the nitrogen in animal wastes in the United States, including those spread on fields as manure and those held in lagoons, is volatilized to the atmosphere[10].

Animal wastes can be composted, which makes them easier to use as effective fertilizers. However, much ammonia is volatilized to the atmosphere during the composting, which then contributes significant pollution as described above and also lowers the value of the compost as fertilizer[3]. The National Research Council's Committee on Causes and Management of Coastal Eutrophication concluded that there is an urgent need for research on more effective, environmentally benign approaches for treating animal wastes[3].

Some progress in developing more environmentally benign approaches for animal wastes is being made, as indicated by the proceedings of a recent symposium sponsored by the International Water Association in Seoul, Korea, on approaches for dealing with nitrogen-rich wastes, including animal wastes. The 135 papers show a wide range of creative and potentially useful approaches, including more effective agricultural re-use and production of biogas for fuel[34]. In the European Union, some dairy oprations now make more money from biogas production from cow wastes than from selling milk, when the biogas subsidies are considered(Holm Tiessen, pers. comm.).

1.3 Fossil Fuel Sources

The emission of oxidized forms of nitrogen (NO_x) to the atmosphere from fossil fuel combustion contributes 6.9 million metric tons of nitrogen per year to the environment in the United States every year, roughly 60% of the rate of nitrogen fertilizer use in the country[10]. Most of this is deposited onto the landscape in rain and as dry deposition, and NO_x are major contributors to acid rain as well as significant contributors to nutrient pollution in coastal waters. Of the nitrogen that is deposited onto forests, on average approximately 20% is exported to downstream aquatic ecosystems[3,16]. The atmospheric deposition of nitrogen from fossil fuel combustion is a major input to virtually all of the coastal rivers and bays along the eastern seaboard via export from their watersheds[3,16,24]. Also, a substantial amount of the nitrogen from fossil fuel sources in the United States (1.3 million metric tons in the late 1990s) may be deposited directly onto the surface waters of the North Atlantic Ocean[10].

Of the major pollutants regulated under the Clean Air Act, NO_x are the only ones not to have shown a significant decline since the Act was passed in 1970, although regulation may have stabilized the rate of emissions[3]. Emissions rose exponentially through the 1960s and 1970s, but have been relatively constant since 1980[35]. About half of the emissions came from mobile sources, including automobiles, buses, trucks, and off-road vehicles. Electric power generation produced 42%[35]. As of the late 1990s, the United States produced approximately one third of all the NO_x released from fossil fuel combustion globally.

Because NO_x emissions are central to the formation of ozone and smog in the lower atmosphere, and also contribute to acid rain, technical approaches for control have received substantial study[3,36]. The basic approaches are to either burn less fossil fuel, through encouraging less driving and more energy-efficient vehicles, or to remove the NO_x from exhaust, as with catalytic converters. Moomaw[37] noted that NO_x emissions from fossil fuel combustion could be reduced to near zero in the United States with currently available technology. Taking old, "grandfathered" power plants off line is a significant and relatively inexpensive step in this direction. Applying stricter emission standards to sports utility vehicles, trucks, and off-road vehicles is another significant step. Generation of electric power through fuel cells rather than traditional combustion would completely eliminate NO_x emissions from that source[37].

Regulatory efforts to reduce NO_x emissions have been driven largely by the ozone and smog problems[8]. That these emissions also contribute significantly to coastal nitrogen pollution provides a rationale for greater efforts at reduction. The coastal pollution issue also calls for year-round reductions in NO_x emissions; since ozone and smog are problems that occur mostly in warm weather, current regulatory requirements often focus on reduction of emissions in the summer only.

1.4 Urban and Suburban Sources

While non-point sources are the dominant inputs of nitrogen to most coastal waters of the United States, sewage and other urban sources are very significant in many coastal rivers and bays and are the largest inputs in some systems, including Long Island Sound, the Hudson River estuary, Boston Harbor, Raritan Bay, and south San Francisco Bay[3,9]. Human wastes are the primary urban source of nitrogen, but atmospheric deposition of nitrogen from fossil fuel combustion can also be substantial since most NO_x emissions are deposited quite close to the emission source, and the emissions are huge in urban areas[3,16,38]. In most older cities in the United States, sanitary wastes and storm waters are served by the same combined sewer system[9]. Consequently, some of the nitrogen entering sewage treatment plants actually originates from deposition of nitrogen from fossil fuel sources and from lawn fertilizer, which was washed off streets and lawns in rainstorms[3].

As of the 1990s, most sewage in the United States received secondary treatment, which is designed to lower the discharge of labile organic matter that contributes to "biological oxygen demand" (BOD), and rather little received further treatment for nutrient removal[3]. Secondary treatment on average is not effective at removing nitrogen, and the nitrogen content of the effluent from an average secondary sewage plant is substantial[9]. Further treatment of sewage for removal of nutrients will on average remove 85% of the nitrogen from secondary effluent, or 90% of the nitrogen of untreated sewage. The cost for this additional level of sewage treatment is approximately 25% more than for the cost of sewage treatment up to the secondary standard, including both capital and operating costs[9]. For a large urban city such as New York, this additional cost for nutrient removal (often called tertiary treatment, although not all tertiary treatment technologies are effective at reducing nitrogen) corresponds to a cost of between $30 and $60 per person connected to the sewer system per year.

The nitrogen inputs from storm sewers and combined sewer overflows (CSOs) are not well quantified for any major urban area, but they are probably less than the input from sewage effluent[3,9]. A rough estimate for the Hudson River estuary suggests that nitrogen inputs from CSOs and storm sewers in the New York metropolitan area are 10% of the sewage input. Nonetheless, it may make sense to treat CSO discharges as part of an aggressive effort to reduce nitrogen pollution in some urban areas. Also, CSOs are the major source of pathogens to some urban estuaries, such as the Hudson River[39]. Restoring urban estuaries for human-contact recreation will require treatment of CSOs to reduce pathogen loads. One approach for treating CSOs is to separate the storm sewers from the sanitary sewers. Another approach, generally less expensive, is to increase the water storage capacity of the combined sewers, so that overflows during storms become less common. Both CSOs and storm sewer effluents can be treated with a variety of technologies, including artificial wetlands[9].

Approximately 29% of the population of the United States is served by septic tanks rather than by sewers[9], and in some coastal areas, septic tanks are the primary source of nitrogen to coastal waters[25]. A well-designed and maintained septic tank is effective at containing pathogens and phosphorus, but because of the greater mobility of nitrogen in soils, they are generally not effective at removing nitrogen[3,40]. Over the past several years, many new designs for septic tanks have been developed to try to improve the retention of nitrogen. However, these are expensive, require a significant amount of routine maintenance, and have been disappointing in objective trials (unpublished studies by the Buzzards Bay National Estuary Program). Reducing nitrogen leakage from septic tanks in sensitive coastal areas may be best accomplished by replacing the septic systems with sewers and nutrient-removal sewage treatment, perhaps at a neighborhood scale.

1.5 Wetlands as nitrogen interceptors — Enhancing nitrogen sinks

The sections above discussed approaches for reducing sources of nitrogen to the environment. Another, often complementary strategy is to enhance sinks for nitrogen in the landscape. Wetlands, ponds, and riparian zones are particularly effective nitrogen traps, serving both to sediment out particulate nitrogen and to convert reactive biologically available nitrogen into harmless N_2 gas through the process of denitrification[3,15,32]. Small woodland streams are also extremely effective sinks, if they are not too disturbed[41].

As part of an overall nutrient reduction strategy for Chesapeake Bay, one goal of the Chesapeake Bay Program is to restore 100 km^2 of wetlands within the watershed over the next 10 years[20]. Mitsch and colleagues[32] estimate that the nitrogen load from the heavily polluted Illinois River basin, an important source of nitrogen to the Mississippi River, could be cut in half by converting 7% of the basin back to wetlands. Restoration of water flows through the wetlands of the Mississippi River delta could also play a significant role in reducing nitrogen fluxes onto the continental shelf, where they contribute to the Gulf's hypoxic zone[32].

2 Policy approaches for implementing technical solutions

2.1 Watershed-based vs. nationally uniform approaches

The National Research Council's Committee on Causes and Management of Coastal Eutrophication[3] called for a national strategy to reduce nitrogen pollution in coastal waters. Federal involvement seems appropriate because for many coastal ecosystems, the sources of nitrogen come from many states through large river systems and through large airsheds. For example, the watersheds for Long Island Sound, Chesapeake Bay, and the Mississippi River basin include area in 5, 6 and 27 states, respectively. Further, national agricultural and energy policies could be significant in reducing nitrogen pollution. However, the problem of nitrogen pollution manifests itself at the local to regional scale, so local and state governments also clearly have a role. Recognizing that coastal ecosystems vary in their sensitivity to nitrogen pollution and that the sources of nitrogen to particular water bodies vary, the Committee recommended a national goal of protecting ecosystems not yet damaged and of restoring those that have been damaged, rather than a national goal of nitrogen reduction per se[3]. The Committee called for a partnership of "federal, state, and local authorities……(working) with academia and industry to: (i) reduce the number of coastal water bodies demonstrating severe impacts of nutrient over-enrichment by at least 10 percent by 2010; (ii) further reduce the number of coastal water bodies demonstrating severe impacts of nutrient over-enrichment by at least 25 percent by 2020; and (iii) ensure that no coastal areas now ranked as "healthy" (showing no or low/infrequent nutrient-related symptoms) develop symptoms related to nutrient over-enrichment over the next 20 years."

Implicit in this approach is the belief that those coastal ecosystems that are most sensitive to nutrient pollution, that have nitrogen sources that can most effectively and economically be reduced, and/or that have the greatest ecological or societal value be restored first. The watershed (and associated airshed) is viewed as the appropriate scale for management. A benefit of this approach is that by targeting locations, limited technical and financial resources are most effectively used.

A watershed-specific approach requires estimates of what are allowable nitrogen loads to coastal rivers and bays. As a start, this could be based on the average responses of these ecosystems to increased inputs of nitrogen[3,6,9]. However, coastal marine ecosystems vary in their sensitivity to nutrient inputs, and so the best, most cost effective protection can be obtained only by considering this sensitivity and having higher allowable nitrogen load limits to ecosystems that are insensitive to the problem and lower allowable load limits for systems that are highly sensitive[3]. The National Research Council's Committee on Causes and Management of Coastal Eutrophication recommended that coastal rivers and bays be classified as to their sensitivity to nutrient pollution and that loading limits be established by this classification, and urged that a national priority be the development of an appropriate classification[3]. An alternative but more expensive option is to use site-specific models for each coastal river and bay[3]. Note that unlike many pollutants, concentrations of nitrogen are a poor predictor of the effects of nitrogen pollution in the coastal zone. A strong scientific consensus exists that nitrogen pollution should be managed on the basis of nitrogen input rates or loads[3]. Note that the Total Maximum Daily Load (TMDL) provision of the Clean Water Act (discussed further below) is one regulatory mechanism that uses allowable loads as a basis for management, but other regulatory or incentive-based systems for reducing nitrogen pollution could also be based on allowable nitrogen loads.

A disadvantage with this watershed-specific approach is that it is technically challenging. We currently lack the ability to classify coastal ecosystems as to their sensitivity to nutrient pollution except in broad outline[3]. We also lack detailed, reliable knowledge on the sources of nitrogen to most individual coastal ecosystems, although the general patterns at the regional or national scale are clear[3,16]. A step towards watershed-specific management would be the development of nitrogen criteria for coastal waters. In 2001, he US Environmental Protection Agency issued a manual for guidance for states to set nitrogen standards[42]. However, little progress has been made since then. While the nation can meaningfully begin a program of restoring individual coastal rivers and bays based on current knowledge, for the program to be most cost effective in the long run will demand aggressive research programs on the sensitivity of ecosystems to nutrient pollution and on sources of nutrients to individual ecosystems[3]. Such research is a priority of a recently developed federal interagency research plan for coastal nutrient pollution[43].

An alternative approach would be to reduce overall nitrogen fluxes to the coastal waters of the United States, say by 10% by 2010 and by 25% by 2020, without regard to the effects on individual coastal ecosystems. That is, a uniform national approach could be used rather than a watershed-specific approach. An advantage of the uniform national approach is that it requires less technical expertise and site-specific information. However, some of the reductions in nitrogen flow will have little if any positive environmental benefit, as some reductions will occur to coastal systems that are insensitive to the problem of nutrient pollution. Consequently, this approach is likely to be less cost effective. Paradoxically, it may also not be protective for the most sensitive coastal ecosystems[3].

2.2 Voluntary policies for reaching goals

Both voluntary and mandatory approaches have been used for nutrient management, and both should be considered as part of a national strategy for nitrogen pollution whether the issue is tackled on a watershed-specific or uniform national basis. Motivations for polluters to voluntarily join in a pollution abatement plan include a commitment to environmental stewardship, a perceived payoff in the marketplace (selling a "green" product), a financial incentive or subsidy, and a fear that failure to participate will lead to strict regulatory control[3]. That the regulatory threat is such a powerful motivator for voluntary compliance is an argument for hybrid approaches, where regulations are part of the mix, rather than rely on voluntary programs alone[3].

Voluntary approaches have been used successfully to reduce nitrogen pollution in Tampa Bay. On the other hand, the State of Maryland moved from voluntary to mandatory control of nutrient management on farms as of 1998[3]. The Integrated Assessment on Hypoxia in the Gulf of Mexico is an example of where voluntary efforts have at least begun movement toward a solution. The Integrated Assessment brought together a diversity of government-agency and academic scientists to produce consensus reports on the problem of the hypoxic zone in the Gulf of Mexico, and on approaches for solving the problem. These reports then supported negotiations, led by the federal government, with the state governments in the Mississippi River basin, culminating in a voluntary agreement as of October 2001 to reduce the size of the hypoxic zone by reducing nitrogen loading down the Mississippi River over the next few decades. It remains to be seen whether voluntary approaches will prove sufficient to reach this goal, but the Integrated Assessment has proven that voluntary steps can be taken even at large, multi-state scales.

Financial incentives and subsidies can contribute to voluntary solutions. However, in many sectors of economic activity, incentive programs can distort the economy in a counter-productive way. For example, if a firm is subsidized to reduce the discharge of a pollutant, its costs and the price of its products can be artificially low. This can encourage other firms to enter the industry and can increase demand for the product, and pollution can actually increase[3].

Economic incentives are a long-established part of farm policy in the United States, which is based on policies of technical assistance and subsidies, including policies for reducing pollution from farms[3]. The Conservation Reserve Program (CRP, with funding from the national Farm Bill) has been successful at reducing erosion and increasing habitat for wildlife in the agricultural landscape through financial payments to farmers to take land out of agricultural production and create buffer strips around streams. CRP has not yet been designed to reduce nitrogen pollution[3], but financial incentives could clearly be used to encourage farmers to undertake best management practices for nitrogen reduction (see above). The US Commission on Ocean Policy[44] has recently urged another source of funding for dealing with the reduction of non-point source pollution in coastal waters, as well as other improvements in ocean management: earmarking some of the $4 billion per year in royalties from offshore oil and gas development and exploration.

A very promising tool for reducing over fertilization by farmers is the use of voluntary crop production insurance. In a trial plan run by the American Farmland Trust, farmers pay into a not-for-profit insurance fund and agree to use less nitrogen fertilizer on most of their crop land. Their payments into the fund are less than the savings from purchasing less fertilizer, so the farmers have an economic incentive to participate. Small patches of the fields are heavily fertilized, and average yield for the entire field planted is compared with yield in the heavily fertilized plots. If average yield is below that of the test plots, the farmer is compensated for this lower yield. To date, average yields have generally been as high as in the heavily fertilized test plots, and the insurance fund has accumulated money (Brian Brandt, pers. comm.).

2.3 Mandatory policies for reaching goals: Regulations

(i) Technology-based Standards. Mandatory policies, which include regulatory control and tax or fee systems, place the burden and the costs of pollution control on those who generate the pollution[3]. Much regulation under the Clean Water Act has been technology based since its inception[45]. Technology-based standards are easy to implement but tend to discourage innovation and are generally considered not to be the most cost-effective approach[3,9].

Under the 1977 Amendments to the Clean Water Act, point sources of pollution are required to meet technology-based standards, and these are administered by EPA through the National Pollutant Discharge Elimination System (NPDES)[43]. For publicly owned sewage treatment plants, the standard remains secondary treatment[9,45]. As noted above, secondary treatment is designed to reduce the discharge of pathogens and labile organic matter (BOD), and is relatively ineffective at removing nitrogen[9]. One appropriate step for reducing nitrogen pollution might be to tighten the technology standard to nutrient-removal treatment, which would provide substantial reductions in nitrogen discharge at modest cost[3,9]. Waivers are available to communities under the NPDES permitting system if they can demonstrate that a lower level of treatment results in no significant environmental deterioration[9].

Animal feeding operations have been subject to the requirements of the Clean Water Act since it was passed, but compliance has been poor. Currently, operations with more than 1000 "animal units" are subject to permit requirements that prohibit discharges to surface waters except during overflow expected during a 25-year storm[45]. As of 2001, only 20% of CAFOs had received the necessary permits[45]. EPA proposed new regulations for effluents that took effect in late 2002, regulating land application of manure as well as lagoon systems. However, the volatilization of ammonia to the atmosphere is be unregulated[45].

(ii) TMDLs. The Clean Water Act requires states to monitor for violations of ambient water quality standards. When a standard is violated, a state is to determine the "total maximum daily load" (TMDL) that could enter the water body without causing impairment. If the TMDL is exceeded, discharges allowed under the NPDES program from point sources are to be ratcheted down[45]. However, nonpoint sources are the dominant input of nitrogen to most coastal waters[9], and the Clean Water Act provides no authority for regulating these nonpoint sources in the TMDL context[45]. New statutory authority will be required for nonpoint source nutrient pollution, if it is indeed desirable to address nitrogen pollution through a regulatory framework.

The Coastal Zone Act Reauthorization Amendments of 1990 require states that participate in the Coastal Zone Management Program to have enforceable mechanisms for controlling nonpoint source pollution. However, in many cases, the Coastal Zone is too narrowly defined to be effective for nutrient management. Further, many states have failed to comply with this requirement, and federal agencies have no authority to force compliance[45]. Funding for the Coastal Zone Management Program is small, giving federal agencies little leverage over state actions. Many states view the nutrient pollution provisions of the Coastal Zone Management Program as an unfunded mandate.

Under current law, TMDLs are applied by a state based on compliance with water quality standards within that state. This can prove problematic when pollution from a state contributes to impairment of a water body not within its boundaries. For example, the TMDL planning process of the State of Pennsylvania is based totally on restoring water quality of impaired streams, rivers, and lakes within Pennsylvania. Nitrogen coming down the Susquehanna River from Pennsylvania is a major source of pollution to Chesapeake Bay, but to date, this has not influenced TMDLs within Pennsylvania. If the TMDL regulatory approach is to be successful in reducing coastal nitrogen pollution, not only is new authority required for nonpoint source pollution, but multiple state sources must be included. Providing enforcement authority to river basin commissions or other similar watershed-based entities may be an appropriate mechanism for achieving this goal.

Although long mandated by the Clean Water Act, the TMDL approach has only been applied recently, and only after litigation led federal courts to direct the EPA to develop TMDLs. Political opposition to the approach remains vocal. In response, Congress requested an assessment of the scientific basis for TMDLs by the National Research Council. The committee appointed by the National Research Council endorsed the basic usefulness of TMDLs while suggesting several ways in which EPA could improve the process, such as explicitly recognizing uncertainty and relying more on biological endpoints for standards[46].

The TMDL approach is based on water quality standards. Currently, many states do not have nutrient standards for coastal waters, and those that do, have loose narrative standards[3]. EPA has been working for the past several years to develop procedures for nutrient criteria that could be used by the states to set nutrient standards. As a step in this process, the "Nutrient Criteria Technical Guidance Manual for Estuarine and Coastal Marine Waters" was released in October 2001[42]. As of that time, states were expected to have developed nutrient standards for freshwaters by 2004 at the earliest[45]. However, a deadline for states to develop nutrient standards for coastal marine ecosystems has not even been set. In the meanwhile, TMDLs for nitrogen control are sometimes driven by other standards, such as those for dissolved oxygen. The current plan for reducing nitrogen pollution in Long Island Sound is based on a TMDL to correct non-compliance with the dissolved oxygen standard there[3].

2.4 Mandatory policies for reaching goals: Taxes, fees, and marketable permits

Rather than mandating particular changes by regulation, taxes and fees can be used to induce changes. Such approaches can include effluent charges, user or product charges, non-compliance fees, performance bonds, and legal liability for environmental damage[3]. These approaches are widely believed to be more cost effective than command-and-control regulations and more likely to spur innovation. However, it is far more difficult to reach specific targets in pollution reduction using the tax/fee approach[3]. Regulators have difficulty predicting how polluters will react with any certainty. Fees and taxes can be adjusted over time to achieve the desired result, but this often creates political resistance. For example, gasoline taxes could be increased to reduce fuel use and hence NO_x emissions, and nitrogen fertilizer could be taxed as a way of encouraging more environmentally benign use of fertilizer. But in both cases, the rate of taxation necessary to make a meaningful change in behavior is likely to be viewed as excessive by large segments of the public[3]. There are no known examples of using taxes and fees as a nutrient management approach for water quality.

Marketable permits for pollution overcome some of the problems of both regulation and tax/fee systems and have been used to reduce sulfur dioxide pollution from electric power plants[3]. As with the regulatory approach, marketable permits start with an allocation of an allowable level of pollution, so there is an assurance that a particular target will be met. However, by allowing trading among permit holders, innovation is encouraged and the most economic abatement is achieved, if there are a sufficient number of buyers and sellers in the market[3]. The approach of marketable permits is now being tried for nitrogen control to coastal waters in several locations, including Pamlico Sound (North Carolina) and Long Island Sound. However, to date no trading has actually occurred in the Pamlico Sound[47]. In Long Island Sound, only trading among municipal wastewater treatment plants in the state of Connecticut have occurred. A major obstacle is establishing a basis for trading between point and nonpoint sources of pollution, which requires precise knowledge of the sources and extent of nonpoint pollution[3,47]. This knowledge is seldom available in watersheds, although the ability of models to assess sources is improving rapidly[3].

The EPA recently has endorsed market-based trading programs as the preferred approach for reduction of nutrient pollution in the waters of the United States in the future, with trading occurring within particular watersheds[48]. Specific policy guidance for trading was released in 2003[49]. The program as envisioned by EPA would involve both point sources and nonpoint sources and would have caps for total nutrient pollution set based on water quality standards. For impaired waters, the caps would be based on the development of standards for TMDLs. The EPA argues that their proposed trading program would provide economic incentives for voluntary reductions from nonpoint pollution sources[48,49]. Their plan would still retain NPDES permits for point-source pollution. The lack of statutory authority for regulating nonpoint sources of nutrients under the Clean Water Act[43] would seem to pose a significant handicap to the EPA's plan for market-based trading in the majority of watersheds where nonpoint sources are the dominant form of nitrogen pollution. The lack of authority for regulating interstate pollution poses another challenge.

2.5 Hybrid approaches for reducing coastal nitrogen pollution

Nitrogen pollution comes from multiple sources, and a "one solution fits all" approach may not be the best national strategy. Some combination of national regulation for some sources and watershed-based management for others may be the most effective approach. Either for national approaches or watershed-based approaches, combinations of regulatory, incentive, and market-based mechanisms are possible and may be the most cost effective and politically acceptable[3]. Following is a brief discussion of possible hybrid policy options as applied to the major sources of nitrogen pollution.

(i) Runoff and leaching from agricultural fields. Loss of nitrogen could be substantially reduced if farmers on average fertilized at the rate recommended by Land Grant universities, or even somewhat below these recommendations. This could be achieved through a national farm policy that insures the economic return of farmers who appropriately reduce fertilizer use. It may also be appropriate to provide no economic subsidies to farmers who exceed recommended fertilization levels.

Other approaches for reducing nitrogen loss include winter cover crops, planting perennial rather than annual crops, discouraging application of fertilizer in the fall, and using wetlands to intercept tile drainage. Any of these could be encouraged nationally through incentive payments. On the other hand, any of these or similar approaches could be applied to specific watersheds where nitrogen reductions are desired by targeting incentives to these watersheds, or through regulations or marketable permits that charge farmers for nitrogen runoff that exceeds some determined limit. Within watersheds, either incentive systems or regulatory and market-based approaches could be tailored to the largest problem sites, such as a farmer in a wet climate who grows annual row crops such as corn and soybeans on sandy soils.

(ii) CAFOs. The scale of pollution from CAFOs is similar to or even greater than that of large municipal sewage treatment plants, and it may be sensible to apply a similar national technology-based standard to CAFOs as point-source pollution under the Clean Water Act. On the other hand, a performance-based standard may be more appropriate, as it would encourage more innovation in treatment technologies and would therefore be less expensive to industry in the long run[3,9]. Marketable permits are another possible approach for controlling pollution from CAFOs. In any case, release of nitrogen to surface waters, ground waters, and to the atmosphere should all be controlled.

The fate of manure from CAFOs should also be considered. In the Netherlands and some other European countries, manure application to fields is now regulated as part of total farm nutrient-balance programs[3]. This approach has recently been mandated in Nebraska and Maryland[3,36]. The goal is to prevent over fertilization with manure as a disposal mechanism for the manure.

(iii) NO_x from fossil fuel combustion. Atmospheric nitrogen pollution comes from multiple sources, including on- and off-road vehicles and stationary sources such as electric power plants. The pollution can also be transported long distances, and the airshed for pollution sources usually overlaps multiple watersheds[3]. This suggests that NO_x emissions are perhaps best regulated at the national scale. Hybrid regulatory approaches are possible at the national level, for instance relying on emission standards for vehicles and marketable permits for electric power plants. Appropriate standards for coastal nitrogen pollution may be different than those for control of ozone and smog pollution. For instance, year-round standards may be appropriate, rather than just summer-time standards[3]. To date, there has been no analysis as to whether standards based on coastal nitrogen pollution would be lower or higher than those based on ozone and smog.

(iv) Urban and suburban sources. Municipal sewage treatment plants are currently regulated by a technology-based standard, but the technology[secondary treatment] is not related to nutrient pollution. Changing the national technology standard to nutrient-removal rather than secondary treatment may be sensible, and as discussed in the preceding section, the cost is moderate. For locations where this level of sewage treatment would clearly serve no benefit, municipalities could apply for waivers under the Clean Water Act, as they currently can for the secondary sewage treatment standard[3,9].

Another approach would be to require nutrient-removal technology only in plants that are in watersheds that contribute to known problems of nitrogen pollution in downstream coastal rivers or bays. Currently, nitrogen-reduction technology is required on a case-by-case basis, and generally only when sewage plants discharge directly into coastal ecosystems. Nitrogen discharges elsewhere in river basins have largely escaped regulation.

Nitrogen pollution from septic tanks is usually regulated by states or by localities, and usually by public health authorities. As discussed above in the preceding section the best technical solution may be to replace septic tanks in some coastal localities with central sewer systems, perhaps at the neighborhood or small-community scale. Policies for accomplishing this could be based on financial incentives to local governments, on regulatory fines to individual homeowners with septic tanks, on marketable permits to individual homeowners, or some combination of these and other approaches.

(v) Wetland creation and preservation. Wetlands and ponds, whether constructed or natural, can serve as significant sinks of nitrogen, and thereby help mitigate pollution of coastal ecosystems. Those wetlands and ponds that best intercept groundwater flows or tile drainage, or those that have the greatest hydrologic interaction with streams and rivers are the greatest sinks of nitrogen. Incentive programs in the Farm Bill and other federal programs could target the creation and preservation of wetlands that best serve as nitrogen sinks, perhaps emphasizing watersheds that have nitrogen pollution problems.

Federal water management programs administered by the Army Corps of Engineers and the Bureau of Reclamation have a significant influence on the ability of wetlands and floodplains to serve as nitrogen sinks[29,32]. Nitrogen retention in the landscape could be made a central concern in the planning process behind such projects.

3 Conclusions

Nutrients, and particularly nitrogen, pose the largest pollution problem for the coastal rivers and bays of the United States. Two-thirds of the country's coastal systems are moderately to severely degraded from nutrient pollution. Nitrogen inputs to the coastal waters of the United States are increasing. If current trends continue, nitrogen loading in 2030 is projected to be 30% higher than today and more than twice what it was in 1961. The nitrogen comes from a variety of sources, including runoff from agricultural fields, concentrated animal feeding operations, atmospheric deposition of NO_x from fossil fuel combustion, and sewage and septic wastes. The relative importance of these varies among coastal marine ecosystems.

Technical tools for a solution of nitrogen pollution exist at reasonable cost. That most of these have not yet been implemented to any significant extent suggests that new policy approaches are necessary[44]. Current efforts, such as the Coastal Zone Management program[8], are under-funded[44]. A variety of voluntary and mandatory policy tools are available. The best solution may involve a combination of these voluntary and mandatory approaches, perhaps applying different approaches to different sources of nitrogen pollution. Nonpoint sources dominate nitrogen inputs to most coastal waters. Current regulatory authority for nonpoint source pollution is very limited. Hence, increased authority to regulate these sources may be necessary to reverse nitrogen pollution in many or most locations.

Nitrogen pollution can be addressed through a uniform national approach, on a watershed-based approach, or through some combination of these two (for example by applying a uniform national approach to NO_x emissions, while also setting watershed-based loading standards). A watershed-based approach is likely to be the most cost effective for some sources of nitrogen (such as runoff from agricultural fields), while a uniform national approach may be better for others (such as NO_x from fossil fuel combustion). While current scientific and technical knowledge is sufficient to begin to make substantial progress toward solving coastal nitrogen pollution, progress will be made more quickly and more cost effectively with increased investment in appropriate scientific research[43].

Since nitrogen pollution in many coastal ecosystems involves sources in multiple states, state and local governments may not be the most appropriate regulatory agencies for a watershed-based approach. River basin commissions or similar entities, if given sufficient authority, may be more appropriate regulators. Federal leadership seems desirable.

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American Water Works Association

The Authoritative Resource on Safe Water℠

Testimony of Wiley Stem

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On Behalf of the American Water Works Association

April 19, 2007

Before the House Subcommittee on Water Resources

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Table of Contents

Summary

Lake Waco is the only viable public drinking water supply for approximately 150,000 central Texas citizens who live in the City of Waco and surrounding communities. In recent decades, Lake Waco has been severely damaged by pollution running off agricultural lands in the watershed. Segments of the North Bosque River upstream from Lake Waco have been determined by both the Texas Commission on Environmental Quality ("TCEQ") and by the United States Environmental Protection Agency ("EPA") to be so impaired due to high concentrations of nutrients, principally phosphorus, that they have been placed on the national list of impaired waters.

Numerous studies and peer reviewed publications have concluded that the high concentrations of phosphorus in Lake Waco are caused by runoff from agricultural operations in the North Bosque River watershed. More specifically, this runoff occurs as a result of dairies over-applying cow manure to their waste application fields. The dairies in question – which, by the way, are industrial-scale operations and not traditional "family farms" - are applying manure to their fields as a means of waste disposal rather than for agronomic purposes.

Although technically speaking, parts of a Concentrated Animal Feeding Operation (CAFO) may be a point source under the Clean Water Act, the type of pollution I am describing – runoff from waste application fields – is considered "non point source" pollution, because it does not come from a pipe or discrete conveyance (a point source) as defined in the Clean Water Act. Non point source pollution is subject to few if any effective controls by EPA or most states.

The excessive phosphorus in our watershed has caused algal growth in Lake Waco, which in turn causes serious taste and odor problems with the water. The end result is that Waco has to spend tens of millions of dollars that it would not have to spend if there were adequate controls on these nonpoint sources of pollution.

In addition to phosphorus, of course, animal wastes are also a significant source of pathogens. Although Waco takes great care to treat its water to safe levels, in other cities there have been several well-documented cases where a chain of events including breakdowns in water treatment have resulted in people being killed or seriously sickened by pathogens associated with animal wastes. The City of Waco has both an obligation under the Safe Drinking Water Act and a moral responsibility, which we take very seriously, to ensure that the water we deliver to our residents is safe, odor free, and pleasant to drink. In order to meet this obligation, Waco has been forced to spend millions of dollars in recent years for additional water treatment costs as the direct result of the pollution in our watershed. The cost of upgrades in equipment and facilities which we must employ to deal specifically with this problem is projected to nearly double the cost of a project we are undertaking to ensure we have adequate water supplies to meet our needs now and in the future. The cost of that project is estimated at approximately $90 million, of which about $40 million is attributable to the poor water quality caused by animal operations in our watershed.

As described in more detail in my statement, the City of Waco was forced to sue a number of the dairies in our watershed, using the authorities of the Clean Water Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, better known as Superfund). These suits were not for the purpose of enriching the City, but to force the dairies to adopt better practices that reduce the levels of polluted run off from their fields. I would note that there are efforts underway in Congress to relax the provisions of Superfund by excluding animal manure and its constituents such as phosphorus from coverage under the law. I urge you to strongly oppose such a relaxation of Superfund.

I would also note that the types of programs that Waco had to sue to get agricultural operators to adopt in our watershed are the same types of programs that could be adopted voluntarily with support under our nation's comprehensive Farm Bill. Congress is expected to pass a new comprehensive Farm Bill this summer. I urge you to expand the conservation programs in it to at least $7 billion annually, as proposed by several members of Congress, and to make protection of drinking water supplies a top priority for those funds. Of particular importance is the "Partnership and Cooperation" program. The US Department of Agriculture should be required to spend at least twenty percent of its "working lands" conservation monies in this program, and water utilities like Waco's should be specifically eligible to coordinate a cooperative effort with agricultural producers in the watershed.

Finally, I would be remiss if I did not thank Representative Chet Edwards for his tireless efforts to procure funds for the City of Waco to help us deal with these problems. I hope that you will strongly support the Water Resources Development Act and the funds Rep. Edwards is seeking to assist Waco in the important work of securing adequate and safe supplies of water for our citizens.

I. Introduction

My name is Wiley Stem. I have been an employee of the City of Waco for the past 29 years. Over that time I have worked as a management analyst, assistant director of public works, water/wastewater supervisor, and director of water distribution and wastewater divisions. In 1999 I assumed a position as Assistant City Manager, which is the position I currently hold. As Assistant City Manager my responsibilities and duties include overseeing several different departments within our local government, including water utilities, environmental services, general services, public works, human resources and parks and recreation.

I received a Bachelor of Business Administration degree from Baylor University in 1976. Among other professional associations, I am a member of the American Water Works Association (AWWA). AWWA was founded in 1881 and is the oldest and largest organization of water professionals in the world. AWWA member utilities serve safe water to about 80 percent of the American people.

I currently serve on the Brazos Regional Water Planning Group and am chair of the Waco Metropolitan Area Regional Sewerage System. I have also served on the United Way board. On a personal note, my family has had a farm in Falls County, Texas, since 1961, and we continue to have a cow/calf operation there. For more than twenty years I have been a member of the Texas Farm Bureau.

I want to thank the Subcommittee on Water Resources for allowing me to testify regarding the effect that runoff pollution often has on city water suppliers.

II. Lake Waco

Lake Waco, part of the Brazos River Basin, is located in the southeastern portion of the Bosque River Watershed, entirely within McLennan County, Texas, and on the northwestern edge of the Waco city limits. In or about 1928, construction of a dam to impound Lake Waco began, and the dam was completed around 1930.

Lake Waco is fed by the North Bosque, the Middle Bosque, and the South Bosque rivers, and by Hog Creek. The contributing watershed to Lake Waco is approximately 1,652 square miles. The great majority of that (about 1,260 square miles) is in the North Bosque River watershed. The North Bosque River and its tributaries flow downstream and terminate in Lake Waco, which means that pollutants dissolved and entrained in the waters of the North Bosque are carried into, and ultimately deposited in, Lake Waco.

In or about 1958, the City of Waco, with the assistance and support of the

U.S. Army Corp of Engineers, began construction of a second larger dam on Lake Waco to provide additional flood control and drinking water. That project was completed in or about 1965.

Lake Waco constitutes the public drinking water supply for the City of Waco and is a significant source of drinking water for many surrounding communities and approximately 150,000 citizens.

Additionally, Lake Waco is used for a wide variety of recreational activities, including fishing, boating, swimming, and water skiing. The shores of Lake Waco provide recreational activities and amenities in the form of parks, picnic areas, boat docks and camping facilities. Lake Waco is also put to a variety of other municipal purposes, including irrigation.

In any city, a clean and reliable source of drinking water is indispensable to the health and welfare of the citizens and is also essential to the existence and growth of business and industry. A substantial supply of clean water is critical to any city's ability to maintain and attract industrial enterprises.

Lake Waco is the regional water supply. There is no viable alternative to the Lake as the regional water supply, and that will continue to be the case into the foreseeable future.

III. Nonpoint Source Problems

In the later half of the 1980's, large industrial dairy operators began moving into counties in the North Bosque River watershed. This influx of dairy operators into the watershed coincided with a massive increase in the amount of nutrients, and specifically phosphorus, which were being released into the North Bosque River and ultimately deposited into Lake Waco. The waste from these dairies is the single most important cause of the environmental problems that are occurring in the North Bosque River watershed and Lake Waco.

A dairy cow generates up to 115 pounds of manure per day or more. Considering that there are over 70 dairies in the North Bosque River watershed with over 50,000 permitted head of dairy cattle, more than 2,875 tons of animal manure is produced every day in our watershed. In addition to this solid waste, these dairies produce large amounts of liquid waste.

Best management practices indicate that to properly dispose of waste, a dairy operator should maintain 1.5 to 3 acres of land per dairy cow. For example, a 2,000 cow dairy ought to have 3,000 to 6,000 acres of land to properly dispose of waste produced by their cows. In many instances, dairies in the North Bosque River watershed have less than 1/4 to 1/5 an acre per cow. In short, in our watershed there are too many cows producing too much waste on too little land.

Solid and liquid cow waste contains many pathogens and bacteria. Significantly, the huge amounts of solid and liquid waste generated by dairy cows contain very high concentrations of phosphorus. A single dairy cow may produce as much as 40 pounds of phosphorus per year or more, which means permitted cows in our watershed would produce as much as 2,000,000 pounds of phosphorus each year.

Because of the enormous amounts of waste generated on a daily basis by Concentrated Animal Feeding Operations, it is critical that they dispose of such waste properly, that is, in a way which ensures that the waste does not reach the water supply. CAFOs often rely on several methods to manage their animal wastes. Liquid waste from cows and slurry resulting from wash water being combined with solid waste from cows is collected in "lagoons" located on the property. Such lagoons are supposed to be specially and properly lined to ensure that the liquid waste is contained and does not leach into the ground and into the groundwater and water supplies. Many of the dairies in this region have failed to construct and maintain their lagoons in a way which prevents leaching or even overflow.

Another waste management practice often used by Concentrated Animal Feeding Operations involves spreading waste on their fields. Several times a year, heavy rain turns this waste into liquid manure that runs off the waste application fields and into our watershed. Moreover, because the land they possess is small relative to the number of cows they have confined in their pens, many of the dairies in our watershed long ago exceeded the natural capacity of the soils and vegetation on their facilities to absorb or otherwise assimilate the phosphorus in the waste.

Any application of manure and waste products containing phosphorus to a waste application field in excess of 80 ppm is a waste management practice, not an agricultural one. That is because at levels of 80 ppm and higher there is far more phosphorus than can be used by plants. At those levels, there is a very high risk that the phosphorus will simply run off of the fields as nonpoint source pollution. Samples taken by the Texas Commission on Environmental Quality

("TCEQ") over a five year period showed over 200 individual waste application fields on dairies in our watershed, where soil levels exceeded 200 ppm. Once soil phosphorus reaches those levels, the time required for the phosphorus to decline to agronomic levels is measured in years or even decades.

The large industrial dairies in our watershed have permits issued to them by the State of Texas which require them to conduct their operations in accordance with various laws, rules and regulations. Many of those dairies have operated their dairies and maintained their land in such a way as to have consistently and egregiously violated the applicable laws and regulations, and they continue to do so.

Finally, it must be noted that the phosphorus being released by these dairies is a pollutant and is poisonous. Both CERCLA and the Clean Water Act recognize phosphorus as a hazardous substance.

IV. Impacts on the City of Waco

Prior to the late 1980's the City of Waco experienced taste and odor problems with the water from Lake Waco only on a sporadic and episodic basis. Those sporadic and episodic taste and odor problems in the water were resolved without the City of Waco having to resort to special water treatment methods.

In or about the late 1980's, large industrial dairy operators began moving into Erath County and into the North Bosque River watershed.

In about 1988 there were very notable increases in the levels of algae in Lake Waco. The mass and volume of algae increased to levels which had never before occurred in the lake. There is a direct correlation between the increased levels of phosphorus in Lake Waco resulting from dairy waste runoff, increased levels of algae in the Lake, and the taste and odor problems with the water in Lake Waco. As the algae level in the lake increased, so did the taste and odor problems with the water. The problems became so bad and so greatly affected the quality of the water that the City began using a different and additional treatment process in order to make the water acceptable for human consumption.

Since 1996, Waco has had to continually employ water treatment methods it would not otherwise use, to ensure our water is palatable. Those treatment methods involve adding treatment chemicals to the water whose sole purpose is to reduce the substantial taste and odor problems of the water from Lake Waco. Despite the high levels at which the additives are being put into the water, they are becoming less effective at improving the taste and odor of water out of Lake Waco. At the same time, the City is reaching the upper limit of the level at which these chemicals can be added to the water, because, at very high levels, they cause adverse side effects by producing undesirable chemical byproducts and by adversely affecting other aspects of the drinking water treatment process.

Needless to say, these chemicals are also expensive. Since 1995, the City has spent close to $4.5 million to address taste and odor problems in Lake Waco. Those expenditures are in excess of those which would have otherwise been made for water treatment. Ongoing remedies for treatment of taste and odor problems directly attributable to excessive phosphorus from dairies currently consume more than half of the City of Waco's budget for chemical water treatment. Prior to 1996, that figure was about 10 percent.

Even though the City has been and continues to be very aggressive and diligent in its efforts to ensure that the water our citizens drink is microbiologically safe and palatable, doing so is a challenge. Because the City is currently unable to sufficiently reduce such taste and odor problems, out of concerns for the microbiological safety of the water, and because of concerns that the pollution in our watershed may continue or even increase in the future, the City has found it necessary to add additional, advanced water treatment equipment and facilities to its two existing water treatment plants.

It should be noted that the equipment and facilities necessary to ensure our drinking water is safe and palatable will do nothing to improve the quality of water in Lake Waco itself. It continues to be impaired by runoff pollution. The pathogens which are borne in cow manure and which enter Lake Waco have created concern about the health and safety of the citizens who fish, swim, ski and engage in other activities in the lake. If this pollution is allowed to continue unabated, there is the potential for substantial risk to the health and welfare of the users and consumers of Lake Waco water.

Segments of the North Bosque River upstream from Lake Waco were placed on the national list of impaired waters after it was determined by both the TCEQ and the Environmental Protection Agency ("EPA") that these waters were severely impaired due to high concentrations of nutrients, principally phosphorus. This data has been confirmed through many scientific and peer-reviewed studies.

Two Total Maximum Daily Loads (TMDLs) for soluble reactive phosphorus in the North Bosque River were adopted by TCEQ and approved by EPA in 2001. TCEQ subsequently approved a plan to implement these TMDLs, which are designed to reduce the amount of phosphorus in the North Bosque River. It remains to be seen whether or not the TMDLs will be effective in reducing the phosphorus entering the North Bosque River. If the underlying problem is not effectively addressed and the polluting conduct not abated, the current water supply may be irreparably damaged.

V. Recommendations

Although this hearing does not focus on specific remedies to the kinds of problems I have described, I would like to make a couple of general recommendations.

A. The Importance of Enforcement

First, I want to stress the importance of properly enforcing the provisions of the Clean Water Act and other environmental statutes. The type of runoff I have described is associated with both point source and nonpoint source pollution. To the extent that some of the pollution I have described could be said to have come from a point source, I would have to say that enforcement was lax in the case of Waco. It does not seem fair to hold the municipal sector to strict accountability in matters of water pollution but essentially to look the other way when there are persistent and serious problems from others in our watershed. With respect to the nonpoint source runoff from fields, there is essentially no federal program at all. And most states will not venture into an environmental area where the federal government does not tread.

Of course, the question of enforcement goes well beyond the Clean Water Act, to encompass the Superfund statute. As I noted in the summary, the City of Waco had to bring legal action against fourteen large industrial dairies in the watershed, using the authorities of both the Clean Water Act and Superfund. Our goal was to bring about improvements in the waste management practices of these dairies. I am pleased to say that the City's efforts were highly effective, and the City has settled with the original defendant dairies. Under these settlements, the dairies have agreed to certain changes in their management of animal wastes that will significantly reduce their polluted runoff, yet allow them to continue in business. None of the dairies that have settled have paid money to settle the lawsuit. In one case, an insurance company for a dairy paid a cash settlement to the City, which Waco then returned to the dairy operator in exchange for a conservation easement prohibiting certain land from being used for confined animals, though it may be used for other agricultural purposes.

These results show the importance of Superfund in addressing pollution problems of this kind. That is why AWWA and others oppose proposals to remove phosphorus and other constituents of animal waste from coverage under Superfund. The normal agricultural application of manure as a fertilizer is already exempt from Superfund. If adopted, the amendment would make it impossible for Waco and other cities to use Superfund authorities to force cleanup where there has been mismanagement and non-agronomic application of animal wastes with consequent damage to our water supplies.

B. The Need for More Effective Nonpoint Source Programs

My second recommendation goes to the need as a nation to develop meaningful programs to reduce and manage nonpoint sources of pollution. Obviously these need to be reasonable, cost-effective, and balanced. The kinds of things that could be done to address this problem include Best Management Practices (BMPs), where those are economically viable. This needn't be a permit-based program, but it needs to be real and effective, and it needs to involve major contributors to water quality problems who up to now have not had to be "at the table" in dealing with problems in a watershed.

C. The Opportunity to Protect Water Under the Farm Bill

Third, we have an opportunity this year to make a real difference in this kind of problem by redirecting resources under the comprehensive Farm Bill towards the protection of sources of drinking water. The Conservation Title of the 2002 Farm Bill authorized record levels of funding for a suite of conservation programs. AWWA was active in the development of this title throughout the legislative process, along with many partner organizations, and we are grateful to the many members of Congress who worked so hard to ensure the enactment of the Conservation Title of the 2002 Farm Bill.

The conservation programs of the U.S. Department of Agriculture (USDA) can do much to enhance the quality of America's waters. Promoting practices such as buffer strips, terracing, temporary or permanent land retirement, and no-till cultivation are great ways to protect sources of drinking water from agricultural runoff. These programs also provide revenue security for agricultural producers – particularly important when international trade requirements may affect price-support programs. Overall, conservation programs protect our vital water supplies, benefit public health, and assist agricultural producers.

The 2002 Farm Bill created a very forward-thinking program, the Partnerships and Cooperation program, which was to be used to encourage local or regional partnerships to solve natural resource challenges related to agricultural production. This program allows regional cooperation projects to compete for conservation funds with single-farm projects, and USDA may use up to five percent of conservation grant funds for Partnerships and Cooperation projects. Water utilities have both a critical interest in water quality and much needed technical expertise, and so utilities would be logical facilitators for such local or regional partnerships.

Unfortunately this program in the 2002 Farm Bill has been little used in practice. AWWA proposes that the 2007 bill require USDA to use up to twenty percent of "working lands incentives" (buffer strips, land retirement, etc.) for local or regional partnerships, as provided in legislation introduced by Rep. Ron Kind, unless the number of partnership applications is less. In addition, water utilities should be specifically listed as being eligible to receive grants to lead local or regional partnerships under this program.

In implementing the conservation programs under the 2002 Farm Bill, the USDA developed factors for scoring project applications. Under these factors, improvement or protection of water quality has received less consideration than, for example, protection of wildlife habitat. The 2007 Farm Bill should be written to explicitly give protection of drinking water supplies at least equal ranking with habitat protection in scoring and ranking proposed conservation projects.

The 2002 Farm Bill authorized mandatory funding at high levels of support for conservation programs. Mandatory funding means the amount of money authorized for a program is available in future years unless Congress acts to limit it. The major conservation programs actually received most of their approved funding for FY2003, but since then Congress has been reducing the funds going to conservation programs. In the budget reconciliation process for FY2006, one-fourth of the cuts in USDA's budget came out of the conservation programs. We urge Congress to protect these funds in the future.

A boost in conservation assistance to agricultural producers could provide them with greater income security in the near future. This is particularly timely as the current U.S. system of subsidies and price supports comes under increasing pressure from international trade organizations, which may conclude that our system constitutes an unfair practice. Conservation programs are not considered to constitute an unfair trade practice under international trade rules. In light of the environmental and public health benefits from conservation programs, as well as the benefits to agricultural producers, AWWA recommends that overall USDA conservation funding increase to at least $7 billion annually, starting in FY 2008.

Finally, I would like to note that Congressmen Chet Edwards has worked to include $10 million for a North Bosque River clean-up plan designed to improve water quality at Lake Waco. This was included during the 109th version of WRDA. We would appreciate the same inclusion for the 110th Congress. The plan would authorize federal funding for Army Corps of Engineers clean-up efforts in the watershed for the first time.

This authorization will clear the way for a wide range of clean-up efforts in the North Bosque Watershed, and that means improved water quality for Lake Waco and 200,000 Waco citizens. This plan will include input from local stakeholders and set in motion a balanced plan that takes into consideration the needs of all parties involved.

Short term objectives of the plan include development of a comprehensive implementation plan that spells out specific improvements throughout the watershed. Potential projects could include wetlands, or even water treatment facilities upgrades to help remove phosphorus from Lake Waco. Long term goals include maintaining environmental improvements, and implementation of four demonstration projects involving dairy producers, rural landowners near dairies, and municipalities.

The plan will pair the Army Corps of Engineers with the USDA's National Resource Conservation Service (NRCS) and the Texas Water Resources Institute (TWRI) at Texas A&M to implement the plan.

VI. Conclusion

Thank you for the opportunity to testify before you today concerning the problems facing Waco and public water utilities all across the country from runoff pollution. This is a serious problem affecting most bodies of water in America and causing thousands of cities to spend significant additional resources to ensure their residents' drinking water is safe and palatable. AWWA, and I personally, look forward to working with the Committee as you consider specific programs to more effectively deal with this important problem.

Subcommittee on Water Resources and Environment
U.S. House of Representatives

Hearing on Nonpoint Source Pollution: The Impacts of Agriculture on Water Quality

April 19, 2007
Testimony of
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Mr. Chairman and Members of the Subcommittee:

Good afternoon, my name is Roger Wolf. I am honored to be here today representing the Iowa Soybean Association, as the Director of Environmental Programs. Thank you for asking me to provide my perspectives on agricultural non-point source pollution and water quality.

My testimony will cover the following:

1. Introduction to Iowa Soybean Association and our experience with performance-based environmental programs
2. Agricultural Nonpoint source pollution impacts upon water quality, progress, challenges and emerging opportunities
3. Recommendations for the future

The Iowa Soybean Association is the nation's largest state-based, row-crop commodity organization in the country, with over 6,100 dues paying members. Over the last decade, we have become a pioneer in employing agriculture information technology and leadership at multiple scales to help farmers improve agronomic, economic and environmental performance. Our mission is to expand profit opportunities while promoting environmentally-sensible production.

Seventy percent of Iowa's 31.7 million acres of farmland are planted in soybeans or corn. Iowa's farmers perennially rank among the top states in corn and soybean production, and often lead the nation in pork and egg production, thanks to the availability of plentiful and reasonably priced feed crops. In terms of cash receipts alone, Iowa farmers' average nearly $11 billion, yes billion with a B, per year. And now, those same Iowa farmers are stepping-up to help meet the nation's call to be a key player in renewable energy and the bio-economy. These are exciting times to be involved in agriculture.

Yet, societal expectations of production agriculture are increasing. Growing concerns about nonpoint source pollution, particularly losses of nutrients from farm fields and associated impacts on the environment, are prompting an increase in studies, articles and debate about what can be, and should be, done to bring about environmental improvements. It is clear that society wants improved environmental quality, along with affordable food and energy.

The factors contributing to Iowa's productivity and high acreages in these crops include the naturally-rich soil and a hydrologically-modified landscape that is relatively flat to gently rolling. It is these same factors that might also be contributing to high nitrate levels in many of Iowa's streams and rivers.

Iowa, like many other Midwest states, has hundreds of waterbodies that do not currently meet current water quality standards. An example is Iowa's North Raccoon River, which drains some of the states richest farmland, but has the distinction of being among the nation's nitrate-yielding. The Raccoon serves as a source of drinking water to Des Moines, Iowa's largest city, and many surrounding communities. The nitrate levels in the river require the Des Moines Water Works to operate expensive nitrate removal facilities. So water quality concerns virtually the entire population of central Iowa.

But Iowa is not alone. Numerous studies and reports describe the increase in nitrogen deposits to the Mississippi River system originating from the nutrient-rich, productive soils and wet spring climates of the north-central farm belt states. There is some variance in the tracking of nitrogen levels by watershed. Depending on models used to generate this data, generally the highest nitrogen contributions to the water are attributed to north-central and northwestern Iowa and central Illinois, with some isolated watersheds in Minnesota and others in Indiana and Ohio.

These reports list contributing non-point sources such as cropping patterns (corn-soybean rotation), naturally organic-rich soils that are augmented by nitrogen applied in commercial fertilizers and manure, animal waste from livestock operations and wildlife, increasing runoff from urban development, and leaching from failing septic systems.

So there are many possible nitrate contributors.

However, please allow me to be clear, agriculture is not in denial about these issues. Farmers do value environmentally sound management on their farms. Most farmers believe they are already using many of the Best Management Practices (BMP's) advocated by various agencies and institutions. The fact of the matter is that Iowa farmers are using all available state and federal conservation financial assistance to help install practices and if more funding was available it would be used. In fact, there is a backlog of EQIP project requests in Iowa. Farmers want to work on these issues because they want to do the right thing, and they know that good environmental stewardship translates into economic benefits over the long haul.

To give you the real picture let me review USDA working land conservation program implementation in Iowa.

Contracts on Iowa's working land increased from 461 in 2002 to 3,531 in 2005. These figures illustrate that there is increasing interest in these programs. But those contracts still represent a small percentage of the over 60,000 Iowa farmers on working lands.

And while funding for the program is significantly higher than in previous years, USDA data shows that only a small percentage of farmers actually gain access to programs and ultimately participate.

For example, the FY 2006 Environmental Quality Incentives Program (EQIP) in Iowa funded slightly over 1,500 contracts. However the NRCS has a backlog of 1,500 applications from farmers who want to apply practices but will not be funded. A similar illustration exists with state soil and water conservation cost share programs – farmer demand to do work is high, but funding is not keeping pace.

Still, agriculture has made significant progress in recent years in protecting soil and water resources. For example, modeled estimates on soil conservation practice application from 1982-2003, illustrate that soil erosion in the U.S. has been reduced by 43 percent, according to the USDA's National Resources Inventory (NRI). There are also many other signs of significant conservation progress:

- Iowa farmers used conservation tillage on almost 5.1 million acres of corn in 2004, up from 4.9 million acres in 2002, according to the Conservation Technology Information Center (CTIC).
- Iowa farmers have more than 1.9 million acres enrolled in the CRP, the sixth largest state enrollment in the country (August 2006, Farm Service Agency)
- Iowa farmers have more than 460,000 acres enrolled in the continuous CRP signup, more than any other state, or 13 percent of the total acres enrolled nationwide (August 2006, Farm Service Agency)
- Iowa farmers have enrolled more than 126,000 acres in the Wetland Reserve Program since 1992 (Iowa NRCS)
- In 2002, nearly 2,500 landowners installed soil and water conservation practices protecting more than 27,000 acres with terraces, waterways, structures, basins and other measures.

Yet despite this ongoing work and the progress being made, impairments identified as originating from non-point sources — possibly due in part from agriculture — continues to be difficult to control and address in Iowa's waters. It's becoming apparent that limitations may exist in the environmental efficacy and the economic viability of various land management technologies. Therefore, the ability of agriculture to meet water quality goals through use of BMP's alone may be limited.

In 2006 the Center for Agriculture and Rural Development (CARD) located at Iowa State University conducted an analysis titled, "Conservation Practices in Iowa: Historical Investments, Water Quality and Gaps." The work was done through support from the Iowa Corn Growers Association, the Iowa Farm Bureau Federation, the Iowa Soybean Association, and the Leopold Center for Sustainable Agriculture.

The analysis is preliminary, but CARD scientists estimate that the statewide cumulative annual cost has been about $435 million for the installation of seven major conservation practices. The practices considered by the assessment and for which data were readily available included activities such as $37 million for terraces and grass waterways. Five other practices added up to $397 million.

CARD then used that data and watershed water quality modeling to estimate that, as a result of these practices and investments, total nitrogen reductions in the 13 watersheds that represent the majority of Iowa range from 11 to 38 percent. Nitrate reductions range from 6 to 28 percent. Total phosphorus reductions were 25-58 percent.

But again, significant challenges still remain. The study also estimated that the total gross cost of implementing an "optimal mix" of conservation practices to achieve a 40 percent reduction in phosphorous, would be almost $613 million a year. Implementing the phosphorous target would also simultaneously result in a state-wide reduction in nitrate loadings of over 31 percent.

However, these reductions, while significant, may fall short of meeting new Water Quality Standards for nutrient criteria. Granted, this analysis is a computer-generated modeling exercise. But it does illustrate the magnitude of the work remaining, and the potential investment required, alongside the challenges of meeting future Water Quality Standards, assuming we continue use prescriptive BMP's.

Some of the other findings from the study that are instructive include:

- Cost-effective measures are different across different watersheds, and watershed residents should gain a good knowledge of their watersheds before adopting any control policies that have been promising elsewhere.
- Targeting different pollutants will mean different land use options, so it is important watersheds identify their needs before any policy discussions occur.
- Programs must target Nitrogen and Phosphorus reductions to be the most effective.
- This work creates a reasonable baseline to evaluate the value of the work already completed by Iowans, and the optimal combinations to address future needs.
- These standards need to be accompanied by significant resources and given adequate time for implementation; and,
- Significant investment in monitoring and evaluation would enable us to be more strategic with our program implementation.

Farmers tell of feeling accused of being stubborn or unyielding, yet the truth is that they are constantly refining their management as technologies evolve. And as technologies and knowledge evolve, BMPs also evolve. Redefining them is a constant journey that has no end. At one time the horse drawn plow was a BMP. Before that, corn was planted with fish being used as a fertilizer source. Farmers have always acted on the best information available to make decisions, and there's every indication that they always will.

So the questions at hand are:

- What more can agriculture do to meet additional rising expectations for addressing water quality challenges?
- How can Congress help?

In 2000 the Iowa Soybean Association initiated environmental programs that sought to advance environmental quality and production efficiency. Today, our programs model cooperative public and private partnerships and apply leadership to achieve goals. The scope of these programs involve over 500 individual farmers, over 1,500 fields, and includes participants in all 99 counties, and compliment eight subwatershed efforts within four major river basins.

Financial support is leveraged with soybean checkoff resources, private grants and donations and funds from the state and federal government. Our programs work to synchronize with local, state and federal assistance programs, like the Iowa Integrated Farm and Livestock Management Program, the USDA – NRCS Environmental Quality Incentives Program, Conservation Innovation Grant Program, and the Conservation Security Program; US EPA's Regional Geographic Initiative; such private sector agriculture partners as John Deere, Pioneer Hi-Bred International - a Dupont Company, and Agriculture's Clean Water Alliance, as well as with private conservation organizations such as Environmental Defense, The Nature Conservancy and The Sand County Foundation.

Multiple tactics are used, but all center on providing growers with technical assistance enabling them to collect and process data from their own farms so that they can address resource concerns in the most effective way for their own operations. We call this Applied Evaluation. Applied evaluation is done on several levels, including individual fields, multiple fields under a grower (farm scale) and within subwatersheds. For example, techniques used at the field level to evaluate nitrogen efficiency in corn production include guided corn stalk sampling, aerial remote sensing, and the use of replicated strip trials, with Global Positioning Systems (GPS) and yield monitors.

Management changes, based on on-farm applied evaluation, translate into economic sustainability, as yields improve with optimum (usually fewer) inputs, sometimes including reduced tillage. No farmer wants to spend an extra $10–15 per acre on nitrogen that will be lost from the soil and washed down the river. Many of the Iowa farmers using applied evaluation have found they can effectively reduce the amount of nitrogen they apply to corn fields by 50–80 lbs. per acre and maintain economic yields. Others have found they need to continue their current rates of nitrogen, but that by changing the time and form of application, they can reduce the loss of nitrogen to the soil and water and make it available to the plant, thus improving their yields.

The effectiveness of applied evaluation is not just in collecting the data annually, but in analyzing it in the context of the operation and the watershed and in helping the farmer develop a management system that will incorporate the annual evaluation results into improved decisions.

So, practices are adjusted for the coming year and new evaluations designed – in other words, an adaptive management system for the farm in now set in motion. As farmers experience the value of the adaptive management cycle, centered on applied evaluation, they are offered options to expand the scope and scale of their adaptive management system into a Certified Environmental Management System for Agriculture (CEMSA), addressing many additional resource issues and environmental issues and aspects for the whole farm.

For example, a whole farm energy audit, with energy efficiency planning and an alternative energy assessment are being added this year. Farmers engaged in these evaluation and adaptive management programs experience accelerated benefits by aggregating their evaluation data with groups of producers in their watershed and learning from the anonymously displayed, aggregated data. The watershed benefits as a critical mass of producers within the watershed work to evaluate document and improve their nitrogen and other resource management.

The early results of our work clearly show that most farmers have potential for improving management in their operation. The reason? With better technology and information the farmer can do better than a generalized BMP recommendation.

These farmer directed programs are getting real world, real time, meaningful answers that are often better for farm economics and the environment than the existing BMP's, and now through active demonstration many of the participating farmers are quickly and eagerly adopting these new answers and are looking for more.

The common, underlying theme is that farmers are taking control of their issues with the power of applied evaluation, information and adaptive management. It is a performance-based approach. And because this approach works, it gets quantifiable results, and it is replicable, we already see it evolving into a working model for landscapes across Iowa and beyond. When we started using the approach of applied evaluation and adaptive management we began to improve economic and agronomic performance on Iowa farms, interestingly we also saw that what had been successful in one place was not successful in another. Although the challenges that exist across all landscapes in Iowa can be similar, it became obvious that there are simply too many variables for broad prescriptions to be effective management tools.

Our recommendations for the future involve system changes that include policy and programs that help advance toward:

1. Maturation of performance-based approaches at all levels
2. Site-specific initiatives using locally collected data to guide implementation strategies (at field, farm, and watershed scales)
3. Employment of integrated solutions (various methods of site-specific source reduction based on local data), coordinated and targeted within watersheds
4. Adaptive management systems at individual and group levels to provide ongoing data collection for performance outcomes measurement and optimization
5. Documentation of practices and outcomes
6. Means for incorporating outcome data as feedback for adjusting implementation strategies and tactics
7. Intergovernmental cooperation and public-private partnerships tailored to local and regional needs
8. Improved means for technical transfer to speed the spread of new developments in tools, information, and solutions that can be adapted for farmers and watershed organizations across the region, so that resources aren't wasted replicating invention and to ensure that capabilities improve over time
9. Coordination and reformation of funding sources

a. Financial assistance must be made available to groups of farmers (e.g., in watersheds), as well as individual farmers.
b. Financial assistance must be provided for management evaluation and data collection in order to move from practice-based to performance-based strategies.
c. Financial assistance for farmers must recognize the likely need for initial major investments required to change cropping, tillage, or drainage systems and share in those costs (e.g., loss of investment in current equipment and purchase of new).
d. Funding (public and private) must be increased substantially for Technical Assistance to farmers and groups, such as watershed organizations.
e. Funding for improved performance in the water must recognize and be geared to the long-term commitment required (5-10 year funding commitments, rather than 1-3 year) to determine performing strategies for specific watersheds, then implement strategies and tactics and collect feedback data to optimize management and document results.

What can Congress do? As I reviewed the various jurisdictional programs under this subcommittee it is clear that there are many agencies that have responsibly for protecting and improving the waters of the nation. Finding a way to focus these programs, to become more complimentary and resource centric would be a key recommendation.

From an agricultural non-point source perspective, the issues are complex and diffuse. What will work in one location will be quite different from what will work in another. The theme of 'Cooperative Conservation' comes to mind.
In any case, we're sure that targeting and flexibility are going to be required.

One area that could be targeted is the Upper Mississippi River watershed, and the sub-watersheds within, focusing on making progress on nutrients would be a leap forward. We believe progress in achieving water quality goals for agricultural watersheds in the Upper Mississippi River Basin hinges on changes that amount to a paradigm shift at individual farm and watershed levels:

- Site-specific, *applied evaluation* must become a centerpiece in programming, and
- *Adaptive management systems* that integrate feedback data from regular applied evaluation must be adopted;
- The efforts of individuals must be *aggregated and coordinated*, at least within Watersheds;
- A means for *diffusing and institutionalizing innovation* (not generalized recommendations, but performing systems) must be developed and supported.

To accomplish this, we recommend:

1. First, the establishment of an **Upper Mississippi River Basin Initiative** to provide a framework for intergovernmental, multi-jurisdictional, and public-private collaboration in implementing and funding a strategic, performance-based, resource-centric Plan for Environmental Performance throughout the basin;
2. Second, the integration into Upper Mississippi River Basin **farm program funding for additional Financial and Technical Assistance** to assist farmers and organized watersheds with implementing performance based management

Deploying the collective leadership of federal, state, local and the private sector is the most likely way forward for achieving progress on non-point source pollution and meeting water quality goals. We hope that Congress, too, adapts its management of the issue of conservation at the farm level. We think that there are many opportunities for supporting these ideas in the 2007 Farm Bill. Please consider our work as a touchstone and our people as a resource as you move forward with changes under your jurisdiction and as work proceeds on the 2007 Farm Bill.

I'm Roger Wolf with the Iowa Soybean Association. The farmers I represent and I thank you for your time.

Attachment – Follow-up Questions

Reply from: Roger Wolf, Iowa Soybean Association

May 18, 2007

1. **How can we get more farmers to perform soil tests, install buffers, restore wetlands and implement other practices that reduce non-point?**

   Farmers respond to economics. Most of the agronomic management strategies that reduce non point source pollution and address soil and water conservation also relate directly to a farmers bottom line. Helping farmers understand how to improve management, via better feedback and information is a key. Therefore, my first suggestion to increase farmer adoption of practices that reduce non-point source pollution is to support education and one- on-one technical assistance. Farmers need to be able to prioritize the important resource issues on their farms, understand management alternatives and the impacts of their actions. There needs to be more support of technical assistance infrastructure coupled with use of incentives to apply practices. In addition to overall numbers of producers, and because of the diffuse nature of nonpoint pollution, it is also important that we work to target specific practices to the locations that could in-fact benefit from practice application. Such an approach enables customization of practices and promotes effective and efficient program implementation. It is also important to work with organized groups of farmers who share in the objective to meet water quality standards. This means that we need programs that are watershed based, with clear goals and programs that are specifically designed to address the unique circumstances that exist in those locations. Management practices that will be good in one location to address non-point source pollution may not be the best in other locations. This, in my opinion, illustrates a key challenge with other strategies that would just increase the use of incentives or regulation as a way to modify or manipulate farmer behavior.

2. **Do we need to provide more incentives to reduce agricultural non-point source runoff?**

   In general, more incentives are needed to address agricultural non-point source pollution. But more importantly, we need to understand how and where to maximize the use and return of incentives to bring about desired responses in water quality. This is why place-based programs, e.g. watersheds make sense. While this requires a more sophisticated and strategic approach, using the alternative of just increasing incentives for practices, we run the risk that such efforts will fall short of performance.

3. **How could markets be employed to encourage the adoption of these practices?**

   Theoretically, markets could be set-up to encourage adoption of agricultural management practices that reduce nonpoint source pollution. Such approaches have been successfully applied for dealing with air pollution problems. The big use of this to date is the acid rain vehicle created in the 1990 Clean Air Act. The technique succeeded and the cost of addressing the problem was about 10% of the projected costs when the legislation was considered. While this worked in the air pollution arena, applications for water quality may be more problematic. First among the challenges for making a market work, would be to create supply and demand for products and services. Today, the demand for less pollution would likely come from the regulated community who has ability to calculate a cost basis for coming into compliance with their regulatory permits. Once this is known, then identification of other 'suppliers' who may reduce similar pollutants for less costs may set-up a scenario for a transaction. Such an approach for agriculture will need to deal with some significant challenges for it to work. Perhaps the largest obstacle for agriculture is there is considerable uncertainty over the credits that are produced from management practices applied. The regulated entity is liable for actual compliance and would need some level of certainty that the transaction they enter into is in fact meeting performance requirements. Also problematic is the overall willingness to participate. Farmers are first and foremost interested in farming. The idea that they can become suppliers of environmental services to the broader community is a new paradigm and would again require sophistication in overall delivery of conservation and resource management. It would not be impossible; however considerable foresight in program design, customized to local conditions and situations, with a solid monitoring and validation component and a long range view would be required.

4. **You testified in favor of "cooperative conservation" grants that would link together groups of farmers working to address local environmental challenges.**
   How would this work?

What is most attractive about "Cooperative Conservation" is the idea of using multiple resources to solve common problems or issues. Water impacted by nonpoint source pollution, comes from many sources and is highly variable and dynamic. Bringing multiple assets from state/federal/local - public and private entities together to focus on problems and issues gives more flexibility in design and application of strategies. Further, federal agencies and staff need authorization to behave in this way and to in-fact require them to meet outcomes that are deemed important to the areas that they are working in.

Enabling federal agencies to enter into projects and partnerships that have specific and measurable goals over time would be the key way that this would work. Such an approach requires significant thought into project planning, design, finance, implementation and oversight.

Could cooperatives or other third parties be engaged to bring farmers together to seek these grants?

Yes. In Iowa this is already occurring. Coordinating with actual stakeholders in the locations as part of the process should lead to greater likelihood of actually performance gains.

Should local, state and private funds be used to expand reach of these grants?

Yes. The benefit of such an approach also leverages investment and gives stakeholders more of a stake in the outcomes of the efforts.

What role if any could EPA play in such efforts?

The key role for EPA is to help the community understand water quality standards, targets and to assist the communities by providing technical and financial support, particularly at the planning and evaluation stages of program implementation.

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STATEMENT OF THE
AMERICAN FARM BUREAU FEDERATION
TO THE
HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT

April 19, 2007

The American Farm Bureau Federation appreciates this opportunity to submit the following statement for the record and asks that it be included in the transcript of the hearing on "Nonpoint Source Pollution: The Impacts of Agriculture on Water Quality." This statement focuses on agriculture's stewardship ethic and the contributions to water quality in the conservation title of the Farm Bill. We also wish to address several incorrect and incomplete statements that were made in the course of the hearing.

Stewardship:
Farmers and ranchers are sensitive to the environment, water quality and impairments resulting from nonpoint pollution because they own and manage two-thirds of the nation's land. They are good stewards of the nation's soil, air and water resources but the cost of this stewardship is not cheap and falls primarily on them as individuals because, unlike most other businessmen and women, farmers are unable to pass along such costs in the price of their products. Meeting the demand for food, feed and fuel as well as society's demands for improved environmental quality requires farmers and ranchers to bear the cost of achieving many competing goals and objectives – a balancing act that can often be difficult. The ability to increase agricultural productivity, with the use of modern crop production tools like fertilizers, has enabled our nation's farmers and ranchers to increase the production of food, feed and fuel without increasing the acreage of cropland. Agriculture's productive capacity allows farmers and ranchers to meet the demands of our nation's growing population as well as growing world populations and markets abroad.

Over the last three decades, farmers and ranchers have made great strides, not only in addressing nonpoint source pollution concerns but in improving the environment generally. By nearly every measure, our environment and natural resources are in better condition today than at any other time. Farmers and ranchers have led the way by adopting conservation practices that are good for the farmer's bottom line and the environment. Through improved crop genetics and new and improved management practices, they have increased outputs while limiting their environmental footprint by lessening the use of crop production inputs. Maintaining crop yields while using less inputs generally means there is greater potential for reduced nonpoint pollution while delivering higher potential returns.

American agriculture has become much more efficient in its use of energy resources. Since 1980, U.S. farmers have increased nitrogen use efficiency by 35 percent while boosting corn yields by 40 percent. That is not to imply, however, that we can do without such inputs completely. Farmers and ranchers must be able, on a site-specific basis, to manage inputs and outputs in a manner that protects soil organic matter, soil carbon and soil sustainability as well as water quality.

This progress in reducing non-point pollution also coincides at a time when agriculture is being called upon to increase domestically grown renewable fuels.

Farmers and ranchers strongly support the increased use of domestic renewable fuels and believe biofuels, such as ethanol and biodiesel, are key components for increasing our nation's energy security. Agriculture has a direct and strong interest in the continued growth of the United States' biofuels industry and flexibility to use inputs responsibly and productively will be a key component of this effort.

Farm Bill Conservation:
As agriculture responds to these efforts to reduce nonpoint pollution while producing more fuel and food for the nation, the conservation programs in the farm bill are increasingly important to farms and ranches. The growth of conservation programs in the years covered by the 2002 Farm Bill reflects the need and desire of the agriculture community to improve environmental protection, particularly on working lands, in a manner that fits the conditions and needs of farming and ranching. Farm Bureau believes the Farm Bill will lead the way by providing farmers and ranchers the conservation incentives to continue and expand existing conservation practices.

The growth in the adoption of conservation programs continues a long trend in the Farm Bill. The 2002 Farm Bill is the greenest ever enacted by Congress and reflects the desire of Congress and the agriculture community to improve environmental protection, particularly on working lands, and in a manner that benefits the environment and the needs of farming and ranching.

We encourage the members of this subcommittee to support the role that incentive-based programs such as the Conservation Security Program (CSP), the Environmental Quality Incentive Program (EQIP), the Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP) play in achieving environmental goals. Conservation cost-share and incentives are essential in assisting producers with environmental improvements.

It is noteworthy that there has been a substantial increase in participation in the WRP, the CRP, the continuous CRP, Conservation Reserve Enhancement Program and the

Farmable Wetlands Program. Farmers and ranchers have planted long-term, resource-conserving covers that will improve the quality of water, control soil erosion and enhance wildlife habitat on millions of acres of farmland. These programs are yielding important water quality benefits that include reducing soil erosion and sedimentation in streams and lakes.

The United States Department of Agriculture's (USDA) conservation programs have helped farmers and ranchers conserve resources while also supporting the productive capacity of U.S. agriculture. EQIP continues to offer financial and technical help farmers and ranchers to install structures or implement management practices. EQIP has cost-shared up to 75 percent of the costs of certain conservation practices and incentive payments are provided for up to 3 years. This encourages producers to carry out management practices that may be too expensive for individual farmers and ranchers to afford without the incentive. A primary focus of the EQIP program is the protection and improvement of water quality.

CSP supports ongoing stewardship of private agricultural lands by rewarding those farmers and ranchers who are meeting the highest standards of conservation and environmental management. CSP will allow producers implement additional conservation practices that provide added environmental enhancement.

Setting the Record Straight:
Lastly, Farm Bureau wishes to comment on certain issues that arose in the context of the subcommittee's hearing. In the course of its hearing, the subcommittee took testimony that referred to the specific situation at Lake Waco, Texas. Clearly, Lake Waco is a valuable public resource that provides a number of important uses to the people of central Texas; these include drinking water, recreation and habitat to an abundance of aquatic life. Some, however, have sought to characterize its problems as due solely to agricultural nonpoint pollution and have attempted to connect this incorrect conclusion to legislation pending on Capitol Hill. Farm Bureau believes the record does not justify the characterization that agricultural sources account for all the Lake's problems, nor do we believe the circumstances of Lake Waco can be used to buttress the argument that CERCLA should regulate animal manure.

In testimony prepared for the subcommittee[1], it was alleged that Lake Waco is impaired and/or polluted. For the record, Lake Waco is not impaired.

> **According to the 2004 Texas Water Quality Inventory, the following uses for Lake Waco are fully supported: public water supply, aquatic life, contact recreation, and general uses. See Attachment 1: 2002 Texas Water Quality Inventory – Waco Lake, Segment 1225.**

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[1] Testimony of Mr. Wiley Stem, Assistant City Manager, City of Waco, Texas, on behalf of the American Water Works Association, before the House Subcommittee on Water Resources, April 19, 2007.

It was further stated to the subcommittee that runoff from agriculture operations in the North Bosque River Watershed is the cause of all pollution. In fact, while agriculture operations have been identified as a contributing factor, regulatory authorities in Texas have identified others as well.

> **As stated in Page 2 in the approved Total Maximum Daily Load Allocation Report – "source categories of urban stormwater runoff, municipal wastewater treatment plants, wood/range land, pasture, row crops, non-row crops, and dairy waste application fields" were identified as the sources of excessive nutrients. See Attachment 2: Page two of Total Maximum Daily Loads for Phosphorus in the North Bosque River.**

Additionally, on page 16 of his testimony the assistant city manager for Waco stated:

> My second recommendation goes to the need as a nation to develop meaningful programs to reduce and manage nonpoint sources of pollution. Obviously these need to be reasonable, cost-effective, and balanced. The kinds of things that could be done to address this problem include Best Management Practices (BMPs), where those are economically viable. This needn't be a permit-based program, but it needs to be real and effective, and it needs to involve major contributors to water quality problems who up to now have not had to be 'at the table' in dealing with problems in a watershed.

> **Contrary to the inference that might be drawn that nothing has been done to alleviate such concerns, approximately \$20 million dollars of Clean Water Act §319(h) funds have been spent in the North Bosque River Watershed to address nonpoint source pollution over the last decade. According to the federal Clean Water Act (CWA) §319(b), Texas is required to develop and update a plan every five years that identifies management measures which will be undertaken to prevent and reduce Nonpoint source pollution. This plan, known as the Texas Nonpoint Source Management Program is prepared jointly by the TCEQ and the TSSWCB. This document is approved by the Governor of Texas and USEPA. Through this plan, more than 687,000 tons of raw manure has been hauled to commercial composting operations for use outside of the watershed.**

The official for Waco further states that "phosphorus being released by these dairies is a pollutant and is poisonous. Both CERCLA and the Clean Water Act recognize phosphorus as a hazardous substance."

> **CERCLA regulations identify phosphorus as a hazardous substance, but with a specific Chemical Abstract Registry Number, 7723140, which relates to a recognized hazardous and toxic substance, commonly referred to as elemental phosphorus, red phosphorus or black phosphorus and used in fireworks, artillery shells, smoke bombs and pesticides. This chemical is a reactive solid, which is highly combustible. Its fumes are extremely poisonous, and when it comes in contact with skin will cause severe burns or intense inflammation. According to legislative history, a fair reading of CERCLA demonstrates that the Act was passed to address serious threats to**

> **human health and the environment from synthetic, man-made chemicals, chemical contamination, and the results of modern chemical technology. The form of phosphorus common to manure or urea, or their by-products, is not characteristic of the forms of phosphorus that are addressed in CERLCA.**

The testimony states:

> Two Total Maximum Daily Loads (TMDLs) for soluble reactive phosphorus in the North Bosque River were adopted by TCEQ and approved by EPA in 2001. TCEQ subsequently approved a plan to implement these TMDLs, which are designed to reduce the amount of phosphorus in the North Bosque River. It remains to be seen whether or not the TMDLs will be effective in reducing the phosphorus entering the North Bosque River.

> **The TMDLs adopted by the Texas Commission on Environmental Quality, and the associated Implementation Plans, lay out a rigorous and detailed plan for ensuring that specified management practices and activities will be carried out. See Attachment 3: Water Quality in the North and Upper North Bosque Rivers: January 2007 Status Report of Activities to Address Elevated Nutrient Concentrations. Figures 3 and 4 illustrate that as water flows from the upper reaches of the river system to Waco Lake, the concentrations of soluble reactive phosphorus and Chlorophyll decrease to a level that meets water quality standards.**

Farm Bureau appreciates this opportunity to contribute to the record of the subcommittee's hearing. In sum, we believe agriculture has made tremendous strides over recent years in reducing nonpoint pollution from agricultural lands. We have done this through the high stewardship ethic of farmers and ranchers, with the assistance of the conservation programs of the Farm Security and Rural Investment Act of 2002. Farmers and ranchers recognize our conservation programs are a vital part of U.S. agricultural production and environmental policy. Farmers and ranchers are key to a good environment, abundant food, feed and home-grown energy. Most importantly, we remind the committee that short-term solutions such as minimizing crop inputs done in the name of environmental protection may well have unintended consequences in the long-term which will not be good for agriculture.

We appreciate the opportunity to offer these perspectives of farmers and ranchers.

Attachment 1

Waco Lake

Segment: 1225 Brazos River Basin

Basin number:	12
Basin group:	D
Water body description:	From Waco Lake Dam in McLennan County to a point 100 meters (110 yards) upstream of FM 185 on the North Bosque River Arm in McLennan County and the confluence of the Middle Bosque River on the South Bosque River Arm in McLennan County, up to the normal pool elevation of 455 feet (impounds Bosque River)
Water body classification:	Classified
Water body type:	Reservoir
Water body length / area:	7,178 Acres
Water body uses:	Aquatic Life Use, Contact Recreation Use, General Use, Fish Consumption Use, Public Water Supply Use

Additional Information: The aquatic life, contact recreation, public water supply, and general uses are fully supported. The fish consumption use was not assessed.

2002 Concerns:

Assessment Area	Use or Concern	Concern Status	Description of Concern
Middle/South Bosque River arm of lake	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen
Middle/South Bosque River arm of lake	Algal Growth Concern	Concern	excessive algal growth
North Bosque River arm of lake	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen
North Bosque River arm of lake	Algal Growth Concern	Concern	excessive algal growth
Portion of lake near dam	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen
Portion of lake near dam	Algal Growth Concern	Concern	excessive algal growth

Monitoring sites used:

Assessment Area	Station ID	Station Description
Middle/South Bosque River arm of lake	11948	LAKE WACO MIDDLE AND SOUTH BOSQUE ARM ABOVE SH 6
Middle/South Bosque River arm of lake	11949	LAKE WACO SOUTH BOSQUE ARM NEAR HEADWATER
Middle/South Bosque River arm of lake	16997	LAKE WACO, EAST BANK, 30M NORTH OF SH6 BRIDGE
Middle/South Bosque River arm of lake	17210	LAKE WACO SOUTH/MIDDLE ARM NORTHWEST OF KOEHNE PARK, 2.4 KM NORTH SH 6
Middle/South Bosque River arm of lake	17211	LAKE WACO SOUTH/MIDDLE ARM AT MOUTH OF HOG CREEK AT WHITE BUOY NEAR SOUTH SHORE

Monitoring sites used:

Assessment Area	Station ID	Station Description
North Bosque River arm of lake	11945	LAKE WACO NORTH BOSQUE ARM
North Bosque River arm of lake	11946	LAKE WACO NORTH BOSQUE ARM AT FM 185 BRIDGE
North Bosque River arm of lake	16995	LAKE WACO, 500YDS WEST OF DAM, EAST OF AIRPORT PARK
North Bosque River arm of lake	17204	LAKE WACO NORTH BOSQUE ARM AT BUOY APPROX 300 M NORTH OF THE END OF PAVEMENT OF NORTH SPEEGLEVILLE ROAD
North Bosque River arm of lake	17205	LAKE WACO NORTH BOSQUE ARM AT SPEEGLEVILLE I PARK AT WHITE BUOY ADJACENT TO BOSQUE BEND CLUBHOUSE
North Bosque River arm of lake	17206	LAKE WACO MID-LAKE 2 KM SOUTHWEST OF SPILLWAY, 5.2 KM NORTH OF SH 6
Portion of lake near dam	11942	LAKE WACO NEAR DAM
Portion of lake near dam	11943	LAKE WACO AT OXYGEN BOIL AERATOR NEAR OUTLET
Portion of lake near dam	11944	LAKE WACO LANGDON BRANCH ARM AT LAKE SHORE DRIVE BRIDGE
Portion of lake near dam	16996	LAKE WACO, MID-LAKE, SW OF THE RISER AND SPILLWAY
Portion of lake near dam	17207	LAKE WACO MIDWAY BETWEEN SPILLWAY AND DAM OUTLET, 315 M SOUTH OF THE DAM
Portion of lake near dam	17208	LAKE WACO 350 M SOUTHWEST OF DAM OUTLET IN MAIN BODY
Portion of lake near dam	17209	LAKE WACO 0.8 KM SOUTHWEST OF DAM OUTLET IN MAIN BODY

Published studies:

Publication	Date	Author
IMS 77 Lake Waco	May 1977	Wyrick, D. (Region 9)

Attachment 2

- the TMDL Team in the Strategic Assessment Division of the Office of Environmental Policy, Analysis, and Assessment of the Texas Natural Resource Conservation Commission.

Significant assistance was provided by:

- the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University in Stephenville, Texas
- the Bosque River Advisory Committee (BRAC)
- the Texas State Soil and Water Conservation Board (TSSWCB)
- the Blackland Research and Extension Center (Blackland)

The two TMDLs described in this document were adopted by the Texas Natural Resource Conservation Commission on February 9, 2001. Upon adoption, the TMDLs became part of the Texas Water Quality Management Plan. The Texas Natural Resource Conservation Commission will use this document and the Texas Water Quality Management Plan in reviewing and making determinations on applications for wastewater discharge permits and in its nonpoint source pollution abatement programs.

Background Information

The North Bosque River (Segments 1226 and 1255) was included in the 1998 Texas CWA § 303(d) List and deemed impaired under narrative water quality standards related to nutrients and aquatic plant growth. Recent studies have indicated that under most conditions phosphorus is the limiting nutrient in the North Bosque River basin (Kiesling et. al., draft), and that dairy waste application fields and municipal wastewater treatment plants are the major controllable sources of phosphorus (McFarland and Hauck 1995, 1997, 1998, 1999a, 1999b). Watershed modeling for the North Bosque River TMDL assessed source categories of urban stormwater runoff, municipal wastewater treatment plants, wood/range land, pasture, row crops, non-row crops, and dairy waste application fields (Santhi et al 2000a, 2000b). The wood/range land use approximates the natural background condition of the watershed prior to development.

Evaluation of water quality conditions in the North Bosque River cannot be expressed exclusively in quantitative terms because the bases for including these segments on the impaired water body list are not related to violations of specific numeric criteria, but rather to narrative standards concerning nutrients and excessive algal growth. The Texas Surface Water Quality Standards [30 TAC, Chapter 307.4 (e)] say:

> "Nutrients from permitted discharges or other controllable sources shall not cause excessive growth of aquatic vegetation which impairs an existing, attainable, or designated use. Site-specific nutrient criteria, nutrient permit limitations, and/or separate rules to control nutrients in individual watersheds will be established where appropriate after notice and opportunity for public participation and proper hearing."

While there is little debate that nutrients in excessive amounts can create a situation conducive to the proliferation of algae and other aquatic plants, the quantification of what

Attachment 3

Water Quality in the North and Upper North Bosque Rivers

January 2007: Status Report of Activities to Address Elevated Nutrient Concentrations

TCEQ

This report provides an overview of activities to monitor and improve water quality in the Upper North Bosque River (Segment 1255) and the North Bosque River (Segment 1226) located in Texas.

Environmental Problem

Nutrient and algal concentrations in excess of screening levels established by the Texas Commission on Environmental Quality (TCEQ) have been found in the North Bosque and Upper North Bosque Rivers since 1996. High concentrations of nutrients can cause excessive growth of algae and other aquatic plants in water bodies which can impair the aesthetic value of the river. Algae can also lead to taste and odor problems in drinking water, and may cause reduced dissolved oxygen which can result in fish kills. Because of these conditions, the two river segments were identified as not meeting the narrative criteria set out in the Texas Surface Water Quality Standards.

Implementing TMDLs

In response to the environmental problem, the TCEQ developed a total maximum daily load (TMDL) for each segment of the North Bosque River, and created an implementation plan to improve water quality in the river. A TMDL is like a budget; it determines how much of a particular pollutant a water body can absorb and still maintain its beneficial uses. The TMDL then divides the allowable amount of the pollutant among its sources in the watershed. An implementation plan describes the actions needed to meet the budget—or load—for the pollutant. The soluble reactive form of phosphorus is the target pollutant for the TMDLs because it has been identified as the most available form of the nutrient. If controlled, it would have the most effect in limiting algal and plant growth in the North Bosque River.

The TMDLs and Implementation Plan address phosphorus that originates from animal feeding operations and from municipal wastewater treatment plants. The Commission approved the TMDLs in February 2001; the EPA approved them in December 2001. The Commission and the Texas State Soil and Water Conservation Board (TSSWCB) approved the Implementation Plan in December 2002 and January 2003, respectively.

Environmental Goal

The goal of the TMDL Implementation Plan is to restore water quality so that it meets state standards and criteria. To meet that goal, the plan is designed to reduce the annual average concentration of soluble reactive phosphorus (SRP) at five index sites (see map, Figure 1) along the North Bosque River. Reduction goals are site-specific, and range from 39% to 62% (see Figure 2).

Environmental Progress

Many regulatory and outreach activities to implement the planned phosphorus control measures are underway and others are just beginning. Some of the measures clearly reduce the amount of phosphorus available in the watershed; however, the effectiveness of the Implementation Plan cannot be determined until all management strategies have been implemented.

The TMDL Implementation Plan indicates that the TCEQ needs at least five years of water quality data after all the management strategies are implemented to adequately compare stream conditions to predictions. The predictions modeled in the TMDL for each index site are illustrated in Figure 2. The graphs in Figure 2 show annual average concentrations of soluble reactive phosphorus from October 1997 through September 2006. The water quality data do not show any improvements that can be confidently attributed to the TMDL Implementation activities. Yearly deviations are best correlated to natural variability due to rainfall and stream flow. The success of the TMDL is dependent upon the full implementation of all management strategies, including new permits and a variety of best management practices.

Figure 1. North Bosque River Watershed

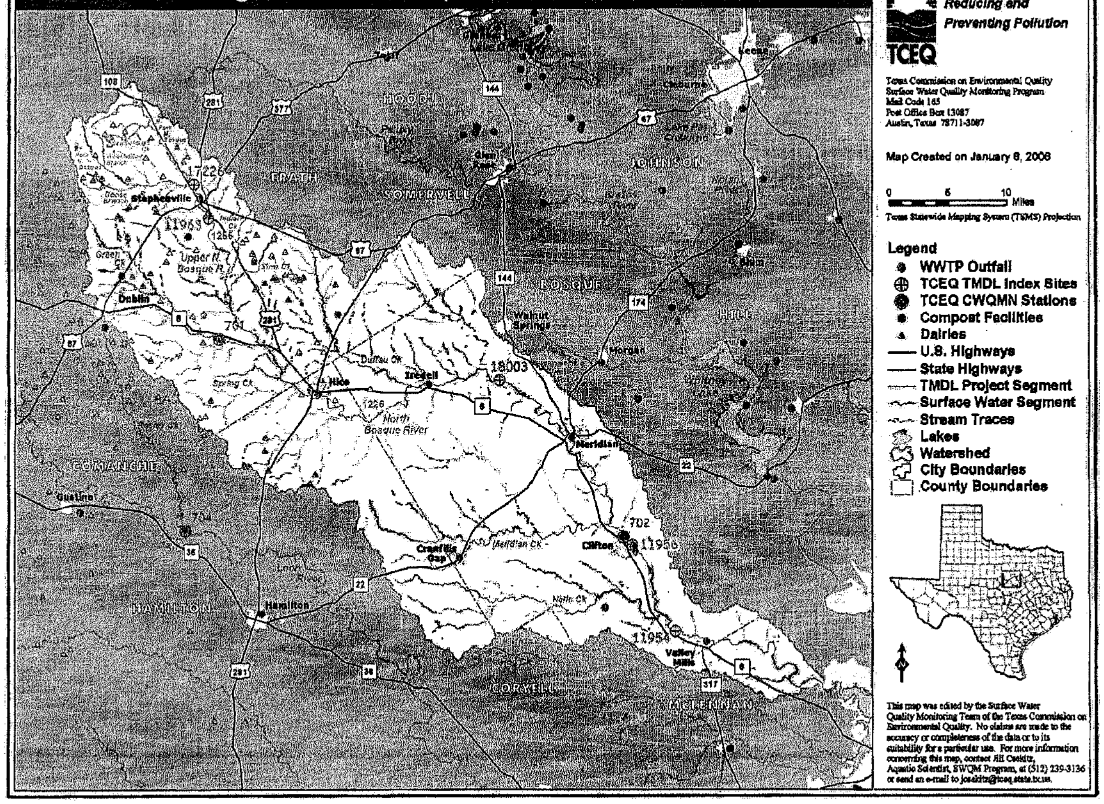
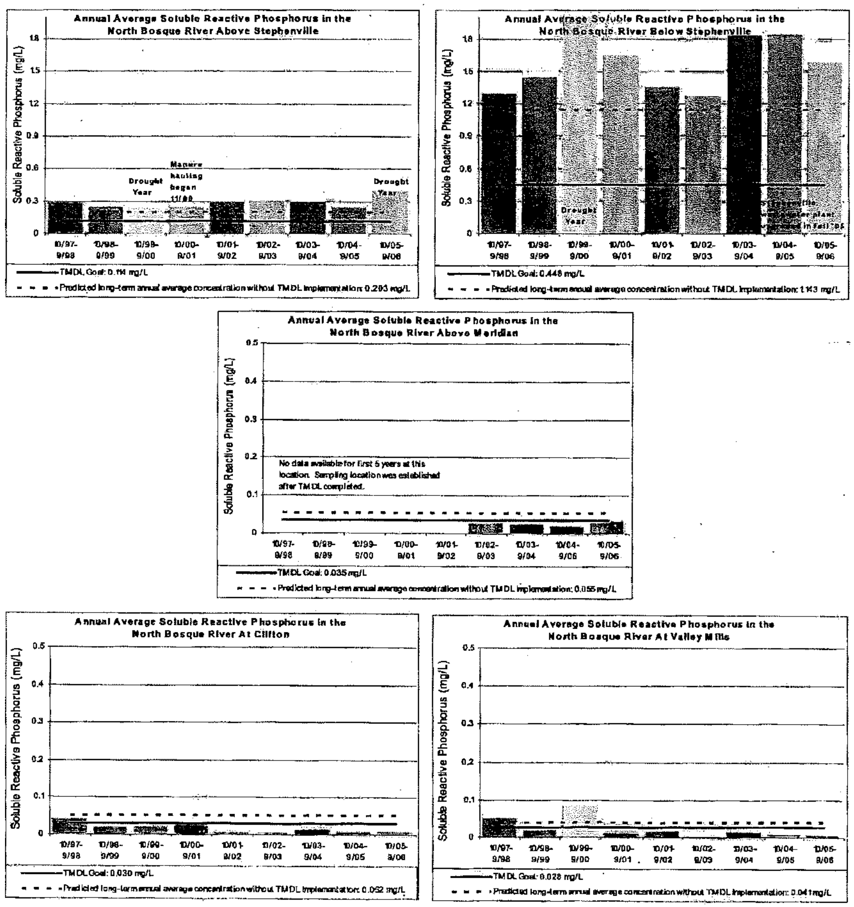


Figure 2. Annual Average Concentration of Soluble Reactive Phosphorus at the five TMDL Index Sites on the North Bosque River - October 1997 through September 2006

As indicated in the TMDL Implementation Plan, the TCEQ needs at least five years of water quality data after "on-the-ground" implementation strategies are completed to adequately compare stream conditions to predictions. The timing for the initial implementation of some of the management strategies is shown on the graphs. In those years shown as "Drought Year", there were only a few samples taken due to no water in the stream. This can cause the average value to be skewed by environmental conditions, and should not be considered representative of average conditions.



Other Indicators of Water Quality

The TCEQ uses screening levels to identify *Concerns* due to nutrients because there are no numerical criteria in the *Texas Surface Water Quality Standards* for nutrients. *Concerns* are identified when more than 25 percent of the samples have concentrations that exceed the screening level over a five-year period. The screening levels differ from the TMDL annual average goals illustrated in Figure 2, which were established by the models designed for load reduction. The Tarleton Institute for Applied Environmental Research (TIAER) along with TCEQ, and its Clean Rivers Program partner, the Brazos River Authority (BRA), routinely collect and analyze water quality samples to determine the concentrations of all nutrients and chlorophyll *a*, as well as a suite of other water quality indicators.

Phosphorus Results

The TCEQ conducted a screening level analysis for all available data from October 2001 through September 2006. Samples that exceeded the screening level for soluble reactive phosphorus were found at two of the five TMDL index sites (Figure 3). At the sampling location downstream of Stephenville, 90 percent of the samples collected exceeded the screening level, indicating a *Concern*; whereas, at the sampling location upstream of Stephenville, only 8 percent of the samples collected exceeded the screening level. It is important to note that the screening levels were derived using the 85th percentile of all samples collected throughout the state of Texas. Therefore, the screening level is merely a way to indicate a relative level of concern and not a true indicator of whether the concentration is causing the water quality to be degraded. The TMDL model for the site located downstream of Stephenville indicates that the average annual concentration of phosphorus after implementation is complete should be approximately 0.5 mg/L, the same as the TCEQ screening level. This is an average and it is accepted that there will be times when the concentration is above or below that level.

TCEQ Screening Levels for Nutrients and Chlorophyll a
The TCEQ screening level for ortho-phosphate phosphorus, also known as soluble reactive phosphorus, in streams is 0.5 milligrams per liter (mg/L); for chlorophyll *a*, the level is 11.6 micrograms per liter (ug/L). These levels are based on the 85th percentile of concentrations found throughout the state. A stream is classified as a *Concern* in the TCEQ's 2004 *Water Quality Inventory* **when more than 25% of the values** in a five-year period exceed the TCEQ screening level.

Chlorophyll a Results

TCEQ screening levels for concentrations of chlorophyll *a* are used to indicate whether a water body has significant concentrations of algae. Although chlorophyll *a* is not one of the measures of success defined in the TMDL Implementation Plan, it is recognized nationally as an indicator of nutrients and algae growth. For the period October 2001 through September 2006, two of the stations (Above Stephenville and Below Stephenville) were shown to exceed the screening levels for chlorophyll *a* more than 25 percent of the time (Figure 4).

Figure 3. Soluble Reactive Phosphorus
Percent of Values Exceeding TCEQ Screening Level (0.5 mg/L)
October 2001 through September 2006

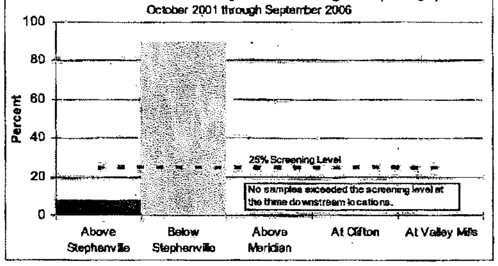
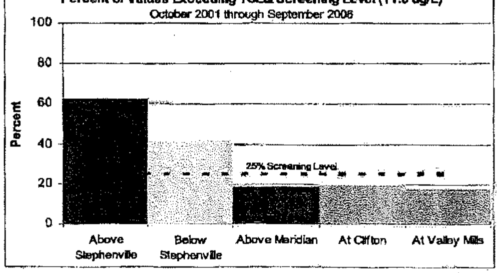


Figure 4. Chlorophyll a
Percent of Values Exceeding TCEQ Screening Level (11.6 ug/L)
October 2001 through September 2006



Implementation Activities

The general approach to implementing the Bosque TMDLs is to reduce phosphorus loading from animal feeding operations and wastewater treatment plants.

Activities fall into nine general categories:

- issuing new and amended permits for dairies and municipal wastewater treatment plants;
- revising rules for animal feeding operations (AFOs), including concentrated animal feeding operations (CAFOs);
- institutionalizing the composting program and its associated permit requirements;
- developing and implementing best management practices;
- education and outreach;
- monitoring to track environmental results;
- enforcing compliance;
- developing a database for tracking results;
- refining the model.

Status of TMDL Implementation

Work has begun on all of the implementation measures, and some have been completed.

Successes

- All municipal wastewater discharge permits have a compliance schedule consistent with the wasteload allocation in the TMDL. The wastewater treatment plant upgrades were completed ahead of schedule.
- The TCEQ adopted amendments to the Subchapter B rules for CAFOs on July 15, 2004.
- As of August 2006, the TCEQ has issued one permit and has 48 more in technical review. The applications contain provisions that are consistent with the CAFO rules.
- The compost program met its goal of removing at least 50% of solid cattle manure from CAFOs in FY 2003, 2004, and 2006, with a slight shortfall in FY 2005 (Figure 6). As of December, 2006, four months after the end of the incentive program, the five compost facilities that participated in the final years of the program are still actively composting and exporting manure from the watershed.
- The TCEQ issued a general permit for manure composting in October 2002, under which compost facilities may use their wastewater for irrigation under restrictions that assure no runoff of wastewater and no accumulation of nutrients in irrigated soils.
- Information presented in the TIAER report, "Preliminary Evaluations of Impacts from the Manure Composting Program on Stream Water Quality," indicates a positive correlation between participation in the compost program and reductions in phosphorus in the stream through November 2005. At two sites downstream of dairies with the highest levels of participation in the compost program, measurements showed small, but statistically significant, reductions in concentrations of soluble reactive phosphorus.

Improvements to Municipal Wastewater Treatment Plants

The cities of Clifton and Stephenville upgraded their wastewater treatment plants with support from grant funds available through the Texas Water Development Board. Upgrades to the facilities were completed in spring 2005 and fall 2005, respectively. The facilities have been contacted and stated that the upgrades are functioning as expected.

Amended Permits for CAFOs

CAFO rules were amended to implement recent changes in federal regulations affecting AFOs statewide, and to support implementation of the North Bosque River TMDL at dairy operations in the watershed. The revised rules require Nutrient Management Plans (NMPs) and enhanced inspection, testing, and record keeping elements.

In addition, requirements specific to dairy CAFOs in the Bosque watershed include:

- obtaining individual permits
- implementing retention control structure management to:
  - increase the design margin of safety to 25-year/10-day rainfall event
  - document when wet-weather overflows are beyond control
- implementing CNMPs
- specifying land application practices for contractors
- installing automatic emergency shutdown or alarm system if required
- adhering to vegetative buffer requirements
- installing filter/buffer strip between vegetative buffer and land application area.

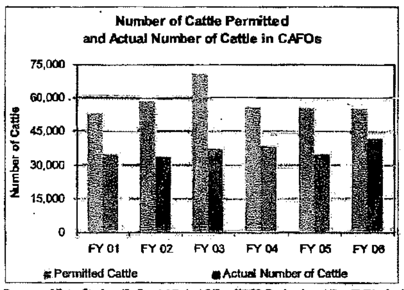
The CAFO rules include education requirements that ensure operators and specialists are adequately trained. Dairy Waste Management courses are required of all permitted dairy CAFO opera-

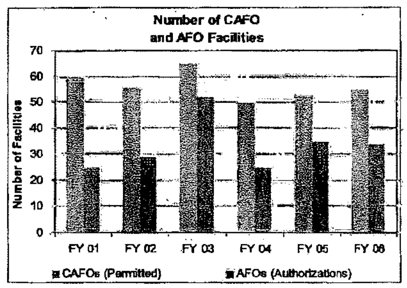
Figure 5. Cattle Population in the North Bosque River Watershed, Fiscal Years 2001 through 2006

The cattle (dairy & beef) population numbers[1] shown below include CAFOs which operate under permits, and those AFOs which are authorized under TCEQ rules[2]. Most CAFOs operate with less cattle than the maximum allowed under their permit; an actual head count is obtained for CAFOs during annual facility inspections[1]. The AFOs are assumed to have the maximum number of head allowed (199).

	Permitted Cattle in CAFOs	Actual Number of Cattle in CAFOs
FY 01	53,563	34,913
FY 02	58,931	33,881
FY 03	71,081	37,269
FY 04	56,196	38,343
FY 05	55,684	34,832
FY 06	55,620	41,955

	Number of CAFOs (Permits)	Number of AFOs (Authorizations[2])
FY 01	60	25
FY 02	56	29
FY 03	65	52
FY 04	50	25
FY 05	53	35
FY 06	55	34





Sources of Data: Stephenville Special Project Office, TCEQ Region 4; and *Two TMDLs for Soluble Reactive Phosphorus in the North Bosque River*

[1] The numbers presented are based on the date of the investigation by the TCEQ. These numbers can change throughout the year due to facilities that may change their status from active to inactive, or vice versa, and as cattle are added or taken away.

[2] The AFOs that are represented here are those inspected by TCEQ staff and do not include those AFOs that operate under the jurisdiction of the TSSWCB's Water Quality Management Plans (WQMPs), of which there are currently 14.

tors and include an initial 8-hour course with a supplemental 8 hours required for every 2 years thereafter. The Texas Cooperative Extension (TCE) has partnered with the Natural Resources Conservation Service (NRCS) to conduct courses to certify Nutrient Management Specialists to prepare NMPs and to take soil samples in the watershed.

Inspecting Permitted Facilities and Enforcing Permits

The TCEQ staffs a field office in Stephenville that can respond to citizen complaints about pollution 24 hours a day, 7 days a week. Each CAFO in the five-county North Texas Dairy Outreach Program Area (DOPA) is inspected at least once annually by staff from the Region 4 Stephenville office. The DOPA contains Erath, Hamilton, Comanche, Johnson, and Bosque counties, and encompasses all the dairies in the North Bosque watershed. TCEQ enforcement actions, including penalties, result when violations at a CAFO are documented.

In addition, the TSSWCB annually reviews the status of at least 10% of AFOs that operate under certified Water Quality Management Plans (WQMPs) that help AFOs operate in a way that supports water quality in area streams. As of August 31, 2006, there are 14 AFOs with TSSWCB certified WQMPs.

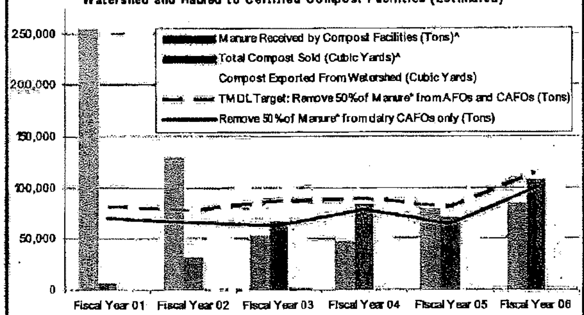
Staff from the TCEQ's Region 4 Dallas–Fort Worth office inspects the City of Stephenville's wastewater treatment plant biannually. Staff from the Region 9 Waco office regularly inspects the other six municipal facilities that have amended phosphorus discharge requirements. Both Region Offices may inspect more frequently if complaints or violations are reported.

Managing Nutrients from Dairies

The TMDL set an annual target for removing 50% of collectable manure from dairy CAFOs and AFOs in the North Bosque River watershed (Figure 5). The model used to develop the TMDL was based on a dairy cattle population of 40,450 head for the entire North Bosque River watershed. The TMDL annual target is depicted in the graph in Figure 6 as a dashed red line and differs from the solid black line, which depicts the target considering only permitted dairy CAFOs.

The Composted Manure Incentive Project (CMIP), supported through grants from the TCEQ and the TSSWCB, has a grant goal for the Texas Department of Transportation to purchase 200,000 cubic yards of composted manure, and for other local governments to purchase 50,000 cubic yards. The yellow columns in Figure 6 depict the portion of the TMDL target that the CMIP has accomplished, varying annually with reported dairy herd sizes. Through August 31, 2006, the CMIP had collected more than 650,000 tons of dairy manure from the North Bosque watershed at participating compost facilities, exported the equivalent of more than 329,000 tons of it from the watershed in the form of compost, thus removing more than 1.48 million pounds of phosphorus from the watershed. The trend lines in Figure 6 representing 50% of manure generated in the watershed show an upward trend in FY '06 because the actual number of cattle in the watershed increased during that period. The bars representing total sales and exports of composted manure also show an upward trend in FY '06, due in part to intensive TCEQ marketing and promotion efforts. These efforts included a supplemental rebate program, available on a limited basis to large-scale non-governmental compost users, as well as demonstration of compost erosion control and reclamation practices at Fort Hood and in rock quarries in Texas. The CMIP rebate and technical assistance program ended on August 31, 2006. Compost sales and export totals will not be available to extend this chart beyond FY 2006.

Figure 6. Fate of Dairy Manure Generated in the North Bosque Watershed and Hauled to Certified Compost Facilities (Estimated)



^ One ton of manure received is equivalent to one cubic yard of composted manure.
* Collectable manure excludes manure flushed into lagoons.

The TSSWCB completed guidance for the Comprehensive Nutrient Management Plan (CNMP) Program in 2003. As of August 31, 2006, the TSSWCB has certified 14 CNMPs for CAFOs in the North Bosque River watershed.

Other Activities

Several activities not specifically outlined in the TMDL Implementation Plan are underway to prevent or reduce further nutrient contamination in the North Bosque River.

Innovative Waste Management

The TCEQ has a contract with the Brazos River Authority (BRA) to oversee the design, construction, and demonstration of an innovative waste management system. The system reduces phosphorus in liquids used to irrigate waste application fields. An anaerobic digester capable of generating electricity was installed at a CAFO in the watershed.

TIAER is currently monitoring the liquids monthly at various collection points in the treatment system to measure the phosphorus reduction, and will conduct an economic analysis of the system. Phosphorus will also be managed in combination with the waste and nutrient management practices specified in the dairy's CNMP. Edge-of-field monitoring and soil sampling are also underway to determine the effectiveness of the CNMPs.

Consolidated Environmental Data

The BRA has another contract with the TCEQ to develop a consolidated environmental data system, accessible through the Internet. The system is a repository of water quality and quantity data from various agencies monitoring streams and lakes in the North Bosque and Leon watersheds. Users can search, display, and download data using a variety of search criteria, as well as learn about watersheds and water quality in general. The data repository is available on the Web at www.brazos.org/projectsNorthBosque.asp.

Continuous Stream Monitoring

Two locations in the North Bosque River watershed have been continuously monitored since June 2001 and an additional site was added upstream of Hico in the summer of 2006. These sites include sensors for detecting total reactive phosphorus, nitrate, and ammonia. Valid data produced from these instruments over an extended period of time can be used to determine effectiveness of watershed management activities.

Evaluating New Technologies

The TSSWCB has contracted with the Texas Water Resources Institute at Texas A&M to test new technologies for reducing phosphorus in dairy waste streams. Four technologies have been selected and include: an electrocoagulation system, a polymer-enhanced solids separation system, an aeration system with microbubblers, and a solids separation system using geotextiles.

North Bosque Aerial Survey

The Brazos River Authority, with funding from a TCEQ CWA 319 contract and their own funds, conducted an aerial survey of the North Bosque watershed using aerial videography to document land uses that may be impacting water quality. The project entailed a helicopter flyover to obtain a photographic record of the riparian zones along the river. Interactive DVDs and an atlas for each county in the watershed were produced showing the flight path and points of interest.

Detailed Status of Activities to Implement the TMDLs

Activity	Responsible Agency	Planned Start & End Dates	Progress as of August 31, 2006
Municipal Permits Initiate amendment actions for municipal wastewater treatment plants in order to make all the permits consistent with the TMDL.	TCEQ	2003/ open	All seven municipal permits are now consistent with the TMDL Implementation Plan. Stephenville and Clifton's amended permits were issued by TCEQ in mid-July 2003; permit conditions require that effluent quality average 1 mg/L total phosphorus (or less) by three years from effective date of the permit. Upgrades to the Clifton facility were completed in spring 2005 and upgrades to the Stephenville facility were completed in fall 2005. The cities secured grant funding through the Texas Water Development Board to assist in upgrading their wastewater treatment facilities.
CAFO Permits All dairy CAFOs in the North Bosque River watershed are required to acquire an individual permit. Beef CAFOs are authorized under a general permit with the TCEQ.	TCEQ	2006/ open	The TCEQ has implemented an application review process for CAFO permits. As of February 2006, the TCEQ received 59 technically complete applications. In FY 06: 1 permit issued 48 applications in technical review
Compliance and Enforcement Perform inspections, report permit violations, and levy fines as appropriate. The Region 4 Stephenville office conducts investigations for all the CAFOs and AFOs in the five-county Dairy Outreach Project Area (DOPA) on an annual basis. The Region 4 Dallas/Fort Worth office conducts investigations at the Stephenville wastewater treatment plant on a bi-annual basis. The Region 9 Waco office conducts investigations at the other six wastewater treatment plants (Hico, Iredell, Meridian, Cranfills Gap, Clifton, and Valley Mills) in the North Bosque River watershed using a risk-based approach when targeting scheduled compliance inspections.	TCEQ	2003/ open	In FY 03: CAFOs and AFOs 307 compliance inspections 23 complaint investigations 66 notices of violation (NOVs) 6 enforcement actions Wastewater Treatment Plants 1 compliance inspection 1 complaint investigation 1 notice of violation (NOV) 0 enforcement actions In FY 04: CAFOs and AFOs 239 compliance inspections 37 complaint investigations 99 notices of violation (NOVs) 12 enforcement actions Wastewater Treatment Plants 7 compliance inspections 2 complaint investigations 5 NOVs 1 enforcement action In FY 05: CAFOs and AFOs 220 compliance inspection 15 complaint investigations

Activity	Responsible Agency	Planned Start & End Dates	Progress as of August 31, 2006
Compliance and Enforcement, continued			77 notices of violation (NOVs) 7 enforcement actions Wastewater Treatment Plants 6 compliance inspections 2 complaint investigations 1 notice of violation 2 enforcement actions In FY 06: CAFOs and AFOs 211 compliance inspections 18 complaint investigations 132 notices of violation (NOVs) 8 enforcement actions Wastewater Treatment Plants 2 compliance inspections 4 complaint investigations 4 notices of violation (NOVs) 1 enforcement action
Amend CAFO Regulations Amend rules for Chapter 321, Subchapter B as needed during the 2004 reauthorization.	TCEQ	2003/ 2004	Amendments to the Subchapter B regulations were adopted on July 15, 2004. Requirements of the amended rules become effective for each CAFO upon the issuance of its new or amended permit.
Nutrient Management Plans (NMPs) Dairy CAFOs in the Bosque River watershed are required to submit NMPs as part of their individual permit applications. Those NMPs must be prepared by a Certified Nutrient Management Specialist and utilize NRCS software to develop the NMP. The software includes a Phosphorus Risk Assessment designed to minimize Phosphorus transport to surface waters. In addition to the NMP required in the individual CAFO permit, all dairy CAFOs in the watershed must implement a Comprehensive Nutrient Management Plan (CNMP) by December 31, 2006. A CNMP includes the NMP from the permit as well as additional methods to control nutrients, such as land treatment practices, feed management, and storage and handling of manure and wastewater. CNMPs must be certified by the TSSWCB.	TCEQ/ TSSWCB	2005/ open	The TSSWCB completed guidance for the Comprehensive Nutrient Management Plan (CNMP) Program in 2003. The NRCS/EQIP program offers incentives of $14,000 for developing CNMPs. More than 80 dairies have qualified for preliminary approval from EQIP. Certified CNMPs at CAFOs in the North Bosque River watershed: In FY 04: 1 In FY 05: 3 In FY 06: 8

Activity	Responsible Agency	Planned Start & End Dates	Progress as of August 31, 2006
Compost Manure Incentive Project (CMIP) and Dairy Manure Export Support (DMES) Project Remove approximately 50% of collectable (or dry-handled) dairy CAFO manure from the North Bosque River watershed through composting.	TCEQ/ TSSWCB	2001/ 2006	Through August 31, 2006, the projects had collected more than 650,000 tons of dairy manure, exported the equivalent of more than 329,000 tons in the form of compost, thereby removing more than 1.48 million pounds of phosphorus from the watershed. The total sales and exports of composted manure increased in FY '06, due in part to intensive TCEQ marketing and promotion efforts. These efforts included a supplemental rebate program, available on a limited basis to large-scale non-governmental compost users, as well as demonstration of compost erosion control and reclamation practices at Fort Hood and in rock quarries in Texas. The CMIP rebate and technical assistance program ended on August 31, 2006. After August 31, 2006, the tracking and reporting of composting activities is no longer required. The DMES portion of the project will continue for another fiscal year.
Compost Facility Design & Oversight Develop and manage a grant program requiring design, construction, and management of participating manure compost facilities so as to prevent discharge or runoff of pollutants to waterways. Develop and manage a general permit for wastewater irrigation and evaporation to accommodate no-discharge wastewater management at manure compost facilities. Provide technical assistance and oversight to assure prevention of wastewater discharges from compost facilities.	TCEQ	2001/ open	Five composting facilities were participating in the project as of August 31, 2006, the last day of the Composted Manure Incentive Project. All are prohibited from discharging wastewater under any circumstances. Three of the facilities operate under the TCEQ general permit for manure composting, under which compost facilities may use their wastewater for irrigation under restrictions that assure no runoff of wastewater and no accumulation of nutrients in the irrigated soil. The remaining facilities may not use wastewater for irrigation and may not discharge wastewater in any manner under any circumstances.
Compost Program Monitoring Monitor water quality to measure improvements attributable to the removal and composting of manure.	TCEQ	2002/ open	The BRA and its subcontractor, TIAER, began collecting water quality data in June 2003. Data collection activities continued until August 2005. When analyzing this two-year dataset independent to other water quality data collected in the Leon and North Bosque River watersheds, it is difficult to make a linear correlation between the Composting Program and improvements in water quality; however, the data becomes much more useful when combined with other datasets collected by TIAER and others. The data collected through this project has been helpful in identifying decreasing trends to in-stream phosphorus concentrations in the North Bosque River Watershed.

Activity	Responsible Agency	Planned Start & End Dates	Progress as of August 31, 2006
Model Refinement and Monitoring Collect data to refine the TMDL model. Data may be gathered from ongoing monitoring activities or collected specifically for modeling needs. Develop refined model and use to reassess the TMDL allocation and implementation plan.	TCEQ	2002/ 2006	TIAER is performing the work for this task under contract with the TCEQ. The University of Texas Center for Research in Water Resources is participating as a subcontractor. The work plans for model refinement and supporting monitoring were developed with stakeholder input. A quality assurance project plan (QAPP) for monitoring to support the model refinement project was approved by the EPA in February 2004. Stakeholder meetings were held in March and December 2003, September 2004, August 2005, and in May, July, and December 2006. Monitoring work has been completed. Model refinement is nearly complete, calibration of the model is underway, and TMDL reassessment should be completed during 2007.
Water Quality Monitoring and Assessment Monitor instream water quality to determine status and trends in concentrations of soluble reactive phosphorus.	TCEQ	2002/ open	Five index sites have been selected and are being monitored under the state's coordinated monitoring program. TIAER, along with the TCEQ, and its Clean Rivers Program partner, the Brazos River Authority, routinely monitor conditions to gauge the overall health of the North Bosque River. The constituents monitored include concentrations of all nutrients and chlorophyll *a*, as well as a suite of other water quality indicators. There has not yet been enough time since implementation, nor has enough data been collected, to determine any trends related to TMDL implementation. For water quality data collected from October 2001 through September 2006: • At the index site downstream from Stephenville, phosphorus concentrations were elevated more than 25% of the time, suggesting a concern for water quality. • At the two sites above and below Stephenville, chlorophyll *a* concentrations were elevated more than 25% of the time, suggesting a concern for water quality. • Samples collected at the other three TMDL index sites indicate that phophorus concentrations are meeting both the TMDL targets and the statewide nutrient screening levels.

Activity	Responsible Agency	Planned Start & End Dates	Progress as of August 31, 2006
Microwatershed Monitoring Monitor in-stream water quality of small tributaries to characterize the contribution of nutrients from waste application fields and other wastewater management practices, for use by the micro-watershed producer councils.	TSSWCB	2002/ open	Baseline data has been collected for the microwatersheds through a contract with TIAER. Their report, *Evaluation of the Manure Composting Program on Stream Water Quality: Interim Update through 2005*," indicates that there is a positive correlation at three sampling sites between participation in the compost program and reductions in phosphorus in the stream. Significant decreases from 19 to 23 percent were observed in soluble reactive phosphorus concentrations at these three sites, which also had the largest drainage areas and removed the most manure per cow in the watershed.
Microwatershed-Based Education Form microwatershed producer councils and conduct meetings semiannually to present information on upcoming educational opportunities, discuss findings of monitoring studies, and discuss development and implementation of certified WQMPs or CNMPs for agricultural operations. Deliverables include delineating the watersheds; compiling the location and types of existing BMPs; listing the updated or newly developed WQMPs and BMPs implemented; compiling results of cumulative soil sampling; and documenting annual reviews of WQMPs.	TSSWCB	2002/ open	Progress on this task is dependent on CNMP implementation. Councils will be formed as soon as enough dairies complete CNMPs and receive certification from TSSWCB. Microwatersheds have been delineated. The database design is complete, based on an earlier WQMP database. The TSSWCB expects to begin forming the councils in fall 2005. Because there were not enough completed CNMPs to justify the expenditure for this activity, the TSSWCB has decided to delay this activity and use the fundidg for the ongoing micro-watershed monitoring effort that is evaluating the effect of pollution prevention practices.
Conduct Dairy Waste Management Courses Subchapter B of the CAFO Rules requires all dairy operators to attend continuing education training to maintain knowledge of current practices.	TCEQ/TCE	1998/ open	In 2002, four training classes were held and two special classes were offered. In 2003, two were held; in 2004, there were four classes. In 2005, three major training events were held: the Tri-County Dairy Day, the Stephenville Ag Expo, and the Sulphur Springs DOPA Training. Three smaller training sessions were also held. In February, a training session was provided in Comanche on nutrient uptake, and in March on fecal coliform bacteria in surface water. In April 2006, a training session was held in Hico related to the new rules and nutrient management, and in Stephenville on overseeding and nutrient management. The Texas Cooperative Extension (TCE) has developed several online training modules that are available to owners/operators of dairy CAFOs that they may complete for continuing education credits.

NCGA 1957 - 2007

Written Statement of the National Corn Growers Association

Regarding Agriculture's Impact on Water Quality

Submitted to the Committee on Transportation and Infrastructure Subcommittee on Water Resources and Environment U.S. House of Representatives

Thank you for the opportunity to submit written comments to the Subcommittee on Water Resources and Environment regarding your recent hearing on agriculture's impact on water quality.

The National Corn Growers Association (NCGA) is a national organization founded in 1957 and represents more than 32,000 members in 48 states, 47 affiliated state organizations and more than 300,000 corn farmers who contribute to state check-off programs for the purpose of creating new opportunities and markets for corn growers.

Corn growers are committed to leaving our environment in better shape than we found it. This statement is intended to highlight the proactive agricultural practices and technologies that enable corn farmers to make significant efficiency gains and environmental footprint improvements.

America's corn producers continue to make an important contribution to our nation's economy. The relatively stable production over the past ten years, made possible by innovation in management practices and technological advances, has helped ensure ample supplies of corn for livestock, an expanding ethanol industry, new biobased products and a host of other uses in the corn industry. Moreover, investments by the American taxpayer in our nation's agricultural programs have helped to produce a more stable financial environment for production agriculture and a brighter future for our rural communities. In our view, reliable, abundant, affordable and safe supplies of grain for the food on our tables to the fuel in our cars are generating benefits many times over for our national economy.

Advances in corn production technology during the last 70 years have enabled the realization of greater yields and fewer acres planted. In 1936, approximately 102 million acres were under cultivation for corn. The average yield in 1936 was 18.6 bushels/acre for a corn crop of 1.2 billion bushels produced.

Fast forward to 2006 – corn production eclipsed 10 billion bushels for the fourth consecutive year. Last year corn growers produced the second highest bushel per acre average in history at 149.1 bushels per acre. This was cultivated on 79.3 million planted acres. To produce an amount of corn equivalent to the 2006 crop using production practices from the 1930s would require 430 million acres – an area slightly larger than the state of Alaska.

However, it's not just about growing more corn; it's about how we grow it. Because American farmers are dependent upon the integrity of their soil and other natural resources for their livelihood, they work tirelessly to protect and improve the land. In the case of corn production, farmers understand that satisfying the demands of a growing world population must not come at the expense of ecological health, human safety or economic viability. Accordingly, for decades corn growers have adhered to a principle of continuous improvement and an incessant pursuit of greater efficiency. As a result, significant benefits to society have been achieved by modern agriculture and improvements in production efficiency will continue to lessen the environmental impacts of food production.

Additionally, we echo the comments submitted to the Committee by the National Cattlemen's Beef Association, the National Pork Producers Council, and the American Farm Bureau Federation. Many corn growers are also in the livestock business and subject to federal Clean Water Act regulations for concentrated livestock and poultry feeding operations. Concentrated animal feeding operations have ample regulatory incentives to ensure water quality is not compromised by the production of their animals, their manure and the use of that manure on land for crop production.

Nutrient Management

Corn, like all plants, is dependent upon three macro-nutrients: nitrogen (N), phosphorus (P) and potassium (K). On average, the earth's soil contains approximately 20 percent of the nutrients food production requires. Manufactured and processed fertilizers make up the difference, most notably in N, P and K.

The Macro-nutrients of Nitrogen, Phosphorus and Potassium

> **N:** Plant growth and chlorophyll production need nitrogen. Nitrogen is the most used nutrient for corn and many other crops, and it is the building block for many fertilizers. Nitrogen makes up approximately 78 percent of the atmosphere and is renewable and sustainable. Ammonia fertilizer is processed by combining nitrogen from the air with natural gas.
>
> **P**: Plant root uptake is dependent on an adequate supply of soil phosphorus/phosphate. Phosphorus is involved in seed germination and helps plants use water efficiently. Phosphorus occurs in natural geological deposits that can be found plentifully in the United States and other parts of the world.

K: Potassium, the seventh most abundant element in the earth's crust, protects plants from cold winter temperatures and helps them resist invasion by weeds and insects. Potassium is necessary for stopping wilting, helping roots stay in place and assists in transferring food. Potassium filters into oceans and seas through natural processes and is left as mineral deposits as these bodies of water eventually evaporate.

A common myth is that N, P and K are "chemicals". Fertilizer frequently is mislabeled as "chemical," and inaccurately lumps together fertilizer and pesticides. Like the "micro nutrient" elements iron, zinc and copper that plants need in smaller amounts, these natural elements are not "chemicals."

Corn, and every other grass species, is incapable of fixing atmospheric nitrogen in the way leguminous plants such as soybeans, peanuts and alfalfa can. Therefore, corn must take up this nutrient through the soil. Although numerous nutrient sources are available, the vast majority of the nutrient requirements are met through synthetic fertilizer compounds.

Increasing fertilizer costs, environmental concerns and changing agronomic practices are accelerating farm nutrient management efficiencies. Early in the next decade life sciences companies will introduce corn hybrids containing biotechnology traits designed to further dramatically increase corn nitrogen utilization efficiency.

The latest advances in agricultural technology enable farmers to apply fertilizers with pinpoint accuracy, minimizing their impact to soil, water and air. For example, the use of enhanced efficiency fertilizers, such as slow- and controlled-release fertilizers and stabilized nitrogen fertilizers, help protect the environment by reducing nutrient losses and improving nutrient efficiency while improving crop yields. Additionally, farmers adopt nutrient management plans to increase fertilizer use efficiencies.

According to the U.S. Department of Agriculture (USDA), U.S. growers used less nitrogen to produce over 50 percent more corn than in 1980. Furthermore, over the past 15 years farmers experienced a 17 percent increase in nitrogen efficiency as measured by bushels of corn produced per pound of nitrogen applied. This in turn means less nutrients lost to run off.

Declining Pesticide Usage

Corn production, similar to every other crop, is highly dependent on adequate control of competition from weedy plants and from feeding insects. The abundant food and high standard of living in the United States would not be possible without pesticides. Pesticides are necessary to protect crops from insects, weeds, rodents, fungi, and other pests. They lead to more efficient production, which in turn leads to less environmental impact. Regardless of the production technique employed, crop production requires pest mitigation. In short, pesticides are a necessary protection for our food production system. In agriculture, pesticides enable producers to compete profitably in the global marketplace.

As the global population grows and farm acreage shrinks, food production efficiency cannot be jeopardized. Fortunately, through research, education and government oversight the risks associated with pesticides are being reducing and safer chemicals, pest-specific pesticides, and improved application methods are continually be introduced.

The most recent (2006) U.S. Geological Survey (USGS) report on the quality of the nation's streams and ground water states that "pesticides were commonly detected at concentrations far below Federal or State standards and guidelines for protecting water quality." Pesticides registered in the past 20 years are less toxic and degrade more rapidly. Furthermore, the USGS data show, when detected, the concentrations are miniscule and do not affect water quality. Even the older pesticides, which are no longer in use, are declining in the environment according to the USGS data.

Herbicides

During the past 20 years nearly all corn acreage was treated with herbicides to control weeds. Prior to the introduction of chemical herbicides, the primary weed control measure was clean plowing (completely turning over soil) followed by multiple passes of mechanical cultivation. At best, this process had only limited effectiveness; it consumed considerable amounts of fossil fuels and increased the likelihood of soil erosion.

The introduction of chemical herbicides has resulted in improved weed control, higher yields and the introduction of minimum and no-till practices. Since the introduction of herbicide-tolerant crop varieties in the mid 1990s, farmers have greatly reduced the pounds of active ingredient per acre. According to USDA, corn growers reduced pounds of herbicide active ingredient by 29 percent between 1990 and 2005.

In tandem with reduced usage of herbicides, life science companies have also introduced more effective herbicides providing improved weed control and a lower environmental footprint.

Insecticides

The advent of insect-resistant crops in the 1990s has enabled growers to treat for Corn Rootworms, European Corn Borers and/or several other soil-borne pests while at the same time reduce usage of insecticides to combat these pests. Insect-resistant crops are infused with proteins from the common soil bacteria *Bacillus thuringiensis* (Bt), the same protein used by organic gardeners for years. Bt proteins only affect the targeted pest, such as the European Corn Borer or Corn Rootworm larvae, and are completely benign to beneficial insects and wildlife. Nearly 30 percent of all corn acres have been treated with insecticides over the past 15 years.

Prior to the introduction of synthetic insecticides, farmers had little control over insects other than crop rotation. Although farmers still incorporate crop rotation as part of an Integrated Pest Management system, rotation alone has had limited impact.

Bt corn has been widely adopted by farmers. The technology reduces the amount of active ingredient used per acre of corn production and cuts back on the number of trips a farmer makes over the field for tillage and pesticide application. According to USDA, U.S. corn growers have reduced pounds of active ingredient insecticides by 81 percent since the 1990s. The National Center for Food and Agricultural Policy estimates the use of biotech corn for control of corn borers reduced total insecticide use by up to 4.7 million pounds of active ingredient with a net savings to growers of $196 million.

In addition to new technologies, such as Bt, life science companies have introduced more effective insecticides and better delivery systems to control targeted pests; these innovations have further lowered farmers' environmental footprint.

Erosion Reduction

In anticipation of upcoming Farm Bill conservation policy deliberations, NCGA sought relevant information and data available at USDA regarding conservation and environmental work on corn lands. The purpose of this research was to determine the level of conservation practices and production practices nationwide that growers have implemented to conserve soil and limit erosion. With this knowledge, we are able to identify the remaining conservation practices or tillage techniques that might be adopted on corn-producing lands to further reduce soil erosion, thereby improving water quality and other environmental issues.

While not the only source, the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) National Resources Inventory (NRI) is the federal government's principal source of information on the status and trends of soil, water and related resources on non-federal land in the United States. The NRI was conducted every five years during the period 1977 to 1997 but is now conducted annually. This shift helps align the NRI with the need for timely information to support agricultural and conservation policy development and the assessment of the impacts of policy choices and conservation program information.

According to the recently released 2003 NRI report, soil erosion resulting from rainfall and run off (sheet and rill erosion) has declined 42 percent between 1982 and 2003 (4 tons per acre per year in 1982 versus 2.6 tons per acre per year in 2003). Likewise, soil erosion from high winds has declined 44 percent during the same time frame (3.3 tons per acre per year in 1982 versus 2.1 tons per acre per year in 2003).

The "most significant reductions" occurred in two major river basins, the Missouri and Souris-Red-Rainy/Upper Mississippi, where approximately half of the nation's cropland is located. Initial exploration of NRI data shows increases in farm bill conservation title investments to conservation tillage, in areas where appropriate, may hold the potential for the single largest gains in further reducing erosion from corn lands and in turn improving water quality.

Much of this decline in erosion has occurred by reducing tillage. Forty-one percent of all cropland is under a conservation tillage system where farmers leave the stubble or residue from the previous crop to cover the soil's surface after planting. The no-till method, where the soil is left completely undisturbed, is the most effective soil-conserving system and can reduce erosion by 90 percent or more. According to USDA, by leaving the crop residue and reducing or eliminating tillage trips, farmers are able to protect the soil from water and wind erosion, conserve moisture, reduce runoff, improve wildlife habitat and limit output of labor, fuel and machinery.

The elimination of tillage means farmer must rely on herbicides to control weeds. Without herbicide use, no-till agriculture becomes impossible, resulting in increased erosion estimated to be more than 300 billion pounds of soil annually or a 15 percent increase. Much of this soil erosion would enter waterways and significantly reduce quality of the nation's surface water.

Agriculture Drainage Management

NCGA is working with the Agriculture Drainage Management Coalition (ADMC) to implement improved drainage water management practices and systems that will enhance crop production, conserve water and reduce nutrient enrichment of water quality. In recent years, science has shown that improved drainage management is the key to enhancing surface and ground water quality from agricultural lands.

The operation of these systems has shown to reduce nitrogen export from agricultural production areas by at least 30 percent or more. In addition to reducing nitrate-nitrogen losses, science has shown that improved drainage management is a major factor in: 1) reducing surface runoff of pesticides; 2) designing and operating more efficient wetlands and conservation buffers; 3) improving fish and wildlife habitat; 4) reducing problems associated with invasive plants in wetlands and waterways; 5) reducing hazards associated with salts or other elements on irrigated lands; and 6) increasing opportunities for enhancing water conservation on range, pasture and crop lands while enhancing agricultural productivity without requiring additional agricultural lands.

ADMC received a $2.2 million conservation innovation grant from the NRCS to study impacts of drainage water management on farms in Illinois, Indiana, Iowa, Minnesota and Ohio. The grant is allowing farmers and researchers to study management practices that control subsurface drains to better conserve water and reduce nutrient loss. The project will examine yield effects as well as pollution reduction. The demonstration projects will utilize the latest technologies, including satellite-controlled water level monitor structures that farmers will be able to control using Web-based applications. This grant will help develop management recommendations for farmers as well as quantify the yield impacts of this practice.

NCGA supports continued research in this area to develop and improve management recommendations for farmers. We support science-based efforts to measure the real results of the conservation practices we've implemented. The ability to develop understandable and relevant performance measures and communicate them to the public will help shape future public and congressional support for farm programs.

TMDL Education Efforts

NCGA also is promoting stewardship by encouraging growers to become informed about their local watershed issues, including Total Maximum Daily Loads (TMDLs). Corn growers farming in a watershed that feeds a stream, river or lake that is too polluted to support the use designated by their state could find themselves in the middle of a TMDL. As good stewards, producers should learn more about the TMDL process in the watersheds where they live.

Using a grant from the Environmental Protection Agency (EPA), NCGA developed a desk reference guide for producers that offers a "walk through" of the TMDL process as it has been actually applied as well as steps to cultivate successful watershed partnerships.

With this guide, NCGA aims to educate grower members on water quality issues and encourage grower participation in the clean water process. TMDL implementation will be a locally driven process and growers must get involved in local watershed activities to ensure best management practices (BMPs) to reduce pollutants targeted by TMDLs are workable.

Restoration of impaired stream segments cannot be successfully achieved without cooperation from those who live in the watershed. U.S. farmers are the best qualified to offer workable approaches to solving water quality problems involving agriculture. Armed with the information contained is this guide, well-informed growers can better connect with their local community-based watershed coalitions to identify successful, accepted agricultural practices that could be promoted to help meet pollutant reduction goals set by TMDLs.

Soil, water, sunlight and nature's resources are the most important tools a farmer has. Agriculture producers use these resources with care so that future generations can continue to work the land as producers of food, feed and fuel. As highlighted in this statement, we are embracing practices and technologies that help improve the environment through reduced tillage, reduced use of pesticides and herbicides and improved land management.

Environmental stewardship begins on private lands, and corn growers are committed to leaving our environment in better shape than we found it. Once again, we appreciate the opportunity to provide you with these comments and are ready to serve as a resource should you require supplemental information.

Written Statement of the

National Pork Producers Council

Submitted to the

Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment
U.S. House of Representatives

April 19, 2007

INTRODUCTION

The National Pork Producers Council (NPPC), an association of 43 state pork producer organizations and the voice in Washington for the nation's 67,000 pork producers, offers the following written comments with respect to your hearing today on agriculture's effects on water quality. Thank you Chairwoman Johnson, Ranking Member Baker, and members of the subcommittee for this opportunity to provide you with our views on this critical issue.

The U.S. pork industry represents a significant value-added activity in the agriculture economy and the overall U.S. economy. Nationwide, more than 67,000 pork producers marketed more than 103 million hogs in 2005, and those animals provided total gross receipts of $15 billion. Overall, an estimated $20.7 billion of personal income and $34.5 billion of gross national product are supported by the U.S. hog industry. Economists Dan Otto and John Lawrence at Iowa State University estimate that the U.S. pork industry is directly responsible for the creation of 34,720 full-time equivalent jobs and generates 127,492 jobs in the rest of agriculture. It is indirectly responsible for 110,665 jobs in the manufacturing sector, mostly in the packing industry, and 65,224 jobs in professional services such as veterinarians, real estate agents and bankers. All told, the U.S. pork industry is responsible for 550,221 mostly rural jobs in the U.S.

The hog industry in the United States has seen rapid structural changes in recent years, yet total hog numbers have trended up since 1990. In 1990, inventories were 54.5 million head; data from December 2006 showed inventories over 62 million head. And in 2006 2.74 billion pounds of pork and pork variety meats were exported; U.S. consumers purchased 18.8 billion pounds of U.S.-produced pork. Domestic consumption of pork in 2006 was 3 billion pounds higher than it was in 1990; exports were 2.2 billion pounds higher than they were in 1990.

The U.S. pork industry today provides 21 billion pounds of safe, wholesome and nutritious meat protein to consumers worldwide. In fact, 2006 will be the fifth consecutive year of record pork production in the United States, and all indicators point to another record in 2007.

Exports of pork also continue to grow. New technologies have been adopted and productivity has been increased to maintain the U.S. pork industry's international competitiveness. As a result, pork exports have hit new records for the past 15 years. In 2006, exports represented nearly 15 percent of production.

It is without a doubt that pork producers are strong and vital contributors to value-added agriculture in the United States, and we are deeply committed to the economic health and vitality of our businesses and the communities that our livelihoods help support.

Just as importantly, though, pork producers take a broad view of what it means to be environmentally responsible farmers and business people, and we have fully embraced the fact that our pork producing operations must protect and conserve the environment and the resources we use and effect. We take this responsibility with the utmost seriousness and commitment, and it was in this spirit that our producer members have made a major commitment to environmental conservation.

The U.S. pork industry treats as its top goal meeting worldwide consumer demand while simultaneously protecting water, air and other environmental resources that are in our care or potentially affected by our operations. NPPC is proud of the reputation it and its members have earned for initiating innovative environmental improvement programs. NPPC and its producer members take an active role in advocacy at both the federal and state levels for clean water environmental initiatives, and our members have committed themselves to achieving high levels of environmental performance. Pork producers have made protecting water quality one of their top priorities for more than a decade, and the publicly available record demonstrates their accomplishments in this regard.

Over the last several years, there have been major and dramatic changes in federal water quality regulatory policy applicable to livestock and poultry producers in this country. By natural extension, these fundamentally new policies also reach to the intersection between livestock and poultry production and crop production and the use of our animals' manure to substitute for commercial forms of fertilizer in support of crop fertility programs. It is very important that as the Committee considers the subject matter of this hearing that it also understand these policy changes, just how fundamental they are, and just how thoroughly prepared pork producers are to meet or exceed these standards. To this end, our testimony will address the following four important considerations:

1. Federal Clean Water Act regulations for concentrated livestock and poultry feeding operations now effectively encompass all animal species and all clean water aspects of the production of their animals, their manure and the use of that manure on land for crop production that the farmer controls.
2. As a result, concentrated animal feeding operations (CAFOs) now have more than adequate regulatory incentives to ensure that they do not discharge their manure to water and use sound and appropriate agronomic practices for applying their manure to land because failure to do so can result in major CWA penalties. But these water quality protections, which pork producers are treating as a "zero discharge standard," are now achievable without a CAFO having to get a federal CWA permit, and many CAFOs will choose to do that.
3. The EPA CAFO rulemaking record clearly indicates that EPA considers modern pork operations in all parts of the U.S. as capable of achieving this "zero discharge" standard.
4. The state regulatory record of pork producers operations in the major hog producing states indicates that for the last several years, except in a limited number of rare incidents, pork operations are conforming to this "zero-discharge" standard.

BROAD SCOPE OF CWA REGULATORY PROGRAM FOR CAFOS

In 2003 the U.S. EPA issued a final CAFO National Pollution Discharge Elimination System (NPDES) rule and Effluent Limitation Guideline, which dramatically extended and altered the CWA regulatory provisions applicable to animal feeding operations. EPA has subsequently initiated a rulemaking to make changes to the 2003 CAFO rule as a result of litigation that lead the federal courts to invalidate two important provisions of that rule in the so-called *Waterkeeper* decision by the U.S. Second Circuit Court of Appeals. The EPA proposed rule, expected to be issued in final form later this summer, deals with several extremely important aspects of CAFO regulation under the NPDES program. There can be a tendency to look simply at these marginal changes, between 2003 and today, and fail to see the broader sweep of change and reform that has occurred from the time preceding the 2003 rule to where we are to come out in 2007 when the current rule revisions are finalized. The scope of changes is enormous.

For example, we note that any animal feeding operation (pork, poultry, beef, dairy or horse) of almost any size faces potential enforcement and severe penalties for even a single discharge from their operations to waters of the United States. This was not the case prior to 2003, and this has been unchanged by the *Waterkeeper* decision. Perhaps even more important, the 2003 rule extended CWA protections to the application of manure to CAFO lands. Under this change, the application of manure to these lands without appropriate and documented agronomic and conservation best management practices would make any resulting stormwater runoff of pollutants to waters of the United States a CWA "point source discharge" potentially subject to extremely stiff penalties of $32,500 a day and possible other sanctions. This new regulation of land application practices was introduced in 2003, and it also has been untouched by the *Waterkeeper* decision.

CAFOS NOW HAVE STRONG REGULATORY INCENTIVES TO PROTECT WATER QUALITY—EVEN WITHOUT FEDERAL PERMITS

These changes represent a monumental shift in the federal policies and regulations that govern animal feeding operations from pre-2003 to today. They have created substantial and effective incentives for CAFOs to prevent any discharge from CAFO production areas and to use sound and effective manure application practices on crop land. They represent substantial improvements in water quality protection, and there is no question that as an entire sector, livestock and poultry agriculture will improve their water quality performance as a result.

Moreover, consistent with the law under *Waterkeeper*, these incentives remain even for CAFOs that are not discharging or proposing to do so and that, under *Waterkeeper,* can choose not to get a federal NPDES permit. We argue that for the CAFO without an NPDES permit, the incentives **not** to discharge **are even greater** than for the CAFO that does get a permit. This is because a CAFO with a permit is allowed to have a discharge from its production area so long as its operation is designed, maintained and managed so as to contain a 25-year, 24-hour storm event. A non-permitted CAFO that discharges under those circumstances will be fully liable for CWA penalties under *Waterkeeper* and as a result, has a very effective incentive to design, maintain and manage its operation so as to **never** have a discharge.

We believe that EPA issued a proposed rule last summer that would result in a final CAFO rule that in many important respects remained effective, workable and within the legal constraints imposed by the Second Circuit's *Waterkeeper* decision. We offered comments to that rulemaking in the firm belief that the final rule can and will achieve the no-discharge, water-quality protection goals of the CWA without requiring NPDES permits for non-discharging CAFOs.

The bottom line for pork producers is that they now must eliminate discharges and properly manage their manure and its nutrients under the effective standards set in the CAFO rule, and the fact that this could be done by many pork producers without a federal NPDES permit does not diminish in the least the protections to water quality.

EPA CONSIDERS PORK OPERATIONS TO BE NO-DISCHARGE FACILITIES

As detailed in the following section, the actual, factual regulatory record for swine operations indicates that the overwhelming majority are not discharging. This should be no surprise as EPA's own analysis and subsequent proposals in the proposed 2001 CAFO rule for the best available technology standard to be applied to swine CAFOs was predicated on the prominent use of animal and manure management systems that are essentially enclosed. EPA's findings in this regard are discussed below.

EPA proposed in the 2001 rule a "zero-discharge" standard for the production areas of swine CAFOs. While there were numerous sound policy, technical, and economic reasons for EPA to ultimately reject that "zero-discharge" standard in the final 2003 rule, the fact remains that for many properly operated manure management systems, these CAFOs do not have to discharge – as EPA correctly noted.

In the case of swine operations, many of the existing operations in the Midwest use "deep pit" systems where the animals are housed over a below-ground, concrete manure storage unit. This system is used in the vast majority of new facilities that have been built in the Midwest over the last several years. As described by EPA, "Deep pit systems start with several inches of water in the pit, and the manure is collected and stored under the house until it is pumped out for manure application, typically twice a year." [See Development Document for the Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations, Page 11-6 (January 2001)]. The manure in a concrete "deep pit" that is being managed according to ordinary design standards should never come into contact with rainfall during the storage period, nor does the manure leak out of the concrete pit. It only comes out when the producer pumps it out so it can be applied to cropland. Manure in a swine deep pit system does not come into contact with rainfall. The concrete "deep pit" is also a "no-discharge" system.

EPA acknowledged as much in its explanation in the 2001 proposed CAFO rule when it explained the "Option 5" technology standard for swine, veal, egg and poultry operations. Option 5 required "zero discharge of manure and process wastewater" and provided "no overflow allowance for manure and wastewater storage" from swine, veal, egg and poultry CAFOs. EPA justified its Option 5 proposal by stating that:

> . . . swine, veal and poultry operations can house the animals under roof and feed is also not exposed to the weather. *Thus, there is no opportunity for storm water contamination*...Those operations with liquid manure storage can comply with the restrictions proposed under this option by diverting uncontaminated storm water away from the structure. . . .

[66 Fed. Reg. at 3,063 (emphasis added)].

EPA went on to say that those swine CAFOs with open liquid manure management systems and open manure impoundments or lagoons that were exposed to rainfall could comply with Option 5's zero-discharge requirement by "covering the lagoons or impoundments." *Id.* EPA ultimately rejected Option 5 as the technology standard in the 2003 final rule because the costs of retrofitting existing open air impoundments and lagoons with covers was found to be so costly that it would have put a large percentage of swine operations out of business. The rejected option therefore failed to meet the economic achievability standard required by the CWA. But this decision, which centered on the cost of covers for the open manure storage units, does not change the fact that all the "enclosed systems" presented "no opportunity for storm water contamination" and as they were currently designed and operated could achieve zero-discharge, as recognized by EPA.

EPA again recognizes in the 2006 proposed rule that these closed systems are zero-discharge systems. In its discussion of the application of modeling techniques that can demonstrate how classes of new CAFOs with open systems can effectively achieve zero-discharge, EPA notes that it "believes that facilities employing other manure handling technologies (*e.g.*, under house pits) will be able to ensure zero-discharge of manure, litter, and process wastewater ..." 71 Fed. Reg. at 37,762. The fact that swine operations have such a high probability that they will **not** discharge, as reflected in Table 1 in the section below, simply bears out EPA's judgments in the matter.

Some critics of the swine sector have argued that an open lagoon manure treatment system must necessarily discharge as it is exposed to rainfall. EPA's ultimate rejection of Option 5's impoundment covers for open systems, as discussed above, is thought by some to justify the view that open systems must regularly discharge. The facts do not support this view. Swine operations in North Carolina, for example, rely almost exclusively on open lagoon systems that are exposed to rainfall. As reported in Table 1, the per facility, per year incidence of discharges from North Carolina swine facilities is estimated to be 1.1 percent. Each year, therefore, essentially 99 percent of the open lagoon facilities in North Carolina do not discharge.

There are several reasons for this strong performance record. One of the most important is the lagoon's basic design. A swine lagoon in North Carolina is commonly designed according to state and USDA- Natural Resources Conservation Service lagoon storage and treatment design standards. The state has a highly developed regulatory system, and these standards are enforced. A swine lagoon in North Carolina built before the mid-1990s must be able to contain a certain number of inches of manure waste water ("minimum volume"), plus a specific, maximum number of inches of manure waste water that represents where the anaerobic treatment process will take place ("treatment volume"), plus a certain number of inches that represents the volume of rain that could fall directly into the lagoon in a 25-year, 24-hour rainfall event ("emergency storm storage"), plus 12 inches of "freeboard." The only liquid entering this system is the manure waste water coming from the animal house and the rainfall that falls directly into the lagoon.

In North Carolina, the number of inches of "emergency storm storage" that corresponds to the 25-year, 24-hour rainfall event ranges from six to seven inches. Added to the freeboard volume, swine lagoons in North Carolina have effective emergency storm storage of 19 inches. By regulation, a properly managed lagoon in North Carolina must land apply its manure waste water so that in the normal course of operation the total number of inches of manure waste water in the lagoon does not exceed the combined minimum volume and treatment volume. This means that these systems are managed so that they can contain a minimum of 19 inches of rainfall. But beyond this minimum amount, the majority of North Carolina lagoons are being managed today under normal conditions so as to maintain approximately 36 inches of effective emergency storm storage at any time. The U.S. Geological Survey reports that a 100-year, 24-hour storm in North Carolina ranges between eight to nine inches, and that 500-year storm levels are not generally calculated for most parts of the country. But even if a 500-year storm is double the 100-year amount, the 19 inches of minimum available emergency volume could contain those 16 to 18 inches of rainfall.

The fact that most swine operators in North Carolina today take the added precaution of properly applying enough of their manure waste water so that they have an effective stormwater volume of 36 inches makes these systems effectively able to meet a zero-discharge standard. It is no wonder that when it comes to North Carolina swine lagoons and production areas, the discharge data indicates that discharges from these facilities are very rare.

The analysis presented in the 2006 proposed CAFO rule regarding the New Source Performance Standard also clearly demonstrates that the commonly used design and operating standards for open, liquid manure management systems using impoundments or lagoons make them effectively zero-discharge systems. 71 Fed. Reg. at 37,760-762. In this section, EPA presents the analytical and case study record of models of open system operations based on the usual and customary design standards resulting from the application of USDA-NRCS' Animal Waste Management ("AWM") design software and simulation analysis of actual field and rainfall conditions using the USDA-NRCS Soil Plant Air Water Hydrology ("SPAW") tool.

EPA presents this information as part of its decision, in light of *Waterkeeper,* to change the New Source Performance Standard for swine, poultry and veal CAFOs to a zero-discharge rather than the 100-year, 24-hour design that was in the 2003 rule. The simulation modeling results are presented in this context to support EPA's proposal to let state agencies allow a new-source CAFO establish that its open system will attain zero-discharge through "a rigorous modeling analysis that it has designed an open containment system that will comply with the no-discharge requirements." 71 Fed. Reg. at 37,760. EPA also uses these results to support its proposal to not require that an individual new source conduct a detailed simulation of its proposed operation of an open system to justify a zero-discharge designation. Instead, EPA proposed to allow the state agency to create categories of pre-approved types of facilities that have been shown through simulation modeling to achieve zero-discharge as a class when used in certain areas of the state with certain climactic and other physical conditions. ("EPA solicits comment on this approach to streamlining the evaluation process for those CAFOs submitting ''preapproved'' designs and operational procedures." 71 Fed. Reg. at 37,762.)

The proposed rule discusses several case studies that EPA has entered into the record at DCN 1–01225 and 1–01226. These case studies are of systems designed according to AWM standards based on actual Comprehensive Nutrient Management Plans (CNMPs) for livestock operations with open systems in Georgia, South Carolina, Nebraska, North Carolina and Iowa. These modeled operations were designed to contain a 100-year, 24-hour storm and then were simulated with 100 years of actual or projected rainfall data to see if the system would discharge. On the basis of these results, EPA states that "If the facility shows no discharge over the 100-year simulation, then EPA has concluded that the lagoon or pond has been designed to achieve the requirement of no-discharge." 71 Fed. Reg. at 37,762.

As a practical matter, any open impoundment with 25-year, 24-hour emergency storm storage capability that also has 12 inches of freeboard has an effective emergency stormwater storage equal to or in excess of the 100-year storm design standard. This fact, combined with the SPAW simulation modeling results, is further indication as to why the incidence of actual discharges from these CAFOs is so rare.

STATE REGULATORY RECORD SHOWS PORK OPERATIONS TO BE EFFECTIVELY NO-DISCHARGE FACILITIES

EPA's findings in the development of the 2003 CAFO rule, and further reinforced in 2006, are fully supported by the available record of discharges for the last several years from states with regulatory programs.

The major swine producing states have state regulatory programs that involve some form of permitting requirements. Under those programs, many states keep records of manure releases or discharges from livestock operations. Some also have strict requirements that CAFOs report not only "discharges" to the waters of the state or U.S., but also other types of permit violations, as well as manure spills, releases or other incidents regardless of whether they involve waters of the U.S. Some of these states actively accept and act on public complaints about incidents, releases or violations, and they record the complaints and the actions taken in response. Some of these states require each regulated CAFO to have a periodic visit from a state regulator to check compliance. The scope, extent and consistency of these publicly available release or discharge records have grown extensively since the late 1990s. While there are differences in the information collected and reported or otherwise available at the state level, there is a sufficient quantity of information available to indicate how rare swine CAFO discharges to waters of the U.S. really are.

For example, Table 1 below summarizes this information for eight of the top 10 swine producing states in the U.S., which collectively account for 76 percent of the swine produced in the country. The states included are Iowa, North Carolina, Minnesota, Illinois, Nebraska, Missouri, Oklahoma and Ohio. Phone interviews were held with the state agency staff, who reported on the state regulatory data, gave their best professional account of the record in this regard or supplied the publicly available electronic information from these states.[1] Looking at the number of incidents reported, the number of years covered by the reports and an estimate of the number of regulated entities in the state, it is possible to estimate the average historical rate of incidents in a state, per year, per facility.

The average rate of swine producing facilities with discharges or release incidents for each of these eight states over the available data period ranged between zero to .036 (0 to 3.6 percent). The average for all eight states was .007 or 0.7 percent. This number is an overestimate of the actual historical rate of discharges as some of these incidents or releases did not constitute a CWA discharge because they never reached a water of the U.S.

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[1] This data and information was collected on behalf of the National Pork Producers Council by C&M Capitolink, LLC between April and July, 2006. For some of the states reported, the manure "release" data is available on their websites. Some other states will provide this data in written form upon request. In others, the data was gathered through phone interviews with state agency staff responsible for the CAFO permitting program. The number of estimated swine production sites is based on USDA/NASS data on the number of hog farms in the US in 2005 with more than 500 head, except in the case of Illinois, North Carolina and Oklahoma, whose state agencies reported the number shown. See Appendix A of NPPC's CAFO rule comments of August 29, 2007, submitted with the United Egg Producers, American Farm Bureau Federal, National Corn Growers Association and the National Council of Farm Cooperatives for further detail on state specific sources of data and for comments on the extent that the data includes incidents and releases not necessarily lending to discharges.

These results for a considerable majority of swine operations across the U.S. provide a sound, factual justification for why CAFOs as a class cannot be presumed to discharge. These rates may vary in other states, but they should not vary greatly. It is entirely reasonable to expect that the actual probability of a discharge from a particular CAFO in a particular year for all of these other livestock species will be quite low. The rarity of these discharges as a percent of all the regulated facilities subject to or covered by the reporting requirements shows that a presumption that swine CAFOs are commonly discharging in a manner requiring an NPDES permit is unwarranted.

Table 2 – History of manure release incidents involving swine operations during 2000 to 2005, selected states

Swine Operations – 8 States Representing 76% of Production						
State	Rank in Productio n	# Regulated Sites (Estimated)	# Years Reported	# Incidents Reported, Total	Average # Incidents Per Year	Average Rate of Incident s Per Facility Per Year
IA	1	5,250	4	30	7.5	0.001
NC	2	2,300	2.5	64	25.6	0.011
MN	3	2,300	6	2	0.3	0.000
IL	4	3,400	4	6	1.5	0.000
NE	6	950	6	10	1.7	0.002
MO	7	570	6	5	0.8	0.001
OK	8	220	5	40	8	0.036
OH	10	690	6	23	3.8	0.006
Total		15,460		140	5.9	0.007

ENERGY AND FERTILIZER USE EFFICIENCY AND THE USE OF MANURE FOR CROPS BY NON-CAFOS

Our nation and the agricultural community have turned their considerable skills and talents to dealing with the issue of foreign oil dependence. As a sector, we have a long way to go, certainly, but pork producers are making a major contribution to energy independence through the aggressive and efficient use of manure as a source of crop nutrients. Throughout the grain belt where hogs are being raised, the demand for pork producers' manure from non-CAFO corn farmers consistently exceeds the available supply. Many hog operators are of course applying this manure at agronomic rates on their own cropland. But many hog operators also work with their neighbors who want access to manure for nutrients and organic matter to build the quality of their soil.

The extremely high cost of commercial nitrogen fertilizer today drives this tremendous demand for hog manure. The nutrient value of the manure and its great demand ensure that CAFO and non-CAFO corn producers are not wasting this resource and are paying attention to agronomic application rates when the manure is used. CAFOs using this manure on their own land of course need to comply with this agronomic standard as a matter of compliance with the new CAFO rule's requirements governing manure use. But the economics of nitrogen fertilizer and the relative scarcity of manure as a fertilizer ensure that the non-CAFO corn producer user has equally sound financial incentives not to see the manure used inefficiently or wastefully.

CONCLUSION

The new CWA CAFO rule requirements are extensive and thorough when viewed from the perspective of today relative to shortly before the 2003 rule was issued. In the short period of about five years, federal CWA regulations for concentrated livestock operations have been changed to effectively encompass all animal species and all clean water aspects of the production of their animals, their manure and the use of that manure on land for crop production that the farmer controls. CAFOs now have more than adequate regulatory incentives to ensure that they do not discharge their manure to water and use sound and appropriate agronomic practices for applying their manure to land because failure to do so can result in major CWA penalties. But these water quality protections, which pork producers are treating as a "no-discharge standard," are now achievable without a CAFO having to get a federal CWA permit, and many CAFOs will choose to do that.

It is very important that as the Committee considers the subject matter of this hearing that it also understand these policy changes, just how fundamental they are, and how well prepared pork producers are to meet them. Furthermore, it is both sound and prudent for Congress to give these policy changes time to get fully in place and adopted before contemplating other policy changes.

NPPC believes that this record of the exceedingly rare occurrence of discharges from our producers' operations and the strong demand relative to the supply of manure for crop fertility purposes are strong indicators of just how ready pork producers are to meet the no-discharge requirements of the pending final CAFO rule.

Thank you once again Chairwoman Johnson for this opportunity to provide you with our written views on this important subject. We are most happy to respond to any questions you might have on this or other related subject matters and ask that you contact us if that is the case. We also look forward to working closely with your committee on the implementation of the new CAFO rule requirements and the CWA in general to ensure that our manure is properly managed, to achieve the no-discharge standard and to protect our Nation's water quality.