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Senate Agriculture Committee Hearing
"Farmers and Fresh Water:
Voluntary Conservation to Protect our Land and Waters"
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Good morning, Chairwoman Stabenow, Ranking Member Cochran and members of the committee. Thank you for the opportunity to testify today and provide information to the committee on water quality, voluntary conservation incentives, the Iowa Nutrient Reduction Strategy and the Iowa Agriculture Water Alliance. I am here for the purposes of helping to educate and inform and not to advocate or lobby on any particular legislation that is currently before Congress.

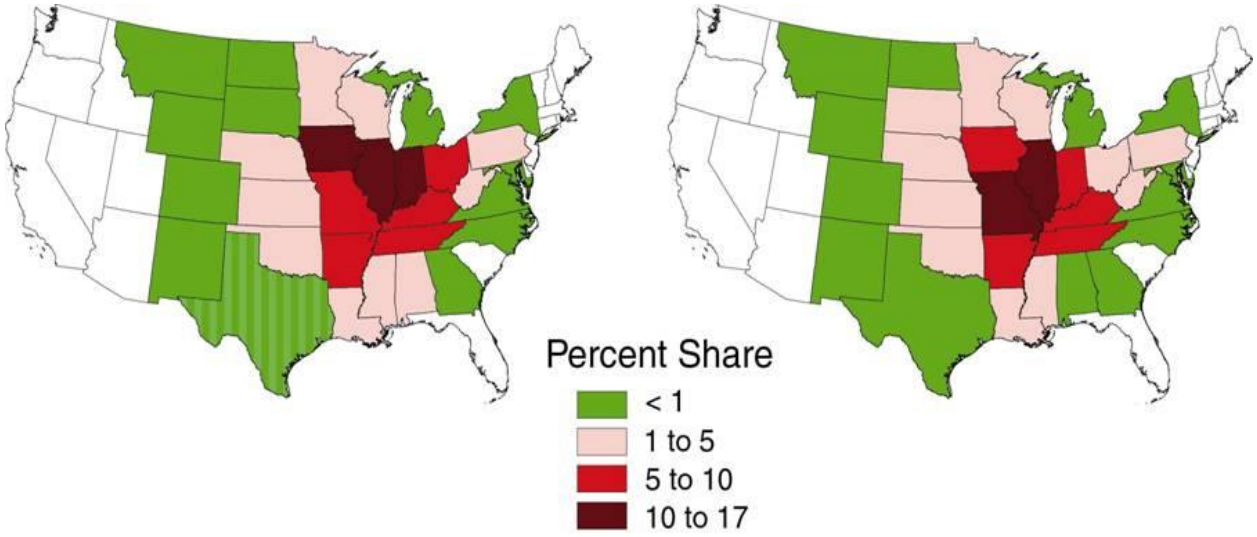
I would like to thank the committee for its work earlier this year and dating back to the previous Congress to pass a bipartisan Farm Bill that contained the strongest Conservation Title of any Farm Bill in history. This is the first Farm Bill to ever have more funding in the Conservation Title than the Commodities Title. The recent Farm Bill includes an innovative new program called the Regional Conservation Partnership Program. This program codifies the principle of targeting conservation practices to where they can have maximum impact, and ushers in a new era of public private partnerships. The new Farm Bill also recouples crop insurance with conservation compliance for the first time since 1995, which will ensure more soil conservation on Highly Erodible Lands while preventing wetlands from being drained and native prairie from being ploughed. I would like to thank the entire committee for their excellent work on the recent Farm Bill, but in particular I would like to single out Chairwoman Stabenow for her tremendous persistence and tireless efforts to pass this historic legislation.

As Executive Director of the Iowa Agriculture Water Alliance, I am partnering with many organizations including the Natural Resources Conservation Service (NRCS) to help to implement the Farm Bill and deliver conservation more effectively in Iowa. The Iowa Agriculture Water Alliance was launched on August 25th of this year. It was created by three leading Iowa agricultural associations – the Iowa Corn Growers Association, Iowa Pork Producers and Iowa Soybean Association. The purpose of the Iowa Agriculture Water Alliance is to increase the pace and scale of implementation of the Iowa Nutrient Reduction Strategy [Iowa Strategy].

Iowa is blessed with some of the most productive soils in the world. Iowa's fertile soils and cropping systems help feed the world, but also contribute to water quality concerns. Many streams and lakes in Iowa are listed as impaired waters. The dominant corn and soybean cropping systems in Iowa are inherently "leaky," meaning that nitrogen and phosphorous are easily transported to streams. Excessive nutrients in agricultural run-off are impacting Iowa's waters as well as the Gulf of Mexico.[i] Iowa is one of the largest annual contributors of nitrogen and phosphorous to the Gulf of Mexico hypoxic zone.

Nutrient delivery to the Gulf of Mexico
State shares of the total annual nutrient flux

Nitrogen **Phosphorous**



Alexander et al, *Environ. Sci. Techn.,* in press. Graphic courtesy of IDALS

That is not to suggest that nutrient impairment in Iowa is chiefly due to mismanagement of fertilizer and manure. On the contrary, it has more to do with precipitation, soil types and historic changes to land use and hydrology. Soils with high organic matter will lose nitrogen even without any fertilizer application.[ii] Parts of Iowa, including the Des Moines Lobe in north central Iowa, are extensively drained with subsurface tiling. This altered hydrology accelerates nutrient transport. In recent decades Iowa has seen a considerable increase in corn and soybean row crop acres and a decrease in pasture and small grains. The loss of perennial vegetation and shorter crop rotations have contributed to water quality concerns by having mostly bare row crop ground in the spring when Iowa typically receives the heaviest precipitation. It is worth noting that only an estimated 5% of all nitrogen inputs and 4% of all phosphorous fertilizer inputs in watersheds are lost to Iowa streams. The rest is removed by harvest, grazing, volatilization, and denitrification or is immobilized in the soil (Libra et al., 2004).[iii]

The Iowa Strategy, released on May 29th, 2013, is a science-based framework to assess nutrient loading and reduce the impacts of excessive nitrogen and phosphorous loads to Iowa waters and the Gulf of Mexico. It directs efforts to cost-effectively reduce surface water nutrients from both point sources, such as wastewater treatment and industrial facilities, and nonpoint sources, such as farm fields.[iv] This coordinated approach between the point source and nonpoint source strategies allows for collaboration among agricultural, municipal and industrial interests to meet the overall goals of the Iowa Strategy in a cost-effective manner. Iowa leaders from agriculture, municipalities and industry representing the point source and non-point source communities are working together to implement the Iowa Nutrient Reduction Strategy through the Water Resources Coordinating Council.

The Iowa Strategy calls for overall reductions of Iowa's nitrogen and phosphorous loads to Iowa waters and the Gulf of Mexico by at least 45%. The majority of the reductions will come from nonpoint sources. The Iowa Strategy calls for a 41% decrease in nitrogen and a 29% decrease in phosphorus from nonpoint sources in the overall state-wide nutrient load, primarily from reducing nutrient loss in agricultural run-off. The Strategy also calls for a 4% reduction of nitrogen and 16% reduction in phosphorous in the overall state-wide nutrient load from point sources. Point sources account for 8% of the total nitrogen load and 20% of the total phosphorous load in Iowa annually. Nonpoint sources account for 92% of the total nitrogen load and 80% of the total phosphorous load in Iowa annually. Both the nonpoint and point sources play important roles in determining Iowa's water quality on both an annual and seasonal basis. While point source loading is considerably less than nonpoint loading on an annual basis, during times of the year with seasonally low flows and droughts, point sources can be the dominant factor in determining water quality in some watersheds.[v]

The Iowa Nutrient Reduction Strategy was developed in response to the 2008 Gulf Hypoxia Action Plan which calls for all states along the Mississippi River to develop strategies to reduce nutrient loading to the Gulf of Mexico.[vi] It is the first state strategy of its kind to lay out a plan to meaningfully address Gulf Hypoxia. The Strategy was developed over a two year period by the Iowa Department of Agriculture and Land Stewardship (IDALS), Iowa State University and the Iowa Department of Natural Resources (IDNR). IDALS led the development of the nonpoint source strategy; the ISU College of Agriculture and Life Sciences led the development of the nonpoint source science assessment; while the IDNR led the development of the point source strategy. More than 1,700 comments were reviewed before the Strategy was finalized. The Strategy continues reliance on voluntary conservation activities for nonpoint sources and will require permitted point source facilities to further reduce nitrogen and phosphorous in their discharge water. Achieving those reductions will likely be extremely expensive for municipalities and industries, so the Strategy calls for the State of Iowa to develop a water quality trading system to potentially lower compliance costs.[vii] A trading system or framework would enable point source facilities to pay for farmers and other landowners to implement conservation practices. In return, the point source facilities would receive credits for the nutrient reductions that would result from the conservation practices they paid for, helping them to meet their permit obligations.

The Iowa Strategy follows the framework provided by the EPA in a March 16, 2011 memorandum titled "Recommended Elements of a State Framework for Managing Nitrogen and Phosphorous Pollution."[viii] The Strategy's approach is to achieve nutrient load reductions through technology based actions while continuing to assess and evaluate nutrient water quality standards.

There have recently been increasing calls to regulate agriculture under the Clean Water Act. Our current voluntary approach to private lands conservation is under increasing pressure and criticism. I personally believe that regulating non-point agricultural runoff in Iowa would be a very expensive and ineffective experiment due to the scale and variability of agriculture in Iowa. Iowa has approximately 92,000 farms.[ix] By comparison, there are only 6,579 Major National Pollution Discharge Elimination System (NPDES) permittees and 87,000 Non-Major NPDES permittees in the entire nation as of July, 2014.[x] It is difficult to fathom how regulation would work at that scale when one considers that there would be approximately as many nonpoint permittees in Iowa as there are currently point source permittees throughout the entire United States. Agriculture is highly variable in Iowa. There are ten different Major Land Resource Areas (MLRAs) in Iowa that vary greatly in terms of geology, climate, hydrology, soil types, slopes, land uses and crop yields.[xi] Soils are known to vary a great deal even within a single field, let alone across different MLRAs. A prescriptive one-size-fits-all regulatory approach is not conducive to such variability. In my opinion, it is better to focus on outcomes, and let farmers decide which practices will work best for their

particular fields to improve water quality rather than prescribe specific practices that may not be suited to every location through a regulatory model. Finally, it would be extremely challenging to police regulating nonpoint agricultural run-off since fertilizer management practices are non-structural in nature and therefore difficult to ascertain and detect. It is not practical to measure edge-of-field water quality on 92,000 farms. That would take an extraordinary amount of financial and human resources. The people of Iowa and its natural resources would be much better served by allocating appropriate resources for voluntary conservation measures that will improve water quality.

Three agricultural associations – the Iowa Soybean Association, Iowa Corn Growers Association, and Iowa Pork Producers – are committed to ensuring the success of the Iowa Strategy through voluntary conservation actions. In an effort to foster better collaboration among Iowa's agricultural groups and produce quantifiable results to improve water quality at meaningful scales, these organizations recently established the Iowa Agriculture Water Alliance. The mission of the Iowa Agriculture Water Alliance is to unite agricultural groups and other committed partners to implement a statewide effort to improve water quality that is both accountable and credible, improving the state's water quality while maintaining and improving agricultural productivity.

The Iowa Agriculture Water Alliance is collaborating with IDALS, NRCS, ISU, University of Iowa, local Soil and Water Conservation Districts, agricultural retailers, Agribusiness Association of Iowa and many other committed partners to pursue voluntary approaches to implementing the Iowa Strategy and addressing nonpoint source pollution by continuing to reduce nutrient transport to water resources. The Iowa Agriculture Water Alliance is committed to working with our partners to further the Iowa Strategy by raising awareness of the strategy among farmers, driving increased adoption of conventional conservation practices, pairing the most effective in-field and off-field conservation practices for cumulative impacts, targeting practices for maximum conservation effectiveness, and helping to develop market driven approaches to conservation.[xii]

Nonpoint Source Science Assessment

The Iowa Science Assessment, conducted by a science team led by ISU, entailed a comprehensive literature review by 23 ISU and government agency experts. The Science Assessment identifies management practices, land use practices, and edge-of-field practices that are effective in reducing nitrogen and phosphorous, quantifies load reductions for those practices and estimates the cost of each practice in terms of cost per pound of reduced nutrients. This extensive review provides a valuable reference for implementing the Iowa Strategy and prioritizing practices.[xiii]

The science team evaluated the following conservation practices for effectiveness at reducing nitrogen and phosphorous loading.

Nitrogen Management Practices

- •Application (Timing, Rate, Placement, Source)
- •Drainage Water Management
- •Extended rotations
- •Cover crops
- •Alternative land uses (Energy Crops, Perennial Crops, Land Retirement)
- •Buffers
- •Targeted Wetlands
- •Bioreactors[xiv]

	Practice	Comments	% Nitrate-N Reduction[+]	% Corn Yield Change[++]
			Average (SD*)	Average (SD*)
Nitrogen Management	Timing	Moving from fall to spring pre-plant application	6 (25)	4 (16)
		Spring pre-plant/sidedress 40-60 split Compared to fall-applied	5 (28)	10 (7)
		Sidedress – Compared to pre-plant application	7 (37)	0 (3)
		Sidedress – Soil test based compared to pre-plant	4 (20)	13 (22)**
	Source	Liquid swine manure compared to spring-applied fertilizer	4 (11)	0 (13)
		Poultry manure compared to spring-applied fertilizer	-3 (20)	-2 (14)
	Nitrogen Application Rate	Nitrogen rate at the MRTN (0.10 N:corn price ratio) compared to current estimated application rate. (ISU Corn Nitrogen Rate Calculator – http://extension.agron.iastate.edu/soilfertility/nrate.aspx can be used to estimate MRTN but this would change Nitrate-N concentration reduction)	10	-1
	Nitrification Inhibitor	Nitrapyrin in fall – Compared to fall-applied without Nitrapyrin	9 (19)	6 (22)
	Cover Crops	Rye	31 (29)	-6 (7)
		Oat	28 (2)	-5 (1)
	Living Mulches	e.g. Kura clover – Nitrate-N reduction from one site	41 (16)	-9 (32)
Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
		Land Retirement (CRP) – Compared to spring-applied fertilizer	85 (9)	
	Extended Rotations	At least 2 years of alfalfa in a 4 or 5 year rotation	42 (12)	7 (7)
	Grazed Pastures	No pertinent information from Iowa – assume similar to CRP	85	
Edge-of-Field	Drainage Water Mgmt.	No impact on concentration	33 (32)	
	Shallow Drainage	No impact on concentration	32 (15)	
	Wetlands	Targeted water quality	52	
	Bioreactors		43 (21)	
	Buffers	Only for water that interacts with the active zone below the buffer. This would only be a fraction of all water that makes it to a stream.	91 (20)	

Image courtesy of IDALS

Phosphorous Management Practices

- Cover Crops
- Alternative land uses (energy crops, perennial crops, land retirement)
- Extended rotations
- Application (rate, placement, source and timing)
- Tillage and residue management
- Buffers
- Erosion control practices and structures[xv]

	Practice	Comments	% P Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
Phosphorus Management Practices	Phosphorus Application	Applying P based on crop removal – Assuming optimal STP level and P incorporation	0.6[d]	0
		Soil-Test P – No P applied until STP drops to optimum	17[e]	0
	Source of Phosphorus	Liquid swine, dairy, and poultry manure compared to commercial fertilizer – Runoff shortly after application	46 (45)	-1 (13)
		Beef manure compared to commercial fertilizer – Runoff shortly after application	46 (96)	
	Placement of Phosphorus	Broadcast incorporated within 1 week compared to no incorporation, same tillage	36 (27)	0
		With seed or knifed bands compared to surface application, no incorporation	24 (46)	0
	Cover Crops	Winter rye	29 (37	-6 (7)
	Tillage	Conservation till – chisel plowing compared to moldboard plowing	33 (49)	0 (6)
		No till compared to chisel plowing	90 (17)	-6 (8)
Land Use Change	Perennial Vegetation	Energy Crops	34 (34)	
		Land Retirement (CRP)	75	
		Grazed pastures	59 (42)	
Erosion Control and Edge-of-Field Practices	Terraces		77 (19)	
	Buffers		58 (32)	
	Control	Sedimentation basins or ponds	85	

Image courtesy of IDALS

The Iowa Strategy allows for additional practices to be evaluated and approved. Saturated buffers were included as an approved practice under the Iowa Strategy in 2014. Other practices that may be considered in the future might include Science-based Trials of Row Crops Integrated with Prairie Strips (STRIPS, see http://www.nrem.iastate.edu/research/STRIPs/), stream bank stabilization and two-stage ditches. According to the Iowa Strategy, "there is still a need for development of additional practices, testing of new practices, further testing of existing practices, and verifying practice performance at implementation

scales. The strategy encourages the development of new science, new technologies, new opportunities, and the further engagement and collaboration of both the public and private sectors." [xvi]

The Science Assessment concluded that it will require a combination of in-field and off-field practices to achieve the goals of the Iowa Strategy.[xvii]

Nonpoint Source Strategy and Estimated Costs

The science team led by ISU developed scenarios of combinations of practices that could achieve the nonpoint goals of the strategy. Three example scenarios were developed that meet both the 41% nitrogen and 29% phosphorous nonpoint source goals. Initial investment costs of the three scenarios range from $1.2 billion - $4 billion, while annual costs range from $77 million per year to $1.2 billion per year. [xviii]

Point Source Strategy and Estimated Costs

A total of 102 major municipal facilities serve the wastewater treatment needs of 55-60% of Iowa residents and treat more than 80% of all wastewater handled by Iowa cities. Among permitted industrial facilities, there are 28 that discharge significant amounts of nitrogen and phosphorus to Iowa waters. Under the Iowa Strategy, for the first time, discharge permits issued to these 130 facilities will require implementation of technologically and economically feasible process changes for nutrient removal. These changes are intended to achieve reductions of at least two-thirds in the amount of nitrogen and three fourths in the amount of phosphorous from current discharge levels from those facilities. If successful, this strategy will reduce the amount of nitrogen and phosphorous loading from point sources by 11,000 tons per year and 2,170 tons per year, respectively. This approach is anticipated to cost approximately $1.5 B if implemented in full.[xix]

Watershed Prioritization and Demonstration Projects

The Iowa Strategy calls for implementing watershed demonstration projects in nine priority watersheds. Eight projects were awarded a total of $4,166,000 in 2013. These projects generated over $8,000,000 in additional match from project partners and landowners.

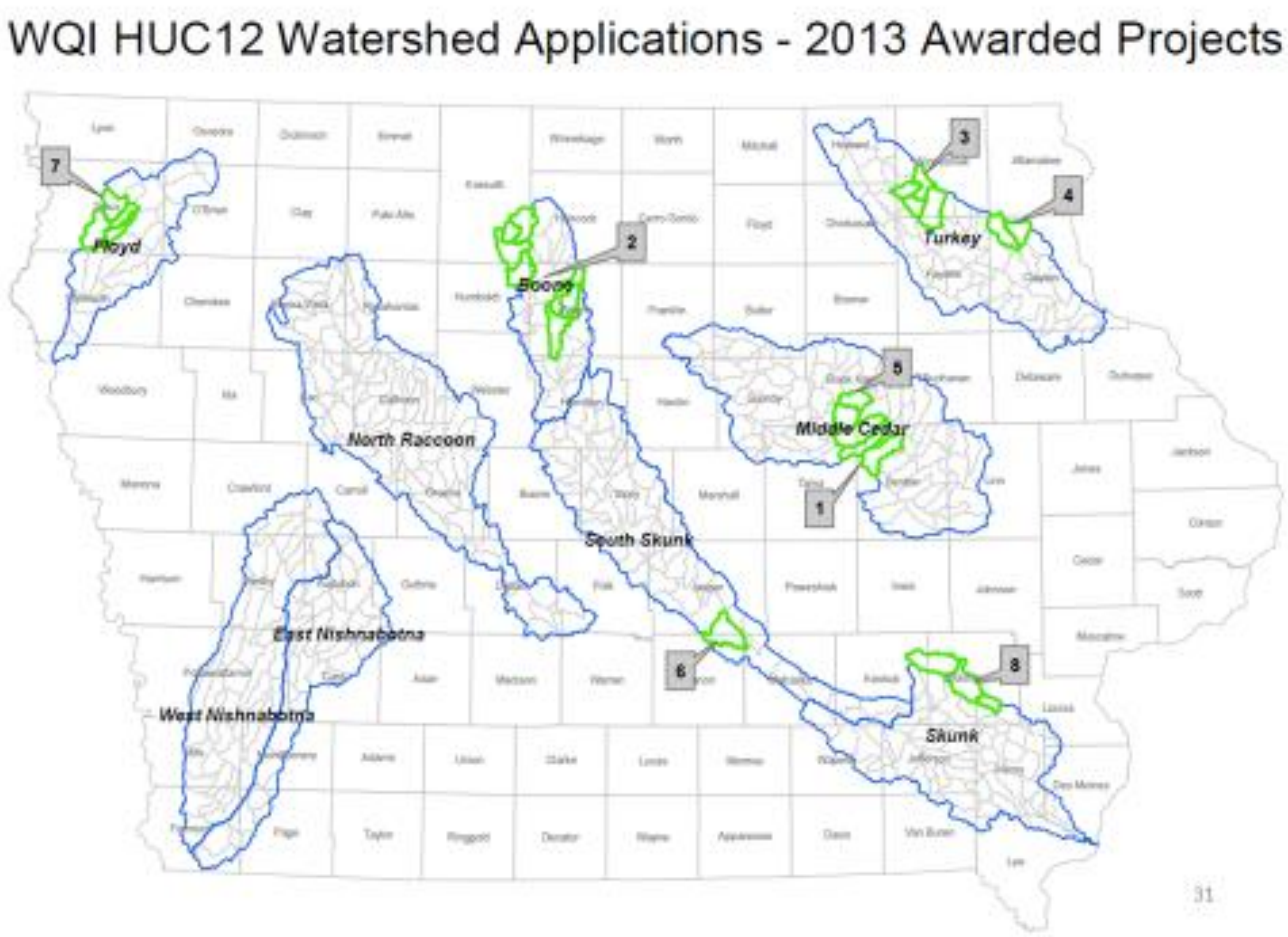


Image courtesy of IDALS

Demonstration projects involve engagement among numerous partners and stakeholders and include a commitment to implement a wide variety of practices within the project area to demonstrate their effectiveness and adaptability.[xx] IDALS issued a Request for Applications for additional demonstration projects in October, 2014.

Iowa Nutrient Research Center

The Iowa Nutrient Research Center [the Center] was established by the Iowa Legislature in 2013 for the purpose of pursuing a science-based approach to nutrient management research. The Center will build upon the work conducted in the science assessment by continuing to evaluate the performance of current and emerging nutrient management practices. The Center will use an adaptive management framework for providing recommendations regarding the implementation of current nutrient management practices as well as the development of new nutrient management practices.[xxi]

The Center is also helping to track progress toward implementing the Iowa Strategy beyond ambient water quality monitoring. The Center is working on a public-private framework for gathering better baseline data and tracking conservation practice adoption and calculated or modeled load reductions resulting from practice adoption.[xxii]

Conclusion

Achieving the goals of the Iowa Strategy is a daunting challenge. It will take many committed partners and will likely take decades to realize 45% reductions in state-wide nitrogen and phosphorous loads. We have had a century and a half of agriculture's impacts on water quality in Iowa and there is already a great deal of "legacy" nutrients and sediment in Iowa's waterways. Yet Iowa farmers are committed to helping lead an effort based on sound science that will fulfill the goals of the strategy and help to improve water quality both in Iowa and downstream to the Gulf of Mexico.

It will take new revenue streams and partnerships with the private sector and municipalities to fund and implement the Iowa Strategy. Public sector funding through NRCS Farm Bill conservation programs and IDALS cost-share programs alone is not adequate. Nascent partnerships among the agricultural sector, cities and municipal wastewater utilities to help fund conservation practices hold tremendous promise. The Iowa League of Cities is exploring how best to create a policy framework to help bring those partnerships to fruition and the cities of Dubuque and Storm Lake have indicated their interests in that effort. The City of Cedar Rapids recently partnered with the Iowa Soybean Association, Iowa Corn Growers, IDALS, IDNR, The Nature Conservancy, Iowa Farm Bureau Federation and local Soil and Water Conservation Districts on a recent Regional Conservation Partnership Program (RCPP) proposal to fund edge-of-field nitrate treatment conservation practices and conservation planning throughout the Middle Cedar River which will help to improve water quality and to a lesser degree address flooding for Cedar Rapids. RCPP advances the principle of targeting conservation practices to where they can have the biggest positive impacts for conservation in priority watersheds and landscapes. NRCS has made tremendous strides in recent years in moving away from the "first in, first offered" approach to increasingly focus Farm Bill resources to deliver conservation outcomes while getting the biggest return for American taxpayers. The recent Farm Bill codified that principle thanks to the efforts of this committee.

The Iowa Agriculture Water Alliance is engaging with additional private sector partnerships and public-private partnerships around nutrient stewardship, soil health and sustainability to help promote conservation practices that improve water quality. The 4R Nutrient Stewardship Program has received some much-deserved attention and momentum in recent years for its work to promote the Right form of fertilizer applied at the Right time, in the Right place and at the Right rate (4Rs). Information about the 4R program can be found at www.nutrientstewardship.com and at the International Plant Nutrition Institute's 4R Nutrient Stewardship Portal at http://www.ipni.net/4R. Fertilizer companies, agricultural retailers, agricultural cooperatives and certified crop advisors are using the 4R program to help producers improve their nutrient management and seek to ensure that fertilizer is taken up by crops more efficiently while reducing nutrient loss and improving water quality. The Iowa Agriculture Water Alliance also supports the Soil Health Partnership, a project of the National Corn Growers Association that is supported by Monsanto, as well as the NRCS Unlock the Secrets in the Soil campaign. These campaigns to improve soil health help to promote practices such as no till, strip till and cover crops which help to improve agricultural productivity as well as water quality. As more producers understand that there is a strong value proposition inherent in these practices that improve productivity and profitability over time, adoption rates for those practices will increase dramatically. Additionally, the Iowa Agriculture Water Alliance is a member of Field to Market, the Alliance for Sustainable Agriculture. Field to Market is a broad-based sustainable agriculture supply chain initiative that unites agribusinesses, food and beverage companies, retailers, agricultural associations, conservation organizations, academic institutions and government agencies in working toward continuous improvement in productivity, environmental quality and human well-being.

In summation, I will conclude with a quote from the Iowa Strategy regarding how Iowa must take its rightful place as a leader in conservation. "*Iowa is a national and global leader in the production of food and renewable fuels, so a goal of this strategy is to make Iowa an equal national and global leader in addressing the environmental and conservation needs associated with food and renewable fuels production*."[xxiii] The Iowa Agriculture Water Alliance, a farmer led initiative, is committed to helping to bring this goal to fruition.

Thank you for the opportunity to present my views before the committee and for your invaluable work to promote conservation on our nation's private lands and help America's farmers meet the growing domestic and international demand for food, feed, fiber and fuel in an increasingly sustainable manner.

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[i] Iowa Nutrient Reduction Strategy Presentation. John Lawrence, Iowa State University. https://www-nutrientstrategy.sws.iastate.edu/sites/default/files/documents/brief.pdf. 2014.
[ii] Lawrence. 2014.
[iii] Iowa Nutrient Reduction Strategy *A science and technology-based framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico.* Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources and Iowa State University College of Agriculture and Life Sciences. Updated September, 2014.
[iv] Reducing Nutrient Loss: Science Shows What Works. Iowa State University Extension and Outreach. SP 435. September, 2014.
[v] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[vi] Iowa Nutrient Reduction Strategy Updated September, 2014.
[vii] Iowa Nutrient Reduction Strategy Updated September, 2014.
[viii] Iowa Nutrient Reduction Strategy Updated September, 2014.
[ix] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[x] Issuance of Clean Water Act National Pollution Discharge Elimination System Compliance Monitoring Strategy. EPA Memorandum from Lisa Lund. July 21, 2014.
http://www.epa.gov/compliance/resources/policies/monitoring/cwa/npdescms.pdf
[xi] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[xii] Iowa Nutrient Reduction Strategy Presentation. Matt Lechtenberg and Shawn Richmond, Iowa Department of Agriculture and Land Stewardship. December, 2013.
[xiii] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[xiv] Lechtenberg and Richmond. 2013.
[xv] Lechtenberg and Richmond. 2013.
[xvi] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[xvii] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[xviii] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[xix] Iowa Nutrient Reduction Strategy. Updated September, 2014.
[xx] Lechtenberg and Richmond. 2013.
[xxi] Lechtenberg and Richmond. 2013.
[xxii] Lechtenberg and Richmond. 2013.
[xxiii] Iowa Nutrient Reduction Strategy. Updated September, 2014.