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IOWA CHAPTER

December 31, 2012

Nutrient Reduction Strategy
ANR Program Services
2101 Agronomy Hall
Iowa State University
Ames, Iowa 50011-1010

To Whom It May Concern:

The following comments on the Iowa Nutrient Reduction Strategy are submitted on behalf of the Iowa Chapter of the Sierra Club. The Sierra Club is the nation's largest grassroots environmental organization with over 600,000 members. Its Iowa Chapter has approximately 5,000 members.

The Iowa Chapter of the Sierra Club has worked for many years to improve Iowa's water quality. Those efforts include petitions to bring Iowa's water quality standards into compliance with the Clean Water Act, litigation to require the establishment of TMDLs and an appropriate 303(d) list, and a petition to withdraw Iowa's authority to administer the Clean Water Act because of Iowa DNR's failure to enforce the Act against animal feeding operations. We have advocated for strong water quality rules from the Iowa Environmental Protection Commission. We have participated in stakeholder meetings regarding antidegradation rules and the Iowa Nonpoint Source Management Plan. Thus, the Iowa Nutrient Reduction Strategy is important to the organization and to our members.

COMMENTS ON NUTRIENT REDUCTION STRATEGY

We have grave concerns about the Nutrient Reduction Strategy. It is based on the false premise that Iowa is making significant progress in reducing water pollution from nitrogen (N) and phosphorus (P) and that no real changes need to be made in what thus far has been a voluntary and ineffective approach to nonpoint sources of pollution. Almost 90% of the Nutrient Strategy document is the scientific and technical assessment of various practices that would reduce the amount

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of N and P polluting Iowa's waters. We have no significant criticism of the scientific and technical assessment, although we do have some comments set out later herein. The problem is that the other 10% or so of the document does not present a thoroughly considered and effective strategy for addressing the problem of nonpoint source pollution. There is a good approach offered for point source pollution, and we are not addressing that aspect of the Nutrient Strategy, with one exception - animal feeding operations. That issue will be discussed later in these comments.

To begin, we generally agree with the comments of the Iowa Department of Natural Resources based on its review of the Nutrient Strategy. We especially refer to the initial November 1, 2012, comments and the letter from Allen Bonini, both of which are hereto attached. The November 6 DNR comments, also attached, were more muted but still raised critical issues with the Nutrient Strategy. In addition to the DNR comments, our comments follow.

Section 1.1 of the Strategy refers to the 2008 Gulf Hypoxia Action Plan. As noted in the Strategy the Hypoxia Action Plan targets at least a 45% reduction in total nitrogen and phosphorus load. But the Strategy does not establish how Iowa can or will reach that goal.

The Strategy then describes the Stoner memo as emphasizing implementation of existing nutrient reduction practices and technologies. In fact, the memo does just the opposite. It highlights the failure of current practices to stem the flow of pollutants into our waters. Further, the memo emphasizes that states need to do better and to innovate in order to improve water quality. This is only the first of many examples I will describe in these comments where the Strategy falsely asserts that what Iowa has been doing in the past is what we should continue to do.

In Section 1.2 of the Strategy it is inferred that the problem of nutrients in rivers and streams can originate from the landscape or within the stream itself. But such background levels of nutrients obviously do not contribute to the problem in the Gulf of Mexico or to the excess nutrients in Iowa's waters. This is an attempt by the authors of the Strategy to minimize the contribution of agricultural practices to the nutrient problem. In fact, it is well-documented that the overwhelming majority of the nutrients come from agriculture. See, e.g., David, Drinkwater and McIsaac, Sources of Nitrate

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Yields in the Mississippi River Basin, 39 J. Eviron. Qual. 1657 (2010). It is also significant that the suggested solutions in the science section of the Strategy for nonpoint pollution center exclusively on agricultural practices.

Section 1.2 next discusses numeric nutrient criteria. The Strategy contends that, based on an article by USGS employees, 52% of stream segments would have background levels of phosphorus exceeding EPA recommended numeric criteria. Smith, Alexander and Schwarz, Natural Background Concentrations of Nutrients in Streams and Rivers of the Conterminous United States, 37 Environmental Science and Technology 3039 (2003). So what about nitrogen? The cited article concludes that total nitrogen concentrations in U.S. streams and rivers currently exceed natural background levels by a much larger factor (6.4) than do total phosphorus concentrations (2.0). The other takeaway from this article is the unpredictability and variability of background concentrations of nutrients. As stated in the article:

> The results of this study, however, indicate that as much as an order of magnitude of variation in the natural background concentration of TN [total nitrogen] and TP [total phosphorus] exists within the boundaries of many of the EPA nutrient ecoregions. Indeed, large variation in background levels appears to occur over short distances in many regions due to elevation-related variation in runoff and differences in cumulative in-stream nutrient loss at the junctions of small tributaries and large rivers. As a result, predicted background TP concentrations in many stream and river segments exceed the EPA-proposed criteria for their region based on lower-quartile values (an estimated 52% of reaches nationwide). Such localized variation in background concentrations argues against the use of arbitrary quantiles (e.g., lower quartiles) of concentration distributions for large regions as a basis for setting water quality criteria.

Thus, the point of the article is that the variability of background concentrations of nutrients should be considered in developing numeric criteria, not that numeric criteria should not be developed, as implied in the Strategy.

It must also be noted that several states have already adopted numeric criteria for nutrients. A map from the EPA web page showing those states is attached. If those states can

establish numeric criteria, so can Iowa. The whining in the Strategy about numeric criteria simply shows the bias and continuing misrepresentation of the facts by the authors of the Strategy.

Farther along in Section 1.2 the statement is made that "many say a regulatory approach on nonpoint sources is not likely to achieve aggressive water quality outcomes." This statement begs several questions. Who are the "many?" On what factual basis to the "many" allegedly base their opinion that a regulatory approach will not be successful? What are the parameters of a regulatory approach that is being referred to so we have an understanding of what is allegedly being evaluated? This is yet another example of the Strategy's bias and misrepresentation of facts.

Section 1.3 of the Strategy purports to describe the "regulatory and administrative framework" regarding nutrient reduction. The general tone of this section is a propaganda piece designed to support voluntary measures alleged to control nutrients and to demonize environmental advocates who are working to protect our water resources. Such an approach has no place in what is supposed to be a government policy document.

Section 1.3 then sets out what it alleges are the roles and responsibilities of the Iowa Water Resources Coordinating Council (WRCC). As noted by the DNR staff in its November 1, 2012, comments hereto attached, the WRCC in its four-year existence has done essentially nothing. Why are we to believe it will do anything in the future, especially when the Strategy does not set out any clear direction or guidelines for the WRCC? Allen Bonini, in his letter hereto attached, put it correctly, that the Strategy simply says, in effect, "the WRCC will figure it all out later."

It is also important to understand who is on the WRCC. Of the 19 people on the WRCC the only ones who could even advisedly be considered to care about water quality or the environment are David Osterberg and Karl Brooks. Mr. Osterberg, according to an article in the Des Moines Register has expressed his frustration with the WRCC and his objections to the Strategy. Mr. Brooks is the Administrator of EPA Region 7. Two against 19 are not very good odds for the environment.

Next, Section 1.3 discusses federal farm bill contributions. But what is omitted in that discussion is how the subsidies

and other provisions of the farm bill could be used to ensure that good conservation practices are implemented by crop and livestock producers. Those benefits in the farm bill could be withheld unless good conservation practices are used. That would be a meaningful incentive for producers to do the right thing.

Finally, Section 1.3 purports to list a number of examples of alleged progress in Iowa in controlling nutrients. The DNR staff comments in the November 1, 2012, document make all the appropriate criticisms of this portion of the Strategy. Those criticisms appear on pages 25-28 of the DNR document. One has to ask, if we have made so much progress, why does the runoff of nutrients into our water and into the Gulf of Mexico dead zone continue unabated. The portion of the Strategy as another example of biased propaganda designed to justify continuing business as usual.

Section 1.4 of the Strategy is optimistically headed "Nutrient Reduction Strategy." It purports to explain how Iowa will implement the EPA framework for managing nutrients referred to in the Stoner memo.

The first item is prioritization of watersheds. The Strategy does not say how watersheds will be prioritized, what parameters or criteria will be used to determine the prioritization, or how watersheds in which nutrient reduction actions are already underway will fit into the prioritization. Again, the answer to all of this seems to be "the WRCC will figure it all out later."

The next item is determining watershed goals. The Strategy, however, does not establish any clear measurable goals. In fact, it can reasonably be said that this portion of the Strategy says nothing. With all of the time, effort and expertise allegedly expended in preparing the Strategy, it is inconceivable that clear, definite and measurable goals could not have been established.

The third point in the EPA framework referred to in the Strategy is ensuring the effectiveness of point source permits. One of the point sources mentioned is animal feeding operations (AFOs). AFOs have been an elusive target for regulation as point sources. That is because they do not discharge on a regular basis and the livestock industry has created the myth that AFOs do not discharge pollutants. Of course, the numerous reported and confirmed discharges from

AFOs into Iowa waters, many resulting in fish kills, belie that myth. In response to a petition to withdraw Iowa's authority under the Clean Water Act filed by the Iowa Chapter of the Sierra Club, Iowa Citizens for Community Improvement, and Environmental Integrity Project, EPA has now required the Iowa DNR to take specific actions to bring its enforcement efforts against AFOs into compliance with the Clean Water Act.

Although the foregoing action by the EPA is a separate process from this Nutrient Reduction Strategy, the Strategy should incorporate DNR enforcement of the Clean Water Act against AFOs as part of the Strategy. As it is now written, the Strategy does not propose any action involving AFOs.

Also under the discussion of point sources is a reference to water quality trading. While pollution trading has had some positive results with respect to air pollution, it is difficult to see how this concept would work with respect to water pollution. Air is ambient and it makes sense that reductions in one area would decrease the pollution in another area. Water resources, however, are more defined in terms of location, sources of pollution, and in our ability to regulate that pollution. The Strategy should abandon any consideration of water quality trading and focus instead on effective regulation of the sources of water pollution.

The next item in the EPA framework is agricultural areas. The Strategy says "Where appropriate, the science assessment and outcomes of the science assessment will be integrated into the operational plans." (emphasis added). When would the science not be appropriate? Secretary Northey and DNR Director Gipp, and the crop and livestock producers and the Farm Bureau, have all been blustering that this Strategy is based on science.

The following two pages of bullet points under the topic of agricultural areas essentially say nothing. They certainly do not contain any meaningful solutions to the problem of nutrient pollution from agricultural practices. The scientific and technical portions of the Strategy describe a number of practical and apparently effective actions that would reduce nutrient pollution. Why are those solutions not evaluated and recommended in responding to the EPA framework?

The next item is storm water, septic systems, and minor POTWs. We have no comments on this item other than to join in the comments of the Iowa DNR in its November 1 comments.

The next two items are accountability and verification and public reporting. Again, the discussion of these items is vague, with no clear description of what will be done, or how, or any specific guidelines. This is another example of whatever time and effort was spent in creating the Strategy being wasted.

The final item is a work plan for development of numeric criteria. It is difficult to see how this portion of the Strategy is really a serious attempt to comply with the Stoner memo when so much effort was spent earlier in the strategy criticizing numeric criteria.

Regarding the science assessment in the Strategy, we generally agree with the comments of the Iowa DNR in its November 1 document. We would note in addition that when the science assessment attempts to conduct a cost/benefit analysis, it only looks at direct costs to the entity undertaking nutrient reduction measures. There is no attempt to factor in the benefits of nutrient reduction nor the costs of not taking adequate measures to reduce nutrient pollution. These factors should be considered.

CONCLUSION AND RECOMMENDATIONS

Having commented on the specific provisions of the Strategy, we want to take this opportunity to make some additional observations. Because the proposed Strategy is actually no strategy at all, we need to look at a strategy that might actually address the problem of nutrient pollution.

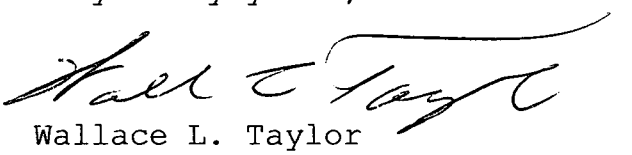
We propose establishment of watershed-based TMDLs (called Water Quality Improvement Plans (WQIP) in Iowa) for nutrients. A template for this proposal is the WQIP for the Raccoon River watershed. Watershed Improvement Plans are also the basis for the Chesapeake Bay TMDL. The Iowa WQIPs would need to have specific load allocations and wasteload allocations and there would have to be effective mechanisms for enforcing those allocations.

It should be clear that water pollution from nutrients is a serious problem, that Iowa has not done enough to abate the problem, and that EPA is serious about solving the problem. It is discouraging, to say the least, that after two years of working on this Strategy, this is the disappointing result. The Iowa Chapter of the Sierra Club also wants to make it clear that the Nutrient Reduction Strategy as proposed does

not address that problem, and if Iowa does not take meaningful action to reduce nutrients, we will ask the EPA to withdraw Iowa's authority under the Clean Water Act.

Thank you for considering these comments. We look forward to seeing an entirely new Strategy and an effective approach to reducing nutrient pollution.

Very truly yours,



Wallace L. Taylor
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From: Bonini, Allen [DNR]
Sent: Thursday, November 01, 2012 11:27 AM
To: Schnieders, Adam [DNR]
Cc: Gipp, Chuck [DNR]; Trautman, Bruce [DNR]; Ehm, William [DNR]; Hall, Tim [DNR]; Hopkins, Stephen [DNR]; Berckes, Jeff [DNR]; Ikenberry, Charles [DNR]; Kiel, Adam [DNR]
Subject: DNR Nonpoint Source Program's Response to IDALS' Draft Nutrient Reduction Strategy

Adam - attached you will find the compiled comments on IDALS' draft Nutrient Reduction Strategy from the DNR Nonpoint Source Program team which consisted of Steve Hopkins, Jeff Berckes, Adam Kiel, Charles Ikenberry and me. As you will note, this document is very weighty, consisting of nearly 60 pages of comments. However, imbedded within this comment document is a complete transcript of the "policy" portion of the "strategy." This was done to facilitate our review and allow for easier tracking of our collective comments. Even discounting for the transcript pages, clearly the breadth and depth of our comments are reflective of the Nonpoint Source Program's serious concerns over the quality of this draft.

Overall, by associating DNR with this document, as written and without major revisions and without including a more open, collaborative process, and by releasing it as a joint IDALS/DNR document, DNR runs the very real risk of sullying our department's reputation with the 97 percent of Iowans that are not farmers, as well as with progressive conservation farmers who are seriously committed to reducing their N and P contributions to streams and rivers.

In order to aid DNR leadership in their general understanding of our over-arching concerns, and recognizing they are not likely to read our entire document, I have attempted to highlight the major themes of our critique below:

- Major fundamental flaws permeate the "Strategy" while concrete ideas for implementation are not provided. For example, the nonpoint piece of this document, as written, fails to meet the intent or spirit of the Stoner Memo regarding achieving meaningful and measurable near-term reductions in N and P pollution to the nation's water.
- After reviewing the "Strategy" it is clear that its development lacked diverse participation including, but not limited to, nonpoint water quality professionals. This document reflects a narrow view not appropriate for a state-issued document. This is evidenced by entire paragraphs being copied from an Iowa Farm Bureau comment letter (without proper citation) submitted in response to the Raccoon River Master Plan. In addition, all costs and benefits are based on production of a single commodity crop. This evidence calls into question the development of the entire document, as similar, narrow-view and single-objective "talking points" are a consistent theme in the document.
- All this document's "policy" piece does is articulate and reiterate a planning process that has been codified in Iowa Code since 2008, which has yet to be implemented in any meaningful way, except for the unilateral efforts by the DNR (assessing HUC-8's, prioritizing, targeting, and developing a public education campaign). Yet this document suggests none of this work has been done by anyone and the WRCC will suddenly take responsibility for a role it has ignored for the past 4 years. Success of this "strategy" is heavily dependent on, and invested in, the WRCC transforming itself into an effective and functional body. What happens to this "strategy" if the WRCC continues to demonstrate its ineffectiveness?
- The "Science Assessment" evaluated a number of possible strategies that could be implemented to reduce nutrients in local and downstream waterbodies. However, the "Strategy" could best

be summarized in two words – "Status Quo" – as the "policy" document lacks novel or innovative concepts for implementation, lacks a commitment to any measurable load reductions from nonpoint sources, and lacks accountability in tracking and obtaining progress.

- The document lacks outputs, outcomes, measurables and milestones by which its success or failure can be tracked. These elements are needed to make it a true strategy. Development of a Nutrient Reduction Strategy should be an open, collaborative process utilizing input from all interested stakeholder groups. Instead, this "Strategy" was developed without inter-agency collaboration and several key stakeholder groups were absent from the table. With appropriate collaboration among agencies and proactive stakeholder and public outreach, one could articulate a specific strategy in a document that has goals, milestones and measurable actions, and responsible parties identified in it.
- Some of Iowa's best and brightest were used to help develop the science assessment piece of this document, including respected scientists, agronomists, engineers, and economists from Iowa State University. However, the "Strategy" does not synthesize their research in an organized way to show a path forward.
- How will this "strategy" fit into the larger, more comprehensive Nonpoint Source Management Plan that was recently approved by EPA after an extensive and open consensus-building process? Nutrient pollution is only a component of the state's WQ problems, yet integration with this statutorily required Plan is never addressed in this document. Also, there is no mention of DNR's Nonpoint Source program, its strategies, efforts or progress to date. The draft also doesn't discuss how this DNR Program will continue to aid in reducing N and P loads in targeted areas throughout Iowa. It is as if the DNR Nonpoint Source Program does not exist or provide any value to address this considerable challenging pollutant problem.
- DNR has already embarked upon developing and implementing a strategy to begin to reduce N and P loads in Iowa waters. DNR has completed nitrate-N TMDLs for the Cedar River, Raccoon River, and the (upper) Des Moines River based on numeric criteria associated with the Drinking Water Standard (10 mg/L of N). These TMDLs cover 27 percent of Iowa's land area and have all identified critical subwatersheds at either the HUC-8 or HUC-12 scale that should be targeted for priority work to develop and implement HUC-12 level watershed plans. Developing and implementing these plans, coupled with using the appropriate combination of practices to achieve the load reduction targets established in the TMDLs would reduce nitrate loads into the system. Similarly for P loads, there are existing HUC-12 watershed plans throughout the state designed to reduce P-load contributions to Iowa waters. Building upon this successful set of strategies would be a more meaningful and measurable way to achieve near term N and P load reductions to the nation's waters than what is espoused in this "Strategy".
- Most "costs" were calculated (or expressed qualitatively) almost exclusively from a "corn yield" and/or "acres in corn production" standpoint. Many of the practices described in the Science Assessment would also create economic opportunities and "benefits," not only costs. The Strategy's science assessment does not fairly account for the economic value of ecosystem services provided by the alternative practices (non row crop practices) considered. Ecosystem services are of benefit to the public. Since it discounts or ignores ecosystem services, the strategy's science assessment may be viewed as biased in favor of practices that provide economic benefit to private landowners, and perceived as biased against practices that provide economic benefits to the public. Also, the cost of crop insurance programs, both to the producer, and to the public, should be mentioned and incorporated into costs associated with practices that might decrease the number of acres in corn and soybean production that may be susceptible to claims.

- The Strategy's science assessment contains several flawed arguments that discount or undermine potentially viable practices that would reduce nutrient loading to Iowa waters. For example, in Section 2.4, cover crops are discounted by the flawed prediction that so much rye seed would be needed that, to raise the needed rye seed in Iowa, it would replace 31.8 million bushels of corn and 6.2 million bushels of soybeans. The reality is that if the demand for cover crop seed increased, the market would respond by filling the increased demand for rye seed from wherever it can be raised most economically.
- There is no mention in this document of how Iowa will address and overcome the social and cultural barriers that we are increasingly coming to realize are the limiting factors in achieving widespread adoption of nutrient reduction practices, both on and off the field.
- The review process put in place for this document was unnecessarily and inappropriately secretive, and an inefficient use of state resources. Hand delivering paper copies, personalized with "Last Name – DO NOT COPY" promotes an unhealthy environment in which to provide an honest review. Plus, this "Strategy" is a state document and therefore has no legal basis for the bluntly attempted confidentiality. This opens the document and the process to questions such as: What is the document trying to hide? Why? From whom?

This document is not a "Strategy." It is filled with generalities. It lacks specific outputs, outcomes, measurables and milestones by which its success or failure can be tracked. These elements are needed to make it a true strategy. All it does is say "we'll figure it all out later." Or more to the point, "the WRCC will figure it all out later." All this needs to be figured out first, using an open, collaborative process utilizing input from all interested stakeholder groups – a far cry from what was done with the development of this document. Once that has been done, then one could articulate a specific strategy in a document that has real substance to it.

Simply put – WHERE'S THE BEEF?!

Respectfully,
Allen

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"Empowering Iowans to Revitalize Rivers, Lakes, Streams, & Groundwater by Fostering Community Partnerships and Offering Technical Guidance"

DNR's Nonpoint Program Comments on the Draft Nutrient Strategy
November 1, 2012

This document constitutes the response from the Iowa Department of Natural Resources' Nonpoint Source Program. The majority of the comments pertain to the nonpoint piece of the "Strategy" but given the marriage of the point source and nonpoint source piece, we are not willing to endorse this document as written. Major fundamental flaws permeate the "Strategy" while concrete ideas for implementation are not provided. What follows are broad comments, presented in a narrative form, organized into major categories, followed by specific comments organized by section/page/paragraph number &/or quote. It is important to note that these comments may not represent all potential issues with the document, as our concerns with the initial 20-page policy piece are so substantial that much of our effort was spent there. With the limited time provided to comment, this document should be considered an initial comment, not a final comment. This "Strategy" needs major revisions completed with the right mix of players at the table and a proper public involvement process.

Development of the Strategy:

While there is an explanation of the parties involved in the science assessment, there is no such explanation of who was involved in the development of the "policy" piece of the document. It is equally important to describe the policy development process and the parties involved.

After review of the "Strategy" it is clear that the development lacked diverse participation including and especially from nonpoint water quality professionals. This document reflects a narrow view not appropriate for a state-issued document. This is evidenced by entire paragraphs being copied from an Iowa Farm Bureau comment letter (without proper citation) submitted in response to the Raccoon River Master Plan, and all costs and benefits being based on production of a single commodity crop. This evidence calls into question the development of the entire document, as similar narrow-view and single-objective "talking points" are a consistent theme.

Further, responses to some elements of the Stoner Memo simply echo its original language, reflecting a lack of serious consideration in the responses to some of the elements. The "Science Assessment" evaluated a number of possible strategies that could be implemented to reduce nutrients in local and downstream waterbodies. However, the "Strategy" could best be summarized in two words – "Status Quo" – as the document lacks novel or innovative concepts for implementation, lacks a commitment to any measurable load reductions, and lacks accountability in tracking and obtaining progress.

The "Strategy" as written risks the perception of shielding the 3 percent of Iowans who farm for a living from being given the information needed to make sustainable land management decisions. This is unfair to farmers and the remaining 97 percent of Iowans who should all be served by, and have a vested interest in, the State of Iowa's Nutrient Strategy. By associating DNR with this document, as written and without major revisions and without including a more open, collaborative process, and by releasing it as a joint IDALS/DNR document, DNR runs the very real risk of sullying our department's reputation with the 97 percent of Iowans that are not farmers, as well as with progressive conservation farmers who are seriously committed to reducing their N and P contributions to streams and rivers. Some of Iowa's best and brightest were used to help develop the science assessment piece of this document, including respected scientists, agronomists, engineers, and economists from Iowa State University. However, the "Strategy" does not synthesize their research in an organized way to show a path forward.

Information Not Used and Efforts Underway:

How will this "strategy" fit into the larger, more comprehensive Nonpoint Source Management Plan? This is never addressed in this document. The Nonpoint Source Management Plan was developed using a collaborative,

open process conducted by an independent third party facilitator. The Strategy would benefit from a similar process. Also, there is no mention of DNR's Nonpoint Source program, strategies, efforts or progress and how this Program will continue to aid in reducing N and P loads in targeted areas throughout Iowa.

DNR has already embarked upon developing and implementing a strategy to begin to reduce N and P loads in Iowa waters. DNR has completed nitrate-N TMDLs for the Cedar River, Raccoon River, and the (upper) Des Moines River based on numeric criteria associated with the Drinking Water Standard (10 mg/L of N). These TMDLs cover 27 percent of Iowa's land area and have all identified critical subwatersheds at either the HUC-8 or HUC-12 scale that should be targeted for priority work to develop and implement HUC-12 level watershed plans. Developing and implementing these plans, coupled with using the appropriate combination of practices to achieve the load reduction targets established in the TMDLs would reduce nitrate loads into the system. Similarly for P loads, there are existing HUC-12 watershed plans throughout the state designed to reduce P-load contributions to Iowa waters. Building upon this successful set of strategies would be a more meaningful and measurable way to achieve near term N and P load reductions to the nation's waters than what is espoused in this "Strategy".

At the same time, there is an active, multi-organizational effort to address nutrient loading within the Boone River WS (HUC-8) (and Lyons Creek (HUC-12), in particular). This effort includes participation by a wide array of local, state and federal agencies, NGO's, private corporations, and local landowners. The Lyons Creek HUC-12 was one of 173 subwatersheds modeled for the development of the Des Moines River TMDL; the modeling identified Lyons Creek as the 5th highest nitrate contributing HUC-12 of the 173 subwatersheds. This prioritization along with a strong conservation partnership has lead to the development of a watershed management plan for the Lyons Creek watershed. The watershed plan identifies goals, objectives, timelines and costs for achieving a 34% reduction in nitrate loads leaving the watershed (the 34% nitrate reduction goal is what was identified in the Des Moines River TMDL).

In the Raccoon River watershed Soil and Water Conservation Districts and partners including IDALS-DSC and the Iowa Soybean Association have used the nitrate subwatershed prioritization presented in the Raccoon River Watershed Water Quality Master Plan to identify areas for focused conservation efforts through the NRCS Mississippi River Basin Initiative.
Similarly, DNR has helped support the continuation of the Cedar River Watershed Coalition which was formed by an-hoc group of concerned local leaders in response to the 2008 floods along the Cedar River. This group is actively engaged in continuing efforts to find ways to address water quality and flood mitigation strategies within the Cedar River Basin. In fact, two subwatersheds (Upper Cedar River – HUC-8; Indian Creek – HUC-10) have recently successfully formed Watershed Management Authorities under Iowa Code Chapter 466B to begin to plan on how to address water quality and flood issues at the local scale. These are real examples of efforts that have been and continue to be pursued to achieve meaningful reductions in N loading in Iowa.

Similarly for Phosphorus loading, DNR has been leading efforts to encourage and support local watershed groups to form and develop EPA 9-element watershed plans to address P loading to Iowa priority public lakes. There are currently 16 watershed plans either in progress, in place or being implemented across the state which are designed to reduce P loading to Iowa's priority public lake systems.

This collective effort already underway constitutes a targeted, priority nutrient reduction strategy for making meaningful and measurable near-term reductions in nitrogen and phosphorus pollution in Iowa. In turn, these reductions will also reduce loading of these pollutants to the larger Mississippi River Basin and the Gulf of Mexico. Unlike this draft proposed nutrient strategy, these are <u>real</u> actions being taken in <u>real-time</u> to address the ever-increasing statewide and national problem of nutrient pollution to the nation's waters.

Review Process:

The review process put in place for this document was unnecessarily and inappropriately secretive, and an inefficient use of state resources. Part of the reason why electronic documents are so valuable is that it is much easier to collaborate on a review with the aid of "track changes" and "note" tools. This helps the reviewer and the original author of the document. The additional time expended on the comment process with paper copies was an unfortunate example of avoidable government waste. Also, it is impossible to click on embedded links on a paper copy of the document. One can only assume where the apparent links in the document go to when one is unable to access them because they only have a paper copy.

Hand delivering paper copies, personalized with "Last Name – DO NOT COPY" promotes an unhealthy environment in which to provide an honest review. Plus, this "Strategy" is a publicly accessible state document and therefore has no legal basis for the bluntly attempted confidentiality. This opens the document and the process to questions such as: What is the document trying to hide? Why? From whom?

Finally, the turnaround time requested on a document of this size and nature is unrealistic. If the Nonpoint Program would have been involved throughout the process, many of these issues could have been resolved during its development. Now that the Nonpoint Program has been presented with a draft document while having no prior involvement, these once-preventable issues have now rendered this document unacceptable for the citizens of the State of Iowa, our colleagues in other Mississippi River Basin states, and the end user of our exported nutrients – the citizens that depend on the Gulf of Mexico for their economic livelihood.

Language Used in the Document:

It is clear that the document uses subjective language, often expressed from a narrow or single-minded perspective, including an entire prelude to the actual "Strategy" that tries to make a case against any kind of EPA regulation. It is not the place of a state document to advocate for special interest groups or to speak against state and federal initiatives that are potentially viable tools to helping solve these issues. This includes, but is not limited to, a TMDL for the Gulf of Mexico.

The document lacks outputs, outcomes, measurables and milestones by which its success or failure can be tracked. These elements are needed to make it a true strategy. Development of a Nutrient Reduction Strategy should be an open, collaborative process utilizing input from all interested stakeholder groups. Instead, this "Strategy" was developed without inter-agency collaboration and several key stakeholder groups were absent from the table. With appropriate collaboration among agencies and proactive stakeholder and public outreach, one could articulate a specific strategy in a document that has goals, milestones and measurable actions, and responsible parties identified in it.

The Role of the WRCC:

The Iowa Nutrient Strategy places much of the implementation responsibility on the WRCC but the document provides the WRCC no goals, objectives, timelines or responsibilities. The Raccoon River Water Quality Master Plan may provide some lessons learned for development of the Iowa Nutrient Strategy. Harry Ahrenholtz, President of Agriculture's Clean Water Alliance, provided comments on the draft Raccoon River Water Quality Master Plan in a letter dated June 9, 2011. One of Mr. Ahrenholtz's recommendations noted the Master Plan does not "establish goals, objectives, timelines, responsibilities etc." To avoid a repeat of that legitimate criticism, the

Iowa Nutrient Strategy should create goals, objectives, timelines and responsibilities to ensure meaningful and measurable near-term nutrient reductions are achieved in Iowa.

The concept of creating the WRCC, evaluating HUC-8 watersheds throughout the state for nutrient load contributions, prioritizing watersheds based on that assessment, then drilling down to priority HUC-12 watersheds and developing specific, targeted watershed plans and water quality improvement strategies to begin to achieve the sought-after reductions, were a product of the final report of the Water Quality Planning Task Force in 2007 and became embodied in Iowa Code in 2008 (Chapter 466B). The Task Force report and subsequent legislation also recommended the state embark on a broad campaign to educate and inform Iowans about water quality issues and their personally responsibility to address these problems. Unfortunately, it has been over 4 years since the creation of the WRCC, and in spite of the fact that the first action taken by DNR to implement Chapter 466B was to assess all 56 HUC-8 watersheds for nutrient loading so that the WRCC could begin the prioritization process (this assessment was completed in April 2009 – see: http://programs.iowadnr.gov/iowawaterweb/watershed/), the WRCC has not fulfilled its responsibilities to set priorities for addressing nonpoint source nutrient pollution in Iowa waters over the past three and a half years.

Social Assessments:

There is no mention in this document of how we will address and overcome the social and cultural barriers that we are increasingly coming to realize are the limiting factors in achieving widespread adoption of nutrient reduction practices, both on and off the field. Further, the Strategy does not include a social assessment to account for which specific actions and practices farmers and landowners would most likely be willing to consider implementing to voluntarily reduce nutrient runoff from their land. Without a professional social assessment, a "science" assessment is of limited value, since the Strategy is based on the voluntary actions of private landowners.

Accounting Methods:

Most "costs" were calculated (or expressed qualitatively) almost exclusively from a "corn yield" and/or "acres in corn production" standpoint. While corn may currently be the most widely grown crop in Iowa, that may not always be the case. Many of the practices described in the Science Assessment would also create economic opportunities and "benefits," not only costs. While some acres may be taken out of production to grow seed for cover crops, living mulches, and produce timber for bioreactors, those crops would have potential profits associated with them as well. If those profits do not match those offered by corn production, we should, at some point, ask ourselves why. Farm bill policy and commodity subsidies have manipulated the pricing mechanism. In a truly free market system, it is quite possible that corn and soybean production would not be the dominant forms of production they are today. We should evaluate the impacts of removing subsidies and incentives that encourage a monocrop, or in this case, a dual crop system. It wasn't that long ago that extended rotations and much larger on-farm diversity were the norms in agriculture. The nutrient strategy should at least ask, and attempt to explain, why things have changed so dramatically and what that has meant for nutrient balance at the farm, watershed, county, and state levels.

For example, the Science Assessment document Section 2.4 page2, paragraph 8 states "These three practices, if adopted on the maximum acres possible, would take approximately 885,000 acres out of corn and soybean production." That is not a valid assumption. Acres needed for wetland establishment likely would include land uses other than just corn and soybean acres. These areas include chronically wet areas that provide little reliable crop production. Wetland areas could include pasture, grassland, and other land uses. The acres needed for rye seed production would likely need to come out of existing corn and soybean acres but the rye crop would be a cash crop due to the demand for seed and may not result in a change in a farmer's bottom line. The acres needed

for trees to construct bioreactors would be better suited for land areas not currently in corn and soybean production, tree planting could be targeted to sensitive lands and achieve multiple benefits while at the same time providing a cash crop.

There is no mention (or cost/benefit analysis) was made of agro-tourism or increased recreational opportunities that might be created by some nutrient reduction practices and/or land use changes. While these opportunities/benefits may not be equivalent to the loss of corn and soybean production (at least not currently), they may help partially offset costs. Private land trusts and the ability those entities have to acquire property, develop conservation easements, and provide recreational and/or environmental services could have been studied and included in the Nutrient Strategy, possibly incorporated into sections pertaining to land retirement. Because private land trust holdings are considered "private property," market-based and voluntary forces, which are endorsed by the Nutrient Strategy, would be in play, as the entities have a vested interest in protecting their property rights (which typically include environmental services), and the costs of land, earthwork, planting, maintenance, and protection (bio/chem/phys and legal) all have monetary transactions that could be included in a cost/benefit analysis. "Land trusts operate much like businesses. Just as businesses provide goods and services, land trusts provide environmental amenities such as wildlife habitat and scenic views. And like businesses, land trusts must keep their costs in check." (http://www.perc.org/pdf/land_trusts_02.pdf) (Parker, 2002).

Crop Insurance Programs:

The "Strategy" does not to account for the role of federal crop insurance subsidies in providing artificial economic incentives to farmers and landowners to convert marginal lands to grow more corn and soybeans, which has contributed to the record high number of acres devoted to row crops in Iowa in recent years. Instead of acknowledging the effect of crop insurance subsidies to create an abnormally high percentage of Iowa land in row crops, which accelerates nutrient loading from marginal lands to Iowa waters, the Strategy's science assessment assumes that current row crop acres are "normal" or baseline, and then penalizes alternative practices and extended crop rotations being a potential "cost" to Iowa farmers if current row crop acres were converted back to alternatives. Instead of ignoring the incentives provided by federal crop insurance subsidies to maximize row crop acres, the NRS should acknowledge the incentives and consider how changes in the subsidies (including reduction, expansion, and elimination of the federal crop insurance subsidies or tying nutrient reduction strategies to eligibility for these subsidies) would likely change future nutrient loads to Iowa waters.

The cost of crop insurance programs, both to the producer, and to the public, should be mentioned and incorporated into costs associated with practices that might decrease the number of acres in corn and soybean production that may be susceptible to claims. Not only would premium costs be reduced (for both landowner and taxpayer), but claims (by the taxpayer) would also be reduced. Examples include implementation of buffers, wetlands, and land retirement in floodplains and poorly-drained depressional areas. It may be possible to grow perennials for energy production in flood-prone areas without significant risks to yields – more research is needed in this area, but this may offer insurance savings as well. Section 2.4 seems incomplete without at least some analysis and/or incorporation of insurance costs (and savings).

Failure to Address Specific Elements from the Stoner Memo:

1. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 1 calls for the prioritization of watersheds on a statewide basis for nitrogen and phosphorus loading reductions. Nowhere in the Iowa Nutrient Strategy are watersheds prioritized. The Iowa Nutrient Strategy states the WRCC will prioritize watersheds on a statewide basis but the intent of EPA's framework is for the strategy document to contain a completed prioritization of watersheds. Meeting notes from the December 14, 2011 WRCC meeting show a discussion of the nutrient strategy. A note attributed to Secretary Northey discussing the Iowa

Nutrient Strategy states "given limited funding available, prioritization will be needed for both practices and watersheds." The Iowa Nutrient Strategy does not accomplish the prioritization suggested by Secretary Northey; nor does it set a timeline for prioritization.

The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 1A calls for the estimation of nitrogen and phosphorus loading to rivers, streams, lakes, reservoirs, etc. in all major watersheds across the state. Nowhere in the Iowa Nutrient Strategy are loading estimates provided. The Iowa Nutrient Strategy does give statewide N and P baseline estimates and calls for at least a 45% reduction in riverine total nitrogen load and in riverine total phosphorus load, but neither loading estimates nor reduction estimates are provided on a watershed basis, as requested by EPA. The Nitrogen and Phosphorus Budgets for Iowa and Iowa Watersheds (Libra 2004) does provide nutrient loading estimates by watershed but this information was not used to support or satisfy the EPA recommended element. The USGS SPARROW modeling of the Mississippi River Basin estimated phosphorus and nitrogen loads to the Gulf of Mexico from each HUC-8 in the basin, this information was not used to support or satisfy the EPA recommended element. The EPA has approved three nitrate TMDLs in Iowa for the Raccoon River, Des Moines River and Cedar River. These three TMDLs all have estimated nitrate loads and have prioritized high contributing subwatersheds within the larger river basins. These three nitrate TMDLs constitute 27 percent of Iowa's land area. The Iowa Nutrient Strategy does not use or reference information from any of these TMDLs to support or satisfy the EPA recommended element.

The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 1B calls for the identification of major watersheds that individually or collectively account for a substantial portion of loads. Nowhere in the Iowa Nutrient Strategy are watersheds identified that contribute a substantial portion of nutrient loads. Again the Nitrogen and Phosphorus Budgets for Iowa and Iowa Watersheds, the USGS SPARROW modeling, and the Raccoon, Des Moines and Cedar River TMDLs all could have been used to identify watersheds contributing substantial portions of loads.

The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 1C calls for the identification of priority sub-waters on a HUC-12 or similar scale to implement targeted nitrogen and phosphorus load reduction activities. Nowhere in the "Strategy" are priority subwatersheds or HUC-12s identified. The Raccoon River Watershed Water Quality Master Plan (2011) may be the best example in Iowa of a basin-wide locally developed voluntary watershed plan that includes prioritization of subwatersheds or HUC-12s for nitrogen and phosphorus load reductions. The Raccoon River Watershed Water Quality Master Plan, using modeling support from ISU-CARD prioritized subwatersheds for nitrate, phosphorus, sediment and pathogens reductions as well as wildlife priorities. The EPA has approved three nitrate TMDLs in Iowa for the Raccoon River, Des Moines River and Cedar River. These three TMDLs all have estimated nitrate loads and have prioritized high contributing subwatersheds within the larger river basins. Conservation agencies at the local, state and federal levels along with conservation groups and commodity groups have all used the subwatershed prioritization presented in both the Raccoon River Watershed Water Quality Master Plan and the nitrate TMDLs to focus water quality efforts to priority subwatersheds.

A great example of prioritization using the TMDL findings is the partnership that has been working in the Lyons Creek HUC-12 watershed within the Des Moines River basin. The Lyons Creek HUC-12 was one of 173 subwatersheds modeled for the development of the Des Moines River TMDL; the modeling identified Lyons Creek as the 5th highest nitrate contributing HUC-12 of the 173 subwatersheds. This prioritization along with a strong conservation partnership has lead to the development a watershed management plan for the Lyons Creek watershed. The watershed plan identifies goals, objectives, timelines and costs for achieving

a 34% reduction in nitrate loads leaving the watershed (the 34% nitrate reduction goal is what was identified in the Des Moines River TMDL).

In the Raccoon River watershed Soil and Water Conservation Districts and partners including IDALS-DSC and the Iowa Soybean Association have used the nitrate subwatershed prioritization presented in the Raccoon River Watershed Water Quality Master Plan to identify areas for focused conservation efforts through the NRCS Mississippi River Basin Initiative.

2. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 2 calls for the setting of watershed load reduction goals based on best available information. The Iowa Nutrient Strategy establishes a state-wide goal of at least a 45% reduction in riverine total nitrogen load and in riverine total phosphorus but the document does not set load reductions goals by watershed.

3. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 3 calls for ensuring effectiveness of point source permits in targeted/priority subwatersheds. Since no watersheds or subwatersheds have been prioritized within the Iowa Nutrient Strategy evaluation of this element is not possible. The Iowa Nutrient Strategy does provide a goal and plan for working with 102 major municipal dischargers and 28 industrial dischargers. The EPA framework also calls for effective permitting of CAFOs; the Iowa Nutrient Strategy provides a brief summary of the existing permit requirements for CAFOs and other AFOs but does not provide plans for ensuring effective permits within priority watersheds or subwatersheds.

4. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 4 addresses nitrogen and phosphorus pollution from agricultural areas by 1) developing watershed scale plans, 2) looking for opportunities to include innovative approaches, and 3) incorporating lessons learned from other successful agricultural initiatives in other parts of the country. The Iowa Nutrient Strategy states HUC-12 scale plans will be developed within prioritized watersheds but the Iowa Nutrient Strategy does not prioritize watersheds or sub-watersheds nor does it provide a timeline for prioritization or development of HUC-12 scale plans. The Iowa Nutrient Strategy does provide some limited examples of innovative approaches (for example, developing new roles for certified crop consultants) but the level to which these examples will lead to accelerated adoption of agricultural conservation practices is unknown. No timeline is provided for establishing innovative approaches. The Iowa Nutrient Strategy does not provide lessons learned from other agricultural initiatives in other parts of the country. The NRCS Mississippi River Basin Initiative and other similar landscape initiatives aimed at nutrient reduction provide great examples of prioritizing watersheds and subwatersheds for nutrient reduction; no mention of these examples were provided within the Iowa Nutrient Strategy. The Iowa Nutrient Strategy does provide examples of two public outreach programs in Iowa (Rathbun Land and Water Alliance and Iowa Farm Environmental Leader Award) and suggests development of a watershed or farmer recognition program but the Iowa Nutrient Strategy provides no details, timelines or goals for the programs. The Iowa Nutrient Strategy also fails to mention the successful efforts of the Iowa Learning Farms to promote a "Culture of Conservation" over the past 7 years. Nor does it acknowledge DNR's recent efforts to develop and implement a public education and outreach campaign targeted to Iowa's K through 12 grade youth.

5. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 5 addresses storm water, septic systems and minor POTWs. The Iowa Nutrient Strategy acknowledges nutrient loading from these sources is minor and the emphasis will be placed on monitoring, inspections and upgrades. The Iowa Nutrient Strategy presents some details regarding inspection and upgrades but no monitoring plan or approach is presented.

6. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 6 calls for accountability and verification measures. The IDNR plan for tracking progress outlines seven measures that will be used to evaluate point source reductions. The nonpoint source portion provides some vague approaches for accountability and verification but details are lacking. Both the point and nonpoint approaches do not propose an evaluation method for watersheds or priority watersheds as suggested in element 6A. The Iowa Nutrient Strategy does propose a "public-private reporting system that documents current nutrient management and conservation system approaches within watersheds." The four elements of the public-system have no timeline for establishment. Element 2 of the public-private system calls for a regular, periodic Iowa Natural Resources Inventory to establish HUC-12 baselines. The 2012 NRI CEAP study of the Boone and Raccoon River watershed is currently being conducted and according to NRCS staff the survey will be statistically valid for the HUC-8 watershed but will not be statistically valid for HUC-12 watersheds. How does the Iowa Nutrient Strategy propose to conduct a statistically valid NRI on a HUC-12 scale subwatershed while at the same time ensuring privacy?

7. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 7 addresses annual reporting of implementation activities and biannual reporting of load reductions and environmental impacts. The Iowa Nutrient Strategy states the WRCC annual reports will be used as the necessary reporting requirements. Nowhere in Iowa Code is the WRCC required to prepare or submit an annual report of progress. There is also no mention of "biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds." (see Stoner Memo element #7); no mention of reporting progress in absolute reductions in in-stream N and P; and no mention of reporting against outputs, outcomes, measurables, milestones within the strategy.

8. The EPA framework for managing nitrogen and phosphorus pollution Recommended Element 8 addresses a work plan and schedule for developing numeric criteria development. The Iowa Nutrient Strategy does not present a "work plan and phased schedule" or "interim milestones" as suggested by the EPA framework.

Science Assessment:

The Strategy's science assessment contains several flawed arguments that discount or undermine potentially viable practices that would reduce nutrient loading to Iowa waters. For example, in Section 2.4, cover crops are discounted by the flawed prediction that so much rye seed would be needed that, to raise the needed rye seed in Iowa, it would replace 31.8 million bushels of corn and 6.2 million bushels of soybeans. The reality is that if the demand for cover crop seed increased, the market would respond by filling the increased demand for rye seed from wherever it can be raised most economically--most likely from Oklahoma, Georgia, and other places it's currently raised. No one is suggesting that Iowa farmers would have to convert land from corn to rye seed to fill the increased demand. However, if the market demand for cover crops increased, then it might become a viable alternative crop for Iowa farmers, too.

Section 2.4 similarly discounts bioreactors by stating that bioreactors "will require that trees be planted to provide needed woodchips", and that this would require conversion of Iowa cropland to trees. As with the cover crop argument, this reasoning is flawed, as wood chips would not have to come from Iowa-raised trees. The reality is that if the demand for wood chips increased for bioreactors, then the market would respond by filling the increased demand for wood chips from wherever it can be raised most economically. In addition, it is possible that much of the timber production needed for bioreactor wood chips could come from marginal land that floods occasional and may be too wet for reliable row crop production, but suitable for timber.

Section 2.4 also discounts the potential for farmers to switch from fall to spring N application because of apparent industry infrastructure costs of shifting the 25% of fall-applied N to the spring (although the science assessment

does not specify what these costs are), and due to the lack of adequate days in the spring to complete field work before the optimal May 10th date of corn planting. This section argues that there is already too much time required by tillage in the spring that prevents adding any more spring operations. Since too much tillage is already the cause of water quality problems from soil erosion in Iowa, it seems near-sighted to argue for continuing fall-applied fertilization—which can result in water quality problems from nutrient losses—in order to continue spring tillage. Instead, adopting both no till and spring-applied fertilizer practices, to name two simple practices that could be adopted at the same time on the same farm fields, would be a win-win for reducing soil losses and reducing nutrient losses. Switching from fall-applied N to spring-applied N could significantly reduce nutrient loads to Iowa waters and, if 100% adopted, farming and the fertilizer industry would adapt to accommodate the switch.

The Strategy's science assessment does not account for the economic value of ecosystem services provided by the alternative practices (non row crop practices) considered. Ecosystem services would include: the economic value of clean water for drinking, swimming, fishing, boating, and other recreation; the economic value of healthy game and wildlife populations, including pheasants (pheasant numbers and pheasant hunting have crashed in Iowa during the last five years, due largely to habitat loss as buffers and fencerows have been plowed up to plant more corn); the economic value of enhanced water infiltration and associated flood reduction (Iowa had severe flooding in 2008, 2009, and 2010); the economic value of clean air (and reduced asthma cases) provided by practices which provide year-round soil cover to reduce wind erosion; the economic value of practices that provide carbon sequestration. Ecosystem services are of benefit to the public. Since it discounts or ignores ecosystem services, the Strategy's science assessment may be viewed as biased in favor of practices that provide economic benefit to private landowners, and perceived as biased against practices that provide economic benefits to the public.

Additionally, the Strategy discounts or downplays possible economic opportunities such as increased diversity of agricultural commodities and economic opportunities created from the increased demand of cover crops, timber, and living mulches. The Strategy seems to doubt the market's ability to adjust to these types of changes, as well as the ability of producers and land-owners to capitalize on these new opportunities.

Specific Comments on "Policy" Document:
Due to the sheer volume of comments on the policy document, it was necessary to transcribe the entire document onto electronic format to properly account for all comments. The entire policy document will be quoted here (*in italics and 10 point font*), with our comments following each issue we have, using the following Key:

Key

1. Red highlight = Significant comment on a critical issue, or a possible inaccuracy that appears to be a factual or numerical error.
2. Yellow highlight = indicates comment that asks for more clarification of a potentially important issue, or a comment on an issue of significance to the overall theme
3. Green highlight = indicates comment that asks for more clarification of a non-critical issue, or a comment on an issue that is likely of low importance to the overall document.

A notation will be given when a new page from the Draft Nutrient Strategy document starts for those following along on a paper copy (ex. **~SECTION 1 - PAGE 4~**). There were no comments on blank pages or the Table of Contents.

~TITLE PAGE~

"IOWA NUTRIENT REDUCTION STRATEGY

A science and technology-based framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico"

Yellow Comment: A more accurate subtitle for a document upholding the elements of the Stoner memo would be: "A science and technology-based framework to reduce nutrients to Iowa waters and the Gulf of Mexico and to Measure Progress and Effectiveness."

~EXECUTIVE SUMMARY PAGE 1~

"EXECUTIVE SUMMARY

The Iowa Nutrient Reduction Strategy is a science and technology-based framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico. It is designed to direct efforts to reduce nutrients in surface water from both point and nonpoint sources in a scientific, reasonable and cost effective manner."

Green Comment: The word "reasonable" is entirely subjective and unless it is defined in detail it is inappropriate for a policy document of this nature.

"It was prompted by the 2008 Gulf Hypoxia Action Plan that calls for states along the Mississippi River to develop strategies to reduce nutrient loadings to the Gulf of Mexico. The plan establishes a goal of at least a 45% reduction in riverine total nitrogen load and in riverine total phosphorus load.

The Environmental Protection Agency (EPA) embraced a practical approach to meet these goals in the March 16, 2011 memorandum titled, "Recommended Elements of a State Framework for Managing Nitrogen and Phosphorus Pollution" (Stoner 2011).

The memo outlines eight strategy elements that emphasize implementation of existing nutrient reduction practices and technologies for point and nonpoint nutrient sources. The Iowa strategy, which was developed over a two-year period, follows the recommended framework provided by the EPA in the 2011 memo."

Red Comment: Several key elements of the Stoner memo are not addressed in this draft strategy while other elements simply echo, verbatim, language right from the memo itself. This document is a far cry from meeting the

intent and spirit of the Stoner memo. Plus, we question how the Draft Strategy was developed over a "two-year period" when the memo wasn't released until March of 2011.

"The Iowa strategy proposes a pragmatic approach for reducing nutrient loads discharged from the state's largest wastewater treatment plants, in combination with targeted practices designed to reduce loads from nonpoint sources. This is the first time such an integrated approach involving both point sources and nonpoint sources has been attempted."

Yellow Comment: It can be argued that the Total Maximum Daily Load documents written for the Nitrate drinking water standard in the Raccoon, Des Moines, and Cedar Rivers do just this. If nothing else, these documents can and should be used to help set the state in the right direction.

"In this document, steps are outlined to prioritize watersheds and limited resources, improve the effectiveness of current state programs, and increase voluntary efforts to reduce nutrient loss."

Red Comment: No clear steps were outlined or adequately described for prioritizing watersheds or limited resources. There are plenty of existing resources that could have been incorporated into the development of this document. For example, identification of HUC-12 watersheds that have impaired lakes or stream segments or identification of watersheds that already have water quality models developed that could provide utility in assessing and predicting water quality improvement.

"Iowa's many successes can be duplicated using the tools known to work, such as targeted, voluntary conservation measures, in conjunction with research, development and demonstration of new approaches."

Yellow Comment: It is not enough to say "there have been successes," be specific on what kind of successes this strategy thinks are worthy of replicating. To be sure, Iowa has experienced localized, small scale water quality improvement in projects with a dedicated watershed management plan and local water quality professionals working with citizens and landowners. Is that what is referred to here? Plus, we would like to see more explanation of "Market-based" approaches here in the Executive Summary as brought up on Page 15, paragraph 5 of this section.

"This strategy recognizes the continued need to work with farmers, industry and cities to optimize nutrient management and lessen impacts to streams and lakes. It also recognizes success is highly dependent on many complicated factors, and new technologies will need to be developed, tested and implemented."

Red Comment: The technologies that are available to use have demonstrated they can help achieve the reductions needed, as detailed in the science assessment. In fact, there are examples of farmers demonstrating just how viable these technologies are while remaining – or increasing – their economic viability. Saying "we need new technology" is too often used as an excuse for inaction when many of the common sense land management decisions could be incorporated without the need of a government program (i.e. conversion to no-till or ridge-till, use of cover crops, employment of beneficial crop rotations, timely fertilizer application, etc.) and would have huge benefits to those farmers while improving water quality.

Additionally, the Stoner Memo clearly and repeatedly talks about the need for the Strategy to "achieve meaningful and measurable near-term reductions in nitrogen and phosphorus pollution" and this "Strategy" fails to address how this will be accomplished.

"All Iowans have an impact on nutrients in surface water and can play a role in reducing those impacts over time. This strategy emphasizes Iowans working together in small watersheds, using existing frameworks, to make an impact."

Green Comment: This concept is not new as the DNR Nonpoint Program is already doing this across the state. The question is how do we expand and accelerate this model given limited and potentially shrinking government resources?

"Point Sources

This strategy is designed to achieve significant reductions in the amounts of nitrogen and phosphorus discharged to Iowa's rivers and streams by point sources. A total of 102 major municipal facilities serve the wastewater treatment needs of 55-

60% of Iowa's population and treat more than 80% of the volume of all wastewater handled by Iowa citied. Another 28 industrial facilities discharge the greatest amounts of nitrogen and phosphorus to Iowa waters."

Red Comment: What is meant here by "greatest amount?" These point sources may have the highest concentrations of N and P but it is highly unlikely that they contribute the largest loads to Iowa waters.

"The portions of this strategy related to point sources are built on a technology assessment of practices that will be the most effective at reducing loading of nitrogen (N) and phosphorus (P) to Iowa surface waters from Iowa's wastewater treatment plans and major industrial facilities that discharge N and P to Iowa waters. It also takes into account related costs of these practices.

For the first time, permits issued to these 130 facilities will require evaluation and implementation of process changes, and construction of additional wastewater treatment processes. These changes are designed to achieve targeted reductions of at least two-thirds in the amount of nitrogen and a three-fourths reduction in the amount of phosphorus from levels currently discharged by these facilities."

Yellow Comment: This fulfills "meaningful and measurable" but it needs to be made clear how soon that will happen and/or interim milestones to ensure the process remains on track. Additionally, discussing how adjustments will be made or will need to be made if there is deviation from the plan.

~EXECUTIVE SUMMARY PAGE 2~

"If successful, this strategy will reduce by at least 11,000 tons per year the amount of nitrogen and 2,170 tons per year the amount of phosphorus discharged annually by municipal facilities alone. These figures represent a 4%reduction in nitrogen and a 16% reduction in phosphorus in the estimated statewide amounts of nitrogen and phosphorus discharged to Iowa waters from both point and nonpoint sources.

Nonpoint Sources"

Red Comment: This section never explains how we are going to achieve meaningful and measurable reductions in N and P, nor is it found in the document itself.

"Accounting for potential load reduction from point sources, nonpoint sources would need to achieve 41% load reduction in nitrate-N and 29% load reduction in phosphorus to meet the overall 45% reduction goal."

Red Comment: As expressed/stated, the reductions in PS and NPS N and P are not cumulative and do not add up to meet the 45% reduction goals. A 67% reduction and 75% reduction in PS N and P, respectively, are stated as having overall reductions of 4% for the total (PS+NPS) N load, and 16% for the total (PS+NPS) P load. This means that point sources comprise 6% of the baseline N and 21.3% of the baseline P loads.

$$N_{PS}(0.67) = N_{total}(0.04) \rightarrow N_{PS} = (0.04/0.67)N_{total} \rightarrow N_{PS} = 6.0\% \text{ of } N_{total}$$

$$P_{PS}(0.75) = P_{total}(0.16) \rightarrow P_{PS} = (0.16/0.75)P_{total} \rightarrow P_{PS} = 21.3\% \text{ of } P_{total}$$

The text states that NPS reduction of N must be 41% and NPS reduction of P must be 29% in order to meet the 45% reduction goal for both. The % reductions for PS and NPS, as expressed, are not additive because PS and NPS loads are not equal. Either the calculation is currently incorrect, or more likely, the language in the text needs to be re-stated. To meet the 45% reduction goal, NPS N must be reduced by 43.6% (not 41%) and NPS P must be reduced by 36.9% (not 29%).

The N and P reductions for NPS loads in the scenarios quantified in the Science Assessment all shoot for the 29% N and 41% P reduction targets. Those must be based on the overall N and P loads, not just the NPS N and P loads, in order to meet the goal. If the reductions are calculated correctly, then the required NPS reductions (43.6%-N and 36.9% P) should either be clearly expressed in these paragraphs, or the following revision could be made to the 2nd paragraph on Page 2: "Accounting for potential load reduction from point sources, nonpoint sources would need to achieve 41% of the total or overall load reduction in nitrate-N and 29% of the total/overall load reduction in phosphorus…"

"The portions of this strategy related to nonpoint sources are built on a scientific assessment of practices and association costs to reduce loading of nitrogen (N) and phosphorus (P) to Iowa surface waters.

In October 2010, the Iowa Department of Agriculture and Land Stewardship and the College of Agriculture and Life Sciences at Iowa State University partnered to conduct a scientific assessment. The team consisted of 23 individuals representing five agencies or organizations."

Yellow Comment: We're happy to see the players involved in the development of the Science Assessment. A similar explanation of the author(s) of the policy piece would be helpful as well.

"The objective of the Iowa Nonpoint Source Nutrient Reduction Science Assessment was to identify and model the effectiveness of specific practices at reducing N and P from reaching the Gulf of Mexico, plus estimate the cost and cost per unit of nutrient removed when implementing each practice."

Green Comment: Did the EPA ask for "cost per unit" or is this an IDALS measure? Please go into more detail.

"The assessment involved establishing baseline conditions, reviewing scientific literature to assess potential performance of practices, estimating potential load reductions of implementing various scenarios involving nutrient reduction practices, and estimating implementation costs.

A combination of practices will be needed to reach desired load reductions. To that end, the science team developed scenarios of practice combination that could potentially achieve the goals. ***The practice combinations are examples, not recommendations.***

Three example scenarios were developed that meet both the N and P reduction objective. One has an annual cost of $756 million and initial investment cost of $3.2 billion. A second example scenario has an annual cost of $1.2 billion, plus a matching initial investment cost of $1.2 billion. A third example has an annual cost of $77 million, with an initial investment cost of $4 billion."

Red Comment: The examples given are so vague that including them here is not helpful without further explanation. Plus, the accounting method used does not appear to be a complete calculus that accounts for offsetting benefits, including the potential income of a new practice. The accounting method appears to be narrowly based a corn-bean production approach.

"Summary

While the positive effects of any individual nutrient control practice may not be noticed immediately, the cumulative impact of these actions will result in long-term water quality improvements in Iowa, plus downstream waters from Iowa to the Gulf of Mexico.

There still is a need for development of additional practices, testing of new practices, further testing of existing practices, and verifying practice performance at implementation scales. This strategy encourages the development of new science, new technologies, new opportunities, and the further engagement and collaboration of both the public and private sectors."

Red Comment: This strategy may in fact encourage those elements above, but it does not recommend any nonpoint source strategies that will result in meaningful and measurable nonpoint source reductions in N and P. Therefore, this document does not meet the expectations of the Stoner Memo and does not qualify as a viable Strategy.

"The path forward to reducing nutrient impacts on aquatic life will not be easy, but this strategy is a key step towards improving Iowa's water quality while ensuring the state's continued, reasonable economic growth and prosperity."

Green Comment: Please provide at least some evidence to support the statement/prediction. "This strategy is a key step..." sounds great but is meaningless given the lack of any meaningful and measurable efforts to reduce N and P in the "Strategy". The word "reasonable" is entirely subjective and unless it is defined in detail it is inappropriate for a policy document of this nature.

"This strategy is the beginning. From this, operational plans will be developed to put wheels under the strategy. In short, this is a dynamic document that will change over time as new information, data and science is discovered and adopted.

~SECTION 1, PAGE 2~ (There were no comments on the Table of Contents)

Introduction

The 2008 Gulf Hypoxia Action Plan calls for states along the Mississippi River to develop strategies to reduce nutrient loadings to the Gulf of Mexico. The plan establishes targets of at least 45% reduction in riverine total nitrogen load and in riverine total phosphorus load.

Iowa has been working for decades to protect and improve water quality, with good results. But progress measured at the Gulf of Mexico towards these large reduction targets has been slow."

Green Comment: This is a generic statement and is not useful without examples of "good results" especially in a document addressing N & P. As the statement says, "progress has been slow." Please include data or a citation to the actual measured reductions that are alluded to.

"The Iowa Nutrient Reduction Strategy outlines efforts to reduce nutrients in surface water from both point and nonpoint sources in a scientific, reasonable and cost effective manner."

Red Comment: There is no evidence in this document that the nonpoint side of the equation does any of this. Plus, please remove the subjective term "reasonable" from this document. Also, using the term "cost effective" needs to be explained more as a more complete accounting method should have been utilized.

"The Environmental Protection Agency (EPA) embraced a practical approach in the March 16, 2011 memorandum titled, "Recommended Elements of a State Framework for Managing Nitrogen and Phosphorus Pollution" (Stoner 2011). The framework includes eight strategy elements that emphasize implementation of existing nutrient reduction practices and technologies for point and nonpoint nutrient sources."

Red Comment: This statement is correct – but this document does not properly address those eight elements.

"Consistent with EPA's framework, the Iowa strategy proposes a pragmatic approach for reducing nutrient loads discharged from the state's largest wastewater treatment plants in combination with targeted practices designed to reduce loads from nonpoint sources."

Red Comment: To repeat, this document is not consistent with EPA's framework and there are no proposals, or even recommendations, of targeted practices to reduce nonpoint loads. In fact, on several occasions the text of the Strategy notes that scenarios are not recommendations, only examples. While it is appropriate for specific implementation plans to be locally-driven, it is critical for the Strategy to, at a minimum, outline a process for developing successful scenarios, and milestones for successful implementation and nutrient reduction.

"Iowa's many successes in protecting the state's water quality can be duplicated using the tools known to work, such as targeted, voluntary conservation measures, in conjunction with research, development and demonstration of new approaches."

Green Comment: Please be specific and give examples of the successes referred to above.

"Current investments will continue to pay dividends, and the policies proposed within this strategy will accelerate progress towards reducing nutrient loads to local and Gulf waters."

Red Comment: How? It is not enough to just say nice words. We need specific plans of action outlined. This "Strategy" is much too vague and noncommittal to claim the above sentence.

"This is a dynamic strategy and science/technology assessment document that will change over time as new information, data and science is discovered and adopted."

Green Comment: Please add in detail of how often the Strategy would be updated and how that process would take place. An open, collaborative process, similar to the development of the State's Nonpoint Source Management Plan would seem to make sense.

~SECTION 1, PAGE 3~

1.1 "Background

Nutrients are chemical elements that are necessary to sustain all life forms. Nitrogen and phosphorus are two nutrients that allow for healthy aquatic ecosystems. However, at excessive levels these nutrients can lead to water quality problems and interfere with beneficial water uses.

Iowa is not alone in facing nutrient-related water quality problems. To some degree, every state faces problems associated with nutrient over-enrichment caused primarily by too much nitrogen and phosphorus in waters. Nutrient enrichment can originate from local sources within a state, or sometimes from distant sources located in upstream states.

At the national level, the Gulf of Mexico and the Chesapeake Bay are high profile examples of nutrient-related water quality problems. In these regions, over-fishing, loss of habitat and wetlands and eutrophication all have contributed to impacts on aquatic life. Both watersheds are now pursuing various nutrient reduction strategies. The EPA has recently established a federal Total Maximum Daily Load or limit on the quantities of nutrients the Chesapeake Bay can assimilate. There's concern a lawsuit against EPA or states will result in the same outcome for the Mississippi River basin and Iowa."

Yellow Comment: Please provide a reference for the description of impacts on aquatic life used in the above paragraph. Please remove the last sentence of the above paragraph or explain who, in particular, harbors concern regarding a Mississippi River basin TMDL. Broad statements like this have no place in a state document.

"Nutrients delivered to the Gulf from the Mississippi River Basin have stimulated excessive algae growth resulting in a large hypoxic zone – an area containing little or no oxygen – that has negatively impacted aquatic life and the livelihood of those relying on the commercial fish/shellfish industry. Targets of 45% total nitrogen and 45% total phosphorus riverine load reductions have been called for in order to achieve the goal for hypoxic zone size and to facilitate water quality improvements in the basin (Gulf Hypoxia Action Plan 2008).

Numeric Nutrient Criteria Limitations

Based on its 1998 Nutrient Strategy, EPA (1998) developed a plan to adopt numeric nutrient criteria within five years. In its urgency to develop nutrient criteria, EPA used statistical distributions of nutrient data from the nation's lakes and rivers to identify nutrient criteria recommendations (EPA 2000). These recommendations were developed with the available water quality data for each of the 14 "nutrient ecoregions" nationwide. Ecoregions are defined as areas of relatively homogeneity in ecological systems and their components.

Concerns with EPA's initial approach have been raised by the U.S. Geological Survey (USGS) and several states. For example, the USGS estimated natural background concentrations for total phosphorus can vary by an order of magnitude within an ecoregion and would exceed EPA recommended numeric criteria in 52% of stream reaches nationwide (Smith et al., 2003). In other words, more than half of all streams in the country might not be able to meet the EPA recommended numeric criteria for phosphorus due to naturally occurring background conditions.

Because of the difficulties involved in deriving and implementing numeric nutrient criteria for streams, as well as the complexity and widespread occurrence of nutrient pollution, states have made only small strides in reducing nutrient pollution. The inability of states to establish and implement numeric nutrient criteria according to the timeframe set by EPA was borne out in the results of a survey conducted by America's Clean Water Foundation (Poole, 2004). Forty-five states indicated a general uneasiness with numeric nutrient criteria, particularly in flowing waters, due to the lack of adequate links between the concentrations of nutrients in a waterbody and adverse water quality impacts. Many states also have expressed concerns that moving forward with poorly-developed nutrient criteria would cause a loss of credibility for state environmental agencies and lead to prolonged legal and political conflicts that could further delay progress in reducing nutrient loads in rivers and streams."

Yellow Comment: First, the "difficulties involved in deriving and implementing numeric nutrient criteria" have little to nothing to do with reducing nutrient pollution. Second, there is a lot of evidence suggesting high concentrations of nutrients in a waterbody have an adverse effect on water quality, hence the impetus for this Strategy. Do not confuse disagreement on the magnitude of impact and an "acceptable" concentration based standard for all waters with the broader understanding of water quality impacts from nutrients. Finally, please provide a reference or delete the last sentence. It seems obvious to say that a state would "express concern...with poorly-developed nutrient criteria" – of course a state doesn't want poorly-developed anything. But it doesn't mean that a state wouldn't consider "well-developed nutrient criteria."

~SECTION 1, PAGE 4~

"The primary impact of numeric nutrient criteria would be felt almost exclusively by point source wastewater treatment dischargers – primarily municipal wastewater treatment plants. Federal regulations require wastewater treatment plant permits contain limitations for pollutants that "contribute to an excursion above any State water quality standard." If a state adopts numeric water quality standards for nutrients, wastewater treatment plants would be required to remove nutrients to the degree their discharge to surface waters would not cause the water quality standard to be exceeded. Nonpoint sources do not have this requirement, but rather use voluntary state and federal conservation programs.

Discharges from wastewater treatment plants contribute approximately 8% of the total nitrogen (TN) and 20% of the total phosphorus (TP) entering Iowa's streams and rivers annually, while nonpoint sources account for the rest (Libra et al., 2004). However, only 5% of all nonpoint source nitrogen outputs and 4% of all phosphorus sources are lost to Iowa streams. The rest is removed by harvest, grazing, volatilization, denitrification or is immobilized in soil."

Yellow Comment: First, please provide a citation for the last two sentences in the above paragraph or delete the sentence. Second, please consider changing the word "outputs" to "inputs" for clarity to the reader. Finally, note that some of the nutrients harvested by grazing end up in waterbodies through direct manure and urine deposition where cattle have access to streams, or due to runoff from grazed areas.

"For Iowa streams, EPA's recommended criteria range from 0.712 to 3.26 mg/L for TN and from 0.070 to 0.118 mg/L for TP. The best performance expected for municipal wastewater treatment facilities utilizing biological, physical, and chemical treatment methods is around 3.0 mg/L TN and 0.1 mg/L TP. Wastewater discharges that comprise a large portion of the flow in a receiving stream could be required to treat to levels that are impossible to achieve even with today's state-of-the-art treatment technologies.

In addition to the issues with treatment efficacy for nutrient removal, the treatment technology is typically beyond the financial and technical capabilities of the many small towns in Iowa. Based on cost data developed by Foess et al. (1998), the cost per household for new treatment facilities including biological nutrient removal (BNR) ranges from approximately $60/month for a population of 1,000 to more than $200/month for a population of 100. These rates are approximately three to 10 times higher than the typical Iowa sewer rate."

Green Comment: Please list and cite the "typical Iowa sewer rate."

"An economy of scale is also apparent in IDNR's estimation of costs[1] associated with BNR improvements for IOWAs current 102 major municipal wastewater treatment facilities. User rates resulting from construction of nutrient removal facilities will depend on a number of factors such as the existing treatment facility type and configuration, ease of BNR modification in specific plant configurations and available funding sources. In general, the larger the population served, the lower the cost per user.

If the EPA nutrient criteria recommendations were adopted as Iowa water quality standards, cities would be required to pay for expensive wastewater treatment plant upgrades that would address only a fraction of the overall amount of nutrients discharged to Iowa's streams while leaving wastewater treatment facilities unable to comply with permit limits. A summary of estimated treatment costs is included in Section 3.2.

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[1] Cost estimates were developed by categorizing each facility by treatment type and design average wet weather flow. Capital and operational costs on a treatment type/unit design flow basis for target effluent nitrogen and phosphorus concentrations of 10mg/L and 1 mg/L respectively, were derived from the Utah POTW Nutrient Removal Coast Impact Study (CH2MHILL). These unit costs then were applied to the Iowa facilities based on treatment type and design flow.

If compliance with stringent numeric effluent limits on point source discharges did not eliminate an existing impairment, the receiving stream would continue to exceed the water quality standard and would require development of a total maximum daily load (TMDL). At that point, any further reduction required by a TMDL would need to be accomplished through voluntary controls placed only on nonpoint sources. Nonpoint sources face another set of equally challenging technological and financial limitations."

Red Comment: This statement contains inaccuracies. As a result of a TMDL, point sources can be given waste load allocations that would require them to achieve further reductions in loading. This would be especially true if a state fails to demonstrate reasonable assurance that the nonpoint contributors will (or have already) achieved their expected load reductions specified in the TMDL (see Lake Champlain). Additionally, please delete the last sentence as it is conjecture.

"As a result of the uncertainty associated with the EPA's current statistical methods of establishing state nutrients standards, and limited financial resources of state and local governments to deal with new treatment requirements, there is doubt about the long-term likelihood of success and cost associated with

~SECTION 1, PAGE 5~

the numeric standards approach. While Iowa should continue to assess and develop the appropriate use of a statistical stressor-response relationship approach to nutrients standards – and the cost for implementing such an approach – a different approach is warranted to address nonpoint sources in Iowa."

Red Comment: The above paragraph is full of conjecture. Delete. Additionally, this comment contradicts the text later in the document under Stoner Memo, Element #8.

"Challenges of Best Management Practice Adoption to Address Nonpoint Source"

Yellow Comment: The text under this heading does not address the challenges to practice adoption. It makes no mention of the social and cultural barriers that are the true obstacles to broad-scale adoption.

"The science from the Iowa Governors' Water Summit (2003), the Gulf Hypoxia and Local Water Quality Concerns Workshop in Ames (September 2005), and the Hypoxia in the Northern Gulf of Mexico: Assessing the State of the Science meeting in New Orleans (April 2006) points to variability in weather as the dominate short- and long-term water quality nutrient influences. Variability in weather, and in volumes of surface run-off and subsurface drainage, may lead to highly variable nutrient exports."

Red Comment: First, the paragraph above is a word for word copy of a comment letter from Rick Robinson and the Iowa Farm Bureau regarding the Raccoon River Master Plan. Mr. Robinson's comments were submitted on June 9, 2011 and are a part of a public document available to the public online. Please cite Mr. Robinson as the source or list the Iowa Farm Bureau as a co-author of this document. Second, this is a misapplication of science. Weather has been variable since the dawn of time – in a way, it is a known, constant in that we can count on for its variability. The changes in the last century to the landscape and the evolution to intense, high input based agriculture in the past few decades have driven the major increases in nutrient export to the Gulf. This is a misapplication and/or selective reading of the science. The weather can account for differences in year to year changes (this year's drought is an example of this variable impact), but there are significant issues that need to be dealt with here and using the weather as a scapegoat is disingenuous. Weather patterns do add uncertainty in tracking water quality trends after implementation of best management practices, but weather patterns do not, over a period of years, override the impacts of tillage, altered hydrology, and on-farm nutrient balance.

"Science suggests current nutrient impairment problems are not mainly due to mismanagement of fertilizers and manures, but more to historic changes in land use and hydrology that came with the conversion of prairie and wetlands to cropland. Iowa's watersheds have fertile soils and generally ample precipitation. Whenever excess water moves over or through the soil, nutrient losses can occur."

Red Comment: The first sentence of this paragraph also comes from the Rick Robinson letter, as stated in the comment above, and the recommendation remains the same. The phrase "science suggests" is unacceptable, vague, subjective language. The statement itself needs to be cited for accuracy. The statement itself contains a degree of accuracy, but these changes in hydrology and land use are part of the current system, which contribute

to excessive levels of nutrients in downstream waterbodies. The addition (and continued expansion) of subsurface drainage and the widespread channelization of streams in Iowa has greatly contributed to nutrient export issues. Plus, fertilizer and manure application is a legitimate issue to put on the table for discussion as we continue to see an increase in animal units to the state. Those animals contribute a significant amount of manure that is applied to the landscape as fertilizer. However, synthetic fertilizer application has not fallen as would be expected with this growing resource. This paragraph is dismissive of a legitimate issue and should be revised or deleted.

"For optimal crop production, adequate amounts of nitrogen and phosphorus must be present in the soil. Mass balance calculations based on zero or low nitrogen rates on corn have shown soil organic matter content can decrease over time. Mining the soil's nutrients through inadequate fertilization below university recommendations can jeopardize soil sustainability, structure and organic matter."

Red Comment: This statement should be deleted as it has nothing to do with reducing nutrient loads or add in a counter statement regarding the impacts of adding excess and unneeded nutrients into the system and its impacts on water quality. There is no recommendation anywhere, that we can see, that suggests fertilizer inputs be below university recommendations in the first place. The university recommendations are also quick to point out that these recommendations are intended as a "do not exceed" mark more than anything to save the farmer from wasted dollars on the landscape. Additionally, a discussion of developing methods or production and/or alternative systems that do not mine the soil and/or improve soil fertility, structure, and organic matter through organic fertilizers, crop rotations, leguminous mulches, etc. would be beneficial in a "Nutrient Strategy."

"While there may be challenges to voluntary best management practice (BMP) implementation to address nutrient, a regulatory approach on nonpoint sources also is not likely to achieve significant success due to the dynamic, variable nature of weather and Iowa's managed landscape. For example, the Iowa State University recommended fertilizer rate for corn and soybeans is 100-150 pounds of nitrogen per acre, depending on the price of fertilizer and the expected price for grain produced. This amount of fertilizer is necessary to produce economically viable corn yield, yet can result in soil water nitrate concentrations of as high as 22-45 milligrams per liter as nitrate-nitrogen. If applied nitrogen or mineralized organic matter nitrogen (conversion from organic to ammonium) would stay in the ammonium form, significant losses would not occur."

Red Comment: Starting with "For example" this text is word for word from Rick Robinson's comment letter, as described above. Please cite Rick as the source or list Farm Bureau as a co-author. As for the statement itself, the first sentence is just conjecture and needs to be deleted. Again, the weather is not a viable argument and needs to be removed from the document. The example nitrate concentrations used (22-45) is a huge range and more details on this data would be useful to see the frequency of results. It would seem that this example is an extreme case and not the typical experience on the landscape. This paragraph seems designed to be misleading to the reader.

We would suggest that a simple and obvious first step to a "Strategy" would be to require nitrogen application at this optimal rate since it protects the economic best interests of the farmer. This strategy could potentially qualify as "meaningful and measurable" as defined in the Stoner Memo and would provide the opportunity to engage Ag Retailers and CCA's in the strategy.

"Unfortunately, that isn't the way it works. Ammonium is converted to nitrate via nitrification. Nitrate is the form of nitrogen primarily taken up by plants but that can also be moved out of the soil profile by leaching or lost by denitrification. Potential nitrogen loss is dependent upon factors that influence each. For nitrification, soil temperature is very important, and for denitrification, soil temperature and soil moisture are important. Conversion to nitrate does not equal loss. It simply means the nitrogen is susceptible to loss. These relationships are complex and largely dependent on weather. While farmers take steps to manage these factors and minimize the potential nitrogen loss, the cost for available management practices and their effectiveness varies."

Red Comment: Once again, this text is word for word from Rick Robinson's comment letter, as described above. Please cite Rick as the source or list Farm Bureau as a co-author. As for the statement itself, this describes a problem of the dual-crop landscape, as a thick, deep, fibrous root system – similar to that of native prairie grasses and forbs – would utilize nitrogen in a way that corn and soybeans cannot. This appears to be the perfect chance to discuss incorporation of native plantings in strategic areas, citing research findings by Iowa State University Cooperative Extension Service (Zhou et al., 2010; also: http://www.nrem.iastate.edu/research/STRIPs/research/index.php?page=Ecohydrological).

"Some improvement in in-field nitrogen management is needed in certain cases, but off-site practices also are needed to meet water quality goals. Targeting of current best management practices and site-specific design of treatment technologies is critical in this Iowa nutrient strategy."

Yellow Comment: Given the magnitude of the problem, the first sentence should be rephrased as "Improvement in in-field nitrogen management is needed in most cases..." as there is clearly an opportunity for significant improvement throughout the state.

"Iowa had developed and adopted a Phosphorus Index, which also is utilized to address this resource concern for regulated livestock operations. The Natural Resources Conservation Service (NRCS) and the Iowa Department of Agriculture and Land Stewardship (IDALS) also use the P-Index as part of voluntary soil and water conservation programs on farms.

Ongoing research at Iowa State University indicates in-channel scouring and streambank erosion contributes a previously unrecognized higher contribution to the phosphorus loading of streams. While this strategy calls for continued in-field erosion reduction and soil sustainability, thereby reducing sediment and phosphorus loading to streams, it is unlikely that in-stream phosphorus mass loading water quality goals

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will be achieved from only in-field phosphorus loading reductions to streams, given in-channel bed and bank sediment, and phosphorus loads."

Red Comment: If we are going to treat this subject fairly the discussion needs to acknowledge that the acceleration in this form of erosion has been brought on, in large measure, by the wholesale transformation of the native Iowa landscape into a vast monoculture of corn and soybean production, and the accompanying transformation of the pre-settlement hydrology of the Iowa landscape including subsurface tile drainage and stream channelization. This increased runoff problem if further exacerbated by the particular monoculture crops' (corn and soybeans) inability to absorb rainfall compared to an established landscape of perennial plants. The paragraph, as written, seems to try to "shift blame" from agricultural practices to "natural conditions" when the current conditions are not natural and are a direct result of the agricultural landscape. A more objective perspective may help illuminate issues that can be addressed.

"Iowa and many other states have been pursuing strategies for establishing numeric water quality standards or strategies in order to reduce nutrients in surface water. EPA has recommended regional criteria or averages and ranges for nutrients in lakes and reservoirs and streams and rivers for states to consider when setting standards. State nutrient criteria based on the EPA recommendations would establish the maximum acceptable concentrations of nutrients in surface waters that would allow those waters to support designated uses, such as drinking water supplies, fishing and swimming."

Yellow Comment: Please note that numeric nutrient criteria for nitrate currently do exist for drinking water standards. Additionally, narrative criteria exist in lakes that often tie back to phosphorus loading.

"There is debate on how to establish the appropriate nutrient criteria for protecting these designated stream and lake uses. Unlike most pollutants that currently have criteria established, no single criterion value appears to be appropriate for every water."

Yellow Comment: The debate is on how it applies to aquatic life uses. This and the preceding paragraph seem out of place and should be deleted.

"Mississippi River/Gulf of Mexico Watershed Nutrient Task Force
The EPA co-chairs the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. The task force has set a goal of establishing state nutrient strategies by 2013 that will coordinate the basin efforts to reduce nitrogen and phosphorus delivery to the Gulf by 45 percent. The task force consists of five federal agencies, 12 state agencies (including Iowa) and the tribes within the Mississippi/Atchafalaya River Basin.
Iowa is well-positioned to work with the federal task force to document past success and make additional progress on nutrient reductions in surface water. The task force was established in the fall of 1997 to understand the causes and effects of eutrophication in the Gulf of Mexico; coordinate activities to reduce the size, severity, and duration; and reduce the effects of hypoxia.

In 2001, the task force released toe 2001 Action Plan, a national strategy to reduce Gulf hypoxia. While there was an initial federal commitment to funding state actions under the plan, none was ever received. Iowa has developed a variety of creative state action (e.g., the Iowa Conservation Reserve Enhancement Program, the Iowa Wetland Landscape Systems Initiative, and various Iowa watershed protection projects) and continues to work to make progress with available resources.

The task force embarked on a four-year reassessment of the science surrounding Gulf hypoxia since the release of the 2001 Action Plan. The 2008 Action Plan currently is being implemented by member states and agencies, including Iowa. The revised action plan includes five annual operating plans, one for each year through the next reassessment, that provide short-term roadmaps to maintaining forward progress towards the goals of the Action Plan.

Iowa Secretary of Agriculture Bill Northey is the state co-chair of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force (EPA is the federal co-chair with states). The Iowa Department of Agriculture and Land Stewardship (IDALS) is the designated lead Iowa agency for hypoxia issues and participated in the hypoxia task force, its subcommittees, and related working groups."

Red Comment: This entire section should be deleted as it has no direct relevance to the nutrient strategy. Additionally, the language ignores the efforts of other Iowa agencies and organizations performing watershed and water quality improvement work in the state. While Secretary Northey currently serves as Co-Chair on the Gulf Hypoxia Task Force Team, other agencies in Iowa deal with nutrient issues in Iowa and hypoxia issues in the Gulf. Please make that distinction if this text remains in the document. It is also unclear who designated IDALS as the lead Iowa agency for hypoxia issues – please include that detail if this text remains in the document.

"Iowa Nutrient Reduction Strategy Development

The Secretary of Agriculture and the Iowa Department of Natural Resources (IDNR) are working cooperatively to develop the state nutrient reduction strategy, with the support of EPA Region 7. IDALS is leading work with the affected nonpoint source industries, while IDNR is working with permitted facilities and industries to focus on point source impacts."

Red Comment: First, the Sec. of Ag is a person and the IDNR is an agency. It should be IDALS and IDNR are working together. Secondly, that is questionable in that the Iowa DNR's nonpoint source program was never engaged in the development process and the document was only made available to review in mid-October, 2012. As far as working with "nonpoint source industries" it would be helpful to list those industries as there is no indication that MS4 cities or communities were engaged in this process, nor were the environmental or conservation stakeholder groups.

"The initial step to developing a statewide strategy to reduce nutrients to streams and the Gulf of Mexico was a scientific assessment of the practices with potential to achieve the desired environmental goals. Iowa has voluntarily moved forward to complete the science assessment and strategy development using existing state funds, much of which comes from fertilizer fees paid by Iowa farm families."

Red Comment: Last sentence change to "Iowa completed the science assessment in July 2012 and the strategy development in October 2012." The phrase "farm families" is overtly emotional and not appropriate in a state document. Fertilizer fees are paid by all purchasers of fertilizers, whether or not they are farmers, have a family, or even live in Iowa. The statement ignores major in-kind contributions from other sources and organizations that pay for the professionals that completed the science assessment, specifically State of Iowa tax dollars. Remove this kind of emotional language – it has no place in a state document.

~SECTION 1, PAGE 7~

"IDALS and the Iowa State University College of Agriculture and Life Sciences (CALS) led the nonpoint source science assessment. The Iowa Nonpoint Source Nutrient Reduction Science Assessment is based on the peer-reviewed science studies of in-field, edge-of-field and watershed scale practices and treatments to determine the potential reductions in nitrate-nitrogen and total phosphorus leaving agriculture landscapes. A team of 23 research and extension faculty from ISU CALS, IDALS, USDA-ARS, NRCS, EPA, and IDNR, as well as scientists from nearby states worked on the science assessment.

The coefficient of potential nutrient reductions for each practice and treatment is based on peer-reviewed literature and best professional judgment of the team. The initial level of use of each practice is based on values estimated by the team using published literature and information publicly available from the USDA. Scenarios of combinations of the practices and treatments were developed to estimate the expected reduction in nutrients and the resulting cost.

For each scenario, the coefficient of potential nutrient reduction was multiplied by adoption rate and potential acreage to determine the potential nutrient reduction for the practice. Next, the reductions from the practices were aggregated to a total potential reduction for the scenario over the state. The cost in investment, operating expenses and lost production also were taken into consideration, as were potential trade-offs with other environmental concerns. For instance, a practice that reduces nitrates in groundwater may increase phosphorus in surface water. The cost and supply impacts of each scenario were used to estimate the local economic impact."

Red Comment: First, please explain the coefficient. Second, explain who these costs are referring to. The calculus needs to be explained or at least offset by the societal and environmental benefits. Anything short of a full cost accounting method ignores the purpose of this document.

"The science assessment demonstrates a combination of practices will be needed to reach desired load reductions from nonpoint sources. To that end, the science team developed scenarios of practice combinations that could potentially achieve the goals. ***The practice combinations are examples, not recommendations."***

Red Comment: This is the crux of the problem – there are no recommendations in this document. The purpose of a Strategy is to have recommendations to achieve meaningful and measurable near-term reductions in N and P loading to Iowa's and the nation's waters. Anything short misses the mark.

"Nitrogen reduction practices considered in the assessment included in-field N management practices such as timing, source, application rate, nitrification inhibitor, cover crops and living mulches; land use changes such as the addition of perennials, extended rotations and grazed pastures; and edge-of-field practices such as drainage water management, shallow drainage, wetlands, bioreactors, and buffers.

Phosphorus reduction practices studied included in-field P management practices such as application, source and placement; erosion control and land use change practices such as tillage, crop choice, perennials and terraces; and edge-of-field practices such as wetlands, buffers and sediment control.

After considering all possible practices, three example scenarios were developed that meet both the N and P reduction objective. One has an annual cost of $756 million and initial investment cost of $3.2 billion. A second example scenario has an annual cost of $1.2 billion, plus a matching initial investment cost of $1.2 billion. A third example has an annual cost of $77 million, with an initial investment cost of $4 billion."

Red Comment: To repeat, a full accounting method is absolutely necessary for this document's legitimacy. A full explanation of the calculus used needs to be explained.

" While significant research has been conducted on the potential performance of various nutrient reduction practices, there is a need for development of additional practices, testing of new practices, further testing of existing practices, and verifying practice performance at implementation scales. Additional research also would improve the predictability of practice performance and the understanding of practice uncertainty."

Red Comment: This paragraph implies that nothing can be done until more research is performed. This is the antithesis of a Strategy and is a recurring theme from groups with a narrow and corn-centric view of Iowa agriculture to "hit the pause button". Iowa has significant research and data that demonstrates how successful technologies like no-till, cover crops, and other best management practices like native prairie buffer strips can be for the environmental and economic benefits of the Iowa landscape and the Iowans that work the land, not to mention the wildlife and citizens of Iowa. **~SECTION 1, PAGE 8~**

1.2 "Regulatory and Administrative Framework"

Green Comment: The focus on this section appears to be limited to nonpoint source. Please include info about point sources (POTWs, MS4 cities, CAFOs, etc.).

"Recent EPA Guidance to States

EPA, in its March 16, 2011 memo, outlined a new path for local-state-federal partnerships to address nutrients. In the memo, Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reduction, the agency said that states, EPA and stakeholders must make greater progress in accelerating the

reduction of nitrogen and phosphorus loadings to the nation's waters. While EPA has a number of regulatory tools at its disposal, its resources can best be employed catalyzing and supporting action by states to protect their waters."

Yellow Comment: The end of the first sentence starting with "stakeholders must make..." is a direct quote from the Stoner Memo and as such should be in quotes and cited.

"Where states are willing to step forward, {the EPA} most effectively encourages progress through on-the-ground technical assistance and dialogue with state officials and stakeholders, couple with cooperative efforts with agencies like USDA with expertise and financial resources to spur improvement in best practices by agriculture and other important sectors," EPA said in the memo. "States need room to innovate and respond to local water quality needs, so a one-size-fits-all solution to nitrogen and phosphorus pollution is neither desirable nor necessary."

Green Comment: Please add in the following sentence to the end of this paragraph:

"Nonetheless, EPA went on to state that they have established a framework of 8 key elements "that state programs should incorporate to maximize progress." (emphasis added) The strategy outlined in Section 1.4 is an attempt to address these 8 elements."

The reality of that above statement is that the current Section 1.4 does not address the 8 element strategy memo at this point, as described in the comments in Section 1.4.

"This approach was supported by EPA Administrator Lisa Jackson in an April 2011 visit to Iowa. During the visit, Jackson said the EPA is not targeting agriculture. She said EPA has decided not to apply its Chesapeake Bay model for reducing pollution to the Upper Mississippi River Basin. Instead, Jackson indicated the EPA might look at ways to quantify how voluntary conservation methods in the Mississippi River basin are helping reduce hypoxia in the Gulf of Mexico. Further, Jackson "ruled-out" the need to move directly to a regulatory approach when states are working to apply more conservation measures on the ground."

Red Comment: Statements attributed to Lisa Jackson should be cited, if available in text or audio, or approved by her or her closest aides. It would be unfortunate and damaging to the Strategy if Administrator Jackson disputed the paraphrase of her comments.

"Petition for Federal Rules Denied

On July 29, 2011, the U.S. Environmental Protection Agency denied a petition from environmental organizations in 13 Mississippi River basin states that requested federal rulemaking to establish water quality standards and a basin-wide watershed plan to address nutrients.

The 2008 petition from the Minnesota Center for Environmental Advocacy asked the EPA to develop numeric water quality standards for nutrients (i.e., nitrogen, phosphorus, chlorophyll a and turbidity) for all navigable waters in all 50 states where such criteria do not already exist, or alternatively, promulgate such criteria for the Mississippi River basin and the northern Gulf of Mexico(some 31 states), but at a minimum promulgate numeric water quality standards for nutrients for the 10 states along the main stem of the Mississippi River and the northern Gulf of Mexico."

Green Comment: Chlorophyll a and turbidity are not nutrients but relate to or reflect presence of nutrients.

"The petition also asked EPA establish total maximum daily loads (TMDLs) for nitrogen (N) and phosphorus (P) for the main stem and tributaries of the Mississippi River that do not meet the criteria EPA establishes for N or P, the portion of the contiguous zone within the Gulf of Mexico, and the portion of the ocean that is within the coverage of the Clean Water Act (CWA) in the Gulf of Mexico.

EPA denied the petition because it believes "...the most effective and sustainable way to address widespread nitrogen and phosphorus pollution in the Mississippi-Atchafalaya River Basin is to build on existing efforts, including providing technical assistance and collaborating with states to achieve near-term reductions, supporting states on development and implementation of numeric criteria, and working cooperatively with states and tribes to strengthen management programs."

Green Comment: In Iowa, nutrient criteria development was put on hold. Also, as currently written, this document does not fulfill the desired outcome the EPA references, specifically the "near-term reductions" actions and the recognition that states need to be working toward some kind of numeric criteria.

"EPA said another reason for its action on the petition was it wants to put its limited resources and efforts into the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force.

~SECTION 1, PAGE 9~

In March 2012, the Gulf Restoration Network – including the Iowa Environmental Council, the Environmental Law and Policy Center and the Sierra Club – filed a lawsuit that seeks to impose federal numeric nutrient criteria throughout the 31-state Mississippi River Basin and the Northern Gulf of Mexico.

In response, almost 30 agriculture organizations, including two Iowa groups, were granted intervention status in the case. These groups are supportive of addressing nutrient challenges without incurring the costly regulatory burden numeric nutrient criteria would bring. These groups are long-time supporters of conservation programs to improve water quality, but recognize more progress can be made through the Iowa nutrient reduction strategy."

Yellow Comment: Please list the two Iowa groups and explain what "intervention status" means. Please remove the phrase "costly regulatory burden" unless there is a citation of costs to implement or a comparison against what the Strategy recommends (which isn't possible currently as there are no actual recommendations). Please delete the last sentence as "long-time supporters of conservation programs" needs more detail or is just not relevant. Paraphrasing two unnamed groups as believing "more progress can be made through the Iowa nutrient reduction strategy" implies an official endorsement of this strategy by those groups, which is inappropriate unless they have reviewed and publicly endorsed the Strategy.

"Eleven states in the Mississippi River Basin, including Iowa, also have been granted intervention in the case as party to the lawsuit, in order to protect their state interests to implement water quality programs in ways that make sense for their respective states. The National Association of Clean Water Agencies, representing municipal interests, also has intervened in the case as a party."

Green Comment: Please change the phrase "make sense" to "reflect specific circumstances."

"The case is expected to be resolved on summary judgment motions. The federal district court for the Eastern District of Louisiana has set a schedule through the spring of 2013 for each side and the intervenors to make their written legal arguments. A decision in the case is expected sometime in 2013."

Green Comment: Please explain what a summary judgment motion is and what this means in this case.

"Existing Agencies – Roles and Responsibilities"

Red Comment: There is no mention of the role of the state's water quality agency, the Iowa Department of Natural Resources in this section.

"In 2011, the Iowa Secretary of Agriculture was given the responsibility by the Iowa Legislature to chair the Iowa Water Resources Coordinating Council (WRCC), which was created in 2008 to coordinate state and federal efforts to address water quality and flooding issues. The WRCC is comprised of 19 state and federal agencies."

Yellow Comment: This paragraph is misleading in that it does not reflect the origins and original mission of the WRCC. Nor does it explain how the WRCC, after 4 years, has not met the charges given to it by the legislature. Chapter 466B establishes that only state agencies are members of the WRCC. It simply states that the WRCC is authorized to invite and solicit input from a host of other entities. Please change this paragraph to reflect the additional information below:

In 2011, the Iowa Secretary of Agriculture was given the responsibility by the Iowa Legislature to chair the Iowa Water Resources Coordinating Council (WRCC), which was created in 2008 to coordinate state and federal efforts to address water quality and flooding issues. The WRCC is comprised of 12 state agencies. In addition, the WRCC is empowered to invite and solicit advice from a number of other state and federal agencies, private organizations, business and citizen groups or not-for-profit organizations.

The Surface Water Protection and Flood Mitigation Act was signed into law in 2010. This law adds several provisions to Iowa Code Chapter 466B. The law:

1. Establishes a Watershed Planning Advisory Council to develop annual recommendations for improving water quality and mitigating floods.

2. Directs several state agencies to seek funding to plan and implement a watershed demonstration pilot.

3. Outlines the process for Watershed Management Authorities to be created using 28E agreements to reduce flood risk and improve water quality, monitor federal flood risk planning and activities, and educate residents of the watershed regarding flood risks and water quality.

"The Iowa Water Planning Advisory Council, a group of private, non-governmental organizations and stakeholders, is to cooperate with the WRCC, make recommendations, and report annually to the Iowa Legislature on the progress. (See Appendix A for more details on recent and existing state legislation.)"

Green Comment: This is partially true. The WPAC also includes DNR and IDALS representation and has 4 non-voting members from the Iowa legislature. Additionally, where is Appendix A? We were not given an Appendix A to review.

"The Surface Water Protection and Flood Mitigation Act was signed into law in 2010. This law adds several provisions to Iowa Code Chapter 466B. The law:

1. *Establishes a Watershed Planning Advisory Council to develop annual recommendations for improving water quality and mitigating floods.*

2. *Directs several state agencies to seek funding to plan and implement a watershed demonstration pilot.*

3. *Outlines the process for Watershed Management Authorities to be created using 28E agreements to reduce flood risk and improve water quality, monitor federal flood risk planning and activities, and educate residents of the watershed regarding flood risks and water quality."*

Green Comment: Please delete as this section was moved above.

"Conservation and Water Quality Funding

Conservation funding is a top priority for agriculture. Funding for these programs is provided through several different sources. Below is a summary of conservation funds approved by the Iowa Legislature in the 2012 session."

Yellow Comment: The phrase "conservation funding is a top priority for agriculture" is a curious statement and may need more explanation. As described below, many of the dollars may mean soil conservation, not targeted at water quality, which does not necessarily reduce nutrients. Further, the reliance on a continuously shrinking pot of government resources is a difficult way to build a statewide strategy of any kind. Government resources are one potential piece of the puzzle, but there are many economically viable options for land managers to employ that don't require the aid of taxpayer resources. Additionally, there is no mention of the DNR nonpoint source program or the lakes restoration program and their collective funds. Finally, the "changes from FY 2012" category may be misleading as many of the programs were cut significantly by the legislature and Governor in 2012, so the increase may not reflect an increase in commitment, but rather a return to previous commitment levels.

Line Item	*Fiscal Year 2013 Funds*	*Change from FY 2012*
Soil Conservation Cost-Share	*$6.65M*	*Increase of $350k*
Cost-Share Funds to Close Ag Drainage Wells	*$1.55M*	*Increase of $1.55M*
Watershed Protection Fund	*$900k*	*No change*
Conservation Reserve Enhancement Program (CREP)	*$1M*	*No change*

Conservation Reserve Program	*$1M*	*No change*
Resource Enhancement and Protection Program (REAP)	*$12M*	*No change*
Farm Management Demonstration Grants – Soybean Association	*$625k*	*No change*
Watershed Improvement Review Board (WIRB)	*$1M*	*Increase of $950k*

~SECTION 1, PAGE 10~

"Federal Farm Bill Contributions
The USDA's 2010-15 strategic plan includes two goals that relate directly to Iowa's nutrient strategy: Ensure our national forests and private working lands are conserved, restored, and made more resilient to climate change, while enhancing our water resources; and help America promote agricultural production and biotechnology exports as America works to increase food security. These two goals and the associated federal resources relate to Iowa's nutrient strategy and will have a major impact on its success."

Yellow Comment: Please delete "and help America promote agricultural production and biotechnology exports as America works to increase food security." This statement has nothing to do with nutrient reductions. This will also change the wording from two goals to one goal that directly relate to Iowa's nutrient strategy.

"Most of the direct federal funding for land treatment on working lands in Iowa to help protect water soil and water quality come through the federal farm bill and the Natural Resources Conservation Service (NRCS). The NRCS works to help USDA implement water quality goals through Iowa county soil and water conservation district. A complete list of the agency's programs can be found at this link."

Green Comment: Insert a comma between "water" and "soil.". Additionally, it is impossible to click on a link when only given a hard copy. It is our assumption that much of the other randomly underlined words and phrases are actually links as well, but this is the first time we see "at this link" in the document. This lack of access has, in many ways, reduced the ability of the reviewers to obtain an accurate full picture of the Strategy.

"The federal Farm Service Agency (FSA) also has conservation programs. The FSA's Strategic Plan (2005-2011) can be found at this link. One of the key FSA programs for Iowa is the Conservation Reserve Program, a land retirement program. Total CRP enrollment in Iowa in FY 2008 was more than 1.8 million acres with total annual rental payments to landowners of $200.6 million (cumulative, all signups), compared with more than 1 million acres enrolled at the end of FY2010 and cumulative annual rental payments of more than $115 million."

Green Comment: This being the year 2012 makes the referenced plan obsolete. We are unable to check this link out as we were provided only a paper copy. "Conservation Programs" may not mean water quality programs. The last sentence seems to have no purpose other than to show the reliance on government programming and that rates of enrollment have fallen dramatically. We recommend tying this information to something or deleting it.

"Iowa farmers' requests for combines federal and state cost-share dollars to match with their own money to protect Iowa's soil and water exceed funds available annually in the range of $25-$100 million."

Green Comment: Citation needed. This truly is a huge range and serves no real value. A better stat may be an annual average. Additionally, please explain the type of funds we are talking about and what kind of cost-share does the farmer pay. This may help better paint the picture the sentence seems to be aiming for.

"Iowa Conservation Progress

State and federal cost share programs have contributed significantly in helping Iowa farmers make progress in protecting Iowa's soil and water resources. Here are some examples:

- *From 1982-2007, soil erosion in the United States has been reduced by 43 percent, according to the USDA's National Resources Inventory report. Iowa's erosion rate was estimated at 5 tons per acre per year in 2007, down 33 percent from 7.4 tons per acre in 1982."*

Yellow Comment: The erosion rate of 5 tons per acre per year is still a very high number and is clearly an unsustainable rate. The data from 2007, which was a relatively low-runoff year and is somewhat outdated. It would be interesting to see estimate from the past few years as corn and soybean prices have led to a dramatic increase in row crop acres at the expense of soil saving practices like CRP, pasture, and land dedicated to hay, let alone the removal of trees from bottom lands in frequently flooded and highly erodible acres.. A multi-year average or a graph with a trend line would be much more useful. Data from 2008 and 2010 should not be excluded, as those were high runoff years, and erosion rates would likely increase the annual average from 2007. Additionally, as it reads, this statistic shows Iowa is under the national average – which underscores a lack of adoption in Iowa relative to the rest of the country. With the emergence of no-till, cover crops, and other best management practices like native prairie buffer strips, there is much more progress to obtain.

- *"A survey of rural well water in Iowa by the University of Iowa showed a decline in the number of wells with detections of nitrates and herbicides, including atrazine. The survey of 473 rural wells in 2006-2008 showed a decline in numbers of wells with pesticides and nitrates detected, and very low concentrations present when detections occurred. It was a follow-up to a similar survey of rural wells in 1988 and 1989. Results include:*
    - *No well had a pesticide exceeding or even close to drinking water standards*
    - *Nitrate detections were down 11 percent from 20 years ago"*

Yellow Comment: This statement needs to be confirmed with the DNR Source Water Protection Program. The survey results do not necessarily show declining nutrients in groundwater. The decline in detects may be due to an increase in rural water use and corresponding decrease in well water use and/or due to declining number of wells tested and/or other factors related to groundwater infrastructure, not groundwater quality. Either this isn't made clear or is misused information. Pesticide is not a nutrient, please delete. Percent detections of nitrate would be a more relevant measure than total nitrate detections to account for potential differences in sample size.

- *"Seven major conservation practices used on Iowa farms are estimated to remove as much as 28 percent of the nitrate, 38 percent of the total nitrogen, and up to 58 percent of the phosphorus that otherwise would be present, according to the Center for Agricultural and Rural Development's Conservation Practices in Iowa: Historical Investments, Water Quality and Gaps."*

Yellow Comment: Please provide the range, mean, and median value for each as maximum numbers tell only a part of the story. What percentage of adoption do these conservation practices enjoy in Iowa?

- *"Between 1980 and 2010, U.S. farmers nearly doubled corn production using slightly fewer fertilizer nutrients than in 1980. According to data from the USDA National Agricultural Statistics Service,*

~SECTION 1, PAGE 11~

farmers grew 6.64 billion bushels of corn using 3.9 pounds of nutrients (nitrogen, phosphorus and potassium) for each bushel in 1980. In 2010 they grew 12.45 billion bushels using 1.6 pounds of nutrients per bushel produced. In total, this represents an 87.5 increase in production with 4 percent fewer nutrients (The Fertilizer Institute)."

Red Comment: While this is an impressive gain in productivity/efficiency, this is not a valid indicator or measure of "conservation progress." With increased acreage of corn and soybeans and less utilization of extended rotations, it is likely that more sediment and nutrients were generated in 2010 than in 1980, despite this improvement in utilization. This stat is also a great compliment to the advances in seed genetics and is disingenuous to draw a straight line between fertilizer inputs and yield with completely different genetics. Further, it is highly questionable to cite a stat from a source like "The Fertilizer Institute" without at least putting it into context, while ignoring the ISU Daily Erosion Report or other credible third party studies. This could also be read that we have only reduced nutrient input by 4 percent in 30 years, meaning we have a lot of room for improvement. This is also troubling since this may not hold a full accounting of fertilizer from animal manure,

which has increased exponentially over that same time period and may conflict with this statistic. The statistic is unclear and should be removed.

- *"The Iowa Conservation Reserve Enhancement Program (CREP) restores strategically located and designed wetlands to intercept tile drainage water, with 72 wetlands currently restored or under development. These 72 wetlands will remove 76,700 tons of nitrogen over their lifetimes and protect 91,500 watershed acres. CREP wetlands also restore high quality wetland and prairie habitat. A new initiative that builds on the N-removal technology of CREP wetlands continues development – the Iowa Wetland Landscape Systems Initiative. It seeks to optimize drainage systems by redesigning them to reduce surface runoff, erosion, and delivery of agricultural chemicals to surface waters while also increasing agricultural productivity. These systems are integrated with N-removal wetlands at their outlets to complete the package of environmental benefits."*

Red Comment: It is not valid to cite "under development" as they could never come to fruition – please restate to the currently created wetlands. The stat should cite nutrient removal per year for comparison purposes with other practices. This bullet point appears to be referring to what was called originally the "Iowa Drainage Plan" and subsequently under several iterations is now known as the "Iowa Wetland Landscape Initiative." This concept has been promoted and repackaged and renamed several times over the last couple of years but the basic criticisms hold true regardless of what name it is called by. This practice is widely questioned by water quality professionals in the feasibility of designating wetland areas for the benefit of upland farmers, the proper sizing of the wetlands to actually provide the desired benefits, and the major concern of using tax payer dollars to install improved drainage to increase flow to our streams and rivers. There are many more cost efficient ways to reduce nutrient loading than this proposed initiative and this initiative certainly does not have widespread applicability to the state's nutrient issues. This initiative is experimental and is highly contentious and should be deleted. If it is not deleted, please replace with the text edit below:

> The Iowa Conservation Reserve Enhancement Program (CREP) creates strategically located and designed wetlands to intercept tile drainage water, with # of wetlands created. These ?? wetlands will remove ??? tons of nitrogen over their lifetimes and protect ??? watershed acres (need citation). CREP wetlands also provide wetland and prairie habitat. The modernized and increased drainage system proposed in the new Iowa Wetland Landscape Initiative, formerly the Iowa Drainage Plan, plans to use similar wetlands that will hopefully offset the added nitrate-N loading resulting from installing the more efficient drainage networks. This initiative is highly controversial and does not have the wide approval of the nonpoint source water quality community as concerns about the tradeoff of new drainage to facilitate greater crop yields without regard to further degradation to the ecosystem is not acceptable without more data and an implementation plan.

- *"Iowa farmers used conservation tillage on almost 15.2 million acres in 2007, up about 9 percent from 12.9 million in 2006 (Conservation Technology Information Center)."*

Yellow Comment: Conservation tillage is too generic of a term. Reduce the numbers to no-till and ridge till (really, continuous no-till and ridge-till) acres as these are truly conservation practices that reduce nutrient loading. This statistic is from 2007 and a lot has happened on the landscape over the last 5 years as row crop acres have increased dramatically. Finally, the most viable statistic here would be no-till and ridge till acres as a percentage of farmed land. Any other number is misleading. A more current and accurate portrayal would help provide a better baseline for a viable Nutrient Strategy.

- *"Iowa farmers have more than 620,000 acres enrolled in the continuous, targeted Conservation Reserve Program, more than any other state (June 2011, Farm Service Agency). This number increases every month. It's also almost 13 percent of the U.S. continuous CRP signup total."*

Yellow Comment: Many non-farmer landowners have enrolled land in CRP. Please add in "and landowners." What may be more enlightening to this Strategy would be the number of acres that have not been re-enrolled, or where CRP contracts were terminated early to plant more corn or soybeans. This also does not identify if CRP acres are targeted to reduce nutrients or not. A more relevant statistic would express this acreage in percent of ag land in Iowa, keeping in mind that many acres are owned by non-farmers.

- *"Iowa farmers have restored more than 250,000 acres of wetlands, putting Iowa farmers 8th in the nation in terms of voluntarily restoring cropland to wetlands (Iowa NRCS, 2008)."*

Yellow Comment: Many non-farmer landowners have restored wetlands. Please add in "and landowners." A more relevant statistic would be what percentage of wetlands have been restored compared to historic wetland acres.

- *"Since 2004, practices installed through voluntary watershed projects now collectively reduce sediment reaching Iowa's waters by 130,947 tons per year and phosphorus loading by 202,312 pounds per year. (February 2010, Iowa DNR)."*

Green Comment: These results are due in part to detailed assessments and targeting of best management practices to reduce impairments.

- *"NRCS Financial Assistance Program 2010 Results: More than $41 million in financial assistance in fiscal year 2010 to Iowa farmers through two of USDA's most popular 2008 Farm Bill financial assistance programs – the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP).*
    - *EQUIP is a voluntary conservation program that promotes agricultural production and environmental quality. Iowa NRCS obligated more than $20.8 million through 1,267 contracts covering 79,374 acres to farmers in all 99 counties through EQIP. This program offers financial and technical assistance to install or implement targeted structural, vegetative and management practices, including terraces, residue management (no-till), grassed waterways, waste storage facilities, prescribed grazing, and nutrient and pest management.*
    - *CSP is a voluntary conservation program that encourages producers to address resource concerns in a comprehensive manner by undertaking additional conservation activities and improving, maintaining, and managing existing conservation activities. CSP pays participants for conservation performance – the higher the performance, the higher the payment. Iowa NRCS obligated more than $20.2 million through 1,480 contracts covering 797,605 acres through CSP in fiscal year 2010."*

Yellow Comment: Please delete the two sub bullets – they are extraneous and not needed.

~SECTION 1, PAGE 12~

"Nutrient Reduction Strategy

The Iowa Nutrient Reduction Strategy, including the science and technology assessments for both nonpoint and point sources, was developed over a two-year period, and is built on a scientific assessment of actions that will be effective and cost efficient to reduce loading of nitrogen and phosphorus to Iowa surface waters."

Yellow Comment: This is a misleading statement. It is difficult to imagine that the first 19 pages of this document could have taken 2 years to develop with regards to a nonpoint strategy given how devoid the document is of anything substantive. Nearly everything in here has been part of ongoing efforts for a lot longer than two years.

"This strategy follows the framework provided by the EPA in its March 16, 2011 memo, Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions."

Red Comment: Again, we really question the validity of this "Strategy" and challenge that it does not fulfill the intent of the framework.

1. "Prioritization of Watersheds

To better coordinate various ongoing activities and promote new watershed initiatives, the Water Resources Coordinating Council (WRCC) will prioritize watersheds on a statewide basis for nitrogen and phosphorus loading reductions."

Red Comment: This section basically only echoes what is in the Stoner Memo with no real strategies. The focus of this entire discussion is on nonpoint sources but the Stoner Memo says the states should prioritize based on both point and nonpoint. The WRCC has had the same charge since 2008, yet Iowa still has nothing to show for it. The DNR delivered HUC-8 assessments of nutrient loadings in April of 2009 and there has been no action

taken by the WRCC. There needs to be much more detail and recognition of existing efforts to address N and P beyond the role of the WRCC.

"Based on previous Iowa reports, including the Iowa Watershed Task Force (2001), the Watershed Quality Planning Task Force (2006), and the Iowa Legislature's Senate File 2363 (2008), a phased adaptive management framework and cycle that prioritizes state watershed management activities will be created. Activities will follow a logical progression of targeting, planning, implementation and measurement, focused primarily on addressing Iowa's nutrient management challenges while optimizing public and private return on investment. The watershed management planning framework also will address other resource needs, such as sediment delivery and flooding. The WRCC will use a variety of data available and in development to prioritize Iowa eight-digit hydrologic unit code (HUC 8) watersheds relative to their contribution to nutrient loading. This prioritization will be reviewed and adjusted every five years."

Red Comment: The Water Quality Planning Task Force report was issued in November of 2007, not 2006.

This paragraph is vague and leaves the reader wondering how prioritization will be performed, what data will be used, etc. These questions should already be answered in this document: Will current impairments be considered? What about outstanding water resources? What objective metrics could/should/will be utilized to determine high vs. low priorities? What water quality data is available? What about stakeholder and landowner interest? What about the likelihood of success from a technical &/or sociological &/or political perspective?

The DNR has existing information that could be used to answer this question, such as Nitrate TMDLs for the Cedar, Raccoon, and Des Moines Rivers, which all contain numeric load reduction targets and have identified critical HUC-12 or HUC-8 subwatersheds where efforts could be focused and prioritized to achieve meaningful and measurable results in reducing nitrate loads to Iowa's drinking water systems. Additionally, we already have a process in place that deals with P issues through lake TMDLs and the actions and activities of the DNR's nonpoint source program. That is a great place to start.

"In addition, within each major watershed that has been identified and prioritized as accounting for the substantial portion of the load, the WRCC will identify existing targeted/priority sub-watersheds on a HUC 12 scale already being implemented, and potential future watersheds to implement targeted N and P load reduction activities."

Red Comment: How will the future actions (or inactions) of the WRCC be any different than in the past? They have been charged with this mission for over 4 years yet have done nothing in this arena. DNR has already identified critical priority HUC-8s and many of the imbedded HUC-12s. Now is the time to get to work on these, not just have more meetings and conversations.

2." Determine Watershed Goals

The WRCC will set measure of success and relate these to watershed improvement based upon a set of mutually agreed-to indicators."

Red Comment: Once again, the focus of this discussion is on nonpoint sources, yet the Stoner Memo says that states should prioritize based on both point and nonpoint. Stoner doesn't differentiate between the two sources until elements 4 and 5 in her memo. Also, Stoner says to "set" goals, not "determine" goals. This section's discussion doesn't set anything.

"The WRCC will develop multipurpose indicators that enable Iowa watershed stakeholders to establish baselines and report water nutrient reduction goal progress. These indicators should be able to be aggregated at a watershed and state scale. These can be integrated across major land resource areas and watersheds to evaluate cumulative impacts and trends. Examples are soil and water indicators, crop performance indicators, economic indicators and social/cultural indicators. These indicators will relate to HUC 8 watershed goals set by the WRCC based on assessment and data."

Red Comment: The indicators should already be in here. This commitment to establish them is what should have been obvious at the first reading of the Stoner Memo. There is no mention in this section of using the existing nutrient-based portfolio of TMDLs to guide goal setting. But it should since they all have set load reduction

targets to achieve the WQ standard in question. Also there is a complete lack of numeric goals even though that is a condition of the Stoner Memo (especially as it pertains at the HUC-12 scale).

Stoner directs states to set numeric goals at the HUC-12 scale, not the HUC-8 scale. This is critical since the likelihood of having meaningful and measurable results in the near term are vastly diminished the larger the scale one operates at or tries to measure.

3. "Ensure Effectiveness of Point Source Permits

National Pollutant Discharge Elimination System (NPDES) permits for point sources will be issued or amended to contain enforceable effluent limits for both total nitrogen and total phosphorus and to require effluent monitoring to determine compliance with effluent limits."

Red Comment: Here again, in the Stoner Memo this key element includes, at the end of the header phrase "in targeted/priority sub-watersheds." This section fails to address this important distinction. Also, there is no mention of how the strategy will address urban stormwater from MS4 communities (as per the directions in element 3.C. of the Stoner Memo).

~SECTION 1, PAGE 13~

"Although continuously evolving, many nutrient removal technologies in wastewater treatment are already proven and well established. Thus, nutrient removal for Iowa's wastewater treatment facilities is technologically feasible. The primary mechanism IDNR will use in assessing the "reasonableness" of nutrient removal for individual facilities is the estimated costs for improvements and the ability of end users to afford those costs."

Yellow Comment: Reasonable to whom? The POTW? The customers? The state and its citizens? The users of the water resource? The downstream states and their affected residents? The businesses that rely on a healthy Gulf for their living? This term doesn't exist in the Stoner Memo, therefore it should not be a basis for a point source (or a nonpoint source) nutrient reduction strategy.

"The goal is to have the major point source dischargers construct or modify treatment facilities or, in the case of some industries, modify plant operations to achieve significant reductions in the amounts of nitrogen and phosphorus discharged into Iowa's rivers and streams.

Iowa has 102 designated major municipal dischargers (Publicly-Owned Treatment Works – POTWs) defined as facilities designed to treat 1.0 million gallons of wastewater or more per day (Average Wet Weather – AWW – Design Flow). There are 28 industries in Iowa designed by the EPA as major industrial dischargers. Ten of these provide biological treatment of process wastewater. There are 12 other industries not designated as major that have existing biological treatment systems for process wastewater that can likely be modified to provide biological nutrient removal. See Section 3.3 for list of affect facilities.

Technology-based nutrient requirements will be specified in municipal and industrial NPDES permits for major facilities, and minor industrial facilities with existing biological treatment systems, at the next permit renewal. See Section 3.1 for the point source technology assessment and implementation details.

Nutrient reduction costs are generally affordable for most of Iowa's major municipal facilities based on the ratio of estimated project cost to median household income (MHI). These same facilities also have the largest design flows and, in general, the greatest point source nutrient contribution. If the communities served by major municipal facilities can afford a project cost/MHI ratio of 0.5%, the design flow treated by those facilities for which nutrient reduction is affordable is over 550 MGD, or roughly 86% of the total designed flow for all major municipal facilities.

These changes are designed to achieve targeted reductions of at least two-thirds in the amount of nitrogen and a three-fourths reduction in the amount of phosphorus from levels currently discharged by these facilities.

If successful, this strategy will reduce by at least 11,000 tons per year the amount of nitrogen and 2,170 tons per year the amount of phosphorus discharged annually by municipal facilities alone. These figures represent a 4% reduction in nitrogen and a 16% reduction in phosphorus in the estimated statewide amounts of nitrogen.

Animal Feeding Operations"

Red Comment: This section fails to discuss or address whether all this "ensure(s) effectiveness of point source permits..." as outlined in the Stoner Memo, as it pertains to CAFOs. Just because there are regulations doesn't means they are all effective at achieving the sought-after outcomes. Nor does it ensure they will or are being adequately enforced. This section needs much more detail to address these missing elements. Otherwise we open ourselves to justifiable criticism.

"All livestock farms (Animal Feeding Operations) are regulated by the IDNR for environmental performance. The amount of regulation varies by the type and size of farm. Farms 1,000 animal units or larger are required to have construction permits and those that discharge to a water of the United States are required to obtain a NPDES operating permit. Stormwater permits also are likely to be required before construction. Farms larger than 500 animal units are required to comply with an IDNR approved manure management plan, which is updated annually. These farms also must have certified applicators land-apply the manure from the farm unless it is marketed and sold to someone else as a common practice."

Red Comment: This section is about AFOs. There are many livestock farms below the 1,000 animal unit threshold, and are therefore less regulated or unregulated, which contribute nutrients and other pollutants to Iowa waters. These are only regulated in a general way in that they are prohibited from discharging to a water of the U. S., but such regulation is only enforced if there is a visible fish kill or a complaint. Small open feedlots have been a significant source of pollutants.

"All farms have water quality setback requirements. Setbacks are required from streams, lakes, designated wetlands, drinking water wells, ag drainage wells, and sinkholes. Livestock barns or manure storage structures cannot be located in a 100-year flood plain. It is illegal to discharge manure to a water body unless it is allowed under the conditions of a NPDES operating permit. Farms with dry or bedded manure also have regulations governing the stockpiling of manure."

Red Comment: This is simply worded incorrectly, as many farms have streams, wetlands, and other features with no specific setback requirement. There is no law prohibiting livestock from being in streams, no law requiring a setback between a crop end row and a stream, and so on. Even where there are manure application setbacks, the existing setbacks are difficult to enforce. There is no mention here of what percent of requirements are currently met in Iowa.

"Credit Trading

~SECTION 1, PAGE 14~

In 2003, the U.S. EPA released guidance for a new National Water Quality Trading Program. This policy calls on states to develop programs for trading water pollution reduction credits, similar to what has been done with air pollutants for several years. There is potential for credit trading to be helpful in restoring water quality in watersheds where it is more economical to address sediment and nutrient causes of impairment through nonpoint source efforts versus point source controls regulated by the Clean Water Act.

Iowa point sources, IDNR, IDALS and the WRCC will work to develop an environmental credit trading program based on need and available resources. The partners will include nonpoint sources in this program. The partners will establish and implement voluntary market-based approaches or incentives, such as prioritized use of State Revolving Funds."

Red Comment: This section on credit trading underscores the lack of water quality and policy understanding in this document. First, there is no legal basis for point to nonpoint trading – especially where TMDLs exist and are in force. Second, IDALS and the WRCC would have no role in a point to point trading program, which is the only trading program that could potentially be viable in the state of Iowa. According to ISU's economists at CARD, water quality trading will not work in Iowa. There simply are not enough point sources to justify the infrastructure and administration costs of running a program and the monitoring required exceeds the potential cost savings benefits. The basic ingredients for a trading program simply do not exist in Iowa. This section of the strategy should detail why credit trading will not be part of the Iowa Nutrient Strategy rather than echo the Stoner Memo and say that we will create one. Consider the language edit below in place of the above suggestion:

Iowa point sources and IDNR will work to develop an environmental credit trading program based on need and available resources. The partners will include nonpoint sources in this program if and when it is determined, as a result of a careful and thorough legal review, that there is a legal basis under the Clean Water Act, EPA rules and regulations, and other federal laws and rules to create and carry out such a program AND is determined by economists at ISU's CARD that a system is even possible in Iowa given the uncertainty of point to nonpoint ratios. As of this time that is not the case. And if it is determined sometime in the future that point to nonpoint trading were to be considered, in instances where there is an enforceable TMDL covering N and/or P loads, trades can only be effected if and when nonpoint sources have first met their assigned load reductions. And then they would only be able to trade reductions over and above those required of them by the TMDL. Given that in many circumstances, approximately 90% of the loading comes from nonpoint sources, an applicable scenario is not likely to surface.

4. "Agricultural Areas

As Iowa is a national and global leader in the production of food and renewable fuels, 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."

Red Comment: This language has no place in the State's Nutrient Strategy. The primary point of emphasis in this document is to set meaningful and measurable goals for reducing N and P loads. While water quality improvement does not occur "in a vacuum," talk about Iowa's leadership in "food and renewable fuels production" should not supersede the point and purpose of the Strategy – reducing nutrients to Iowa's waters and thereby reducing the impacts on Gulf Hypoxia.

"Accounting for potential load reduction from point sources, nonpoint sources need to achieve 41% load reduction in nitrate-N and 29% load reduction in phosphorus to meet the overall 45% reduction goal."

Red Comment: As currently worded, this is not accurate. NPS N must be reduced by 43-44%, and NPS reductions must equate to 41% of the total baseline nitrate-N load. NPS P reductions must be about 37% (not 29%) of current NPS P loadsand must equate to 29% of the total baseline P load.

"Setting Priorities

Coordinate the focus of conservation programs with the goal of reducing nutrient transport to local and Gulf waters. Develop a conservation program infrastructure that fully supports adoption of needed practices that target the reduction of nutrients to water. Increase the delivery of conservation and nonpoint source programs in a straight-forward, flexible manner."

Yellow Comment: While these things are nice to say, we really need to know how this will be done. Without that additional information these are just platitudes. Also, these read more like bullet points and don't make sense in the context of the surrounding text. Separate out.

"Nutrient transport from cropped lands cannot be solved by in-field practices alone, but instead must include a combined and balanced approach of utilizing off-field nutrient and sediment trapping and removal practices with in-field erosion and nutrient reduction practices. Where possible, watershed planning needs to achieve balanced implementation of off-field and in-field practices, to optimize the resulting reductions of nutrients transported to local and gulf waters."

Yellow Comment: As written, the first sentence shows inherit bias toward off-field practices, despite using the word "balanced." To be truly neutral, the sentence should read something like this: "Nutrient transport from cropped lands cannot be solved by only using in-field practices or off-field practices, but instead must include a combined and balanced approach of utilizing both methods.

"In partnership with federal and state agricultural and natural resource partners, non-governmental organizations, private sector partners, landowners, and other stakeholders, local stakeholders will develop HUC 12 watershed-scale plans that target the most effective practices in the HUC 8 watersheds prioritized by the WRCC."

Red Comment: At some level this is already being done, yet in many cases, especially where N is the problem, no one seems to be able to get locals to embrace this strategy. Therefore, what will be done differently in the future to overcome this social/cultural barrier? That is the key question that needs to be answered by this strategy in this area.

"These groups will look for opportunities to include existing state and federal targeted stewardship incentive programs with nutrient trading and innovative new approaches to accelerate adoption of agricultural conservation practices."

Red Comment: Please see previous comments on trading above

"Research and Technology

New technology and creative solutions for nutrient reductions are needed to deliver and optimize implementation at full landscape scale. Retain and enhance the policy framework that facilitates and encourages development and rapid adoption of new technologies for reducing nutrient transport to local and Gulf waters.

Enhances and consistent funding is needed to advance the science and develop new technologies for reducing nutrient transport from agricultural lands to local and Gulf waters. Entrepreneurial opportunity within the private sector needs to be enhanced for development and marketing new technologies that reduce nutrient transport to water. Sustained and consistent public funding of public research activities needs to be enhanced significantly.

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There are many unanswered science issues concerning the hypoxic zone in the Gulf of Mexico, which will become increasingly important as Iowa moves forward addressing its role in Gulf hypoxia. Support of this type of research is critical to this strategy."

Red Comment: This section adds no value and should be deleted. More research will not achieve near-term nutrient reductions, as is the intended purpose of this strategy according to Stoner. We should be doing what we can with the current technologies and knowledge that can make a significant impact in nutrient levels. The Strategy's emphasis on the need for new technology is simply a delaying tactic. Implementation of technologies currently shown to be viable for soil and water quality and economical feasible can go a long way in solving the issues this Strategy should be addressing. Adoption of no-till, cover crops, and other practices such as native prairie buffer strips would help reduce input costs and produce a lot of benefits on the landscape.

Why not include a section on the opportunities created by a more diversified agricultural system, including a market to grow seed for cover crops (oat and rye) and living mulches (clover and vetch). What about the niche markets that would be more accessible with some land currently in corn/bean production converted to pasture (per one of the practices included in the nutrient strategy). Examples would include intensive rotation grazing of beef and dairy cattle). What about timber production (for wood chips). These "opportunities" were largely viewed from the perspective as "costs" in the strategy. More research would certainly be needed to evaluate/improve the viability of these ventures, but the entire premise of the strategy seems to be preservation of corn yields. That is a short-sighted and narrow view.

"Strengthen Outreach, Education, Collaboration

This strategy calls for an expanded and enhanced public-sector role to assist farmers and landowners in reducing nutrient transport to local and Gulf waters. It also calls for identifying new and enhanced ways for the private sector to provide leadership, new technologies and services to reduce nutrient transport.

Agribusiness retailers and certified crop consultants (CCAs) are a largely untapped and existing resource. This strategy seeks to harness the collective power of more than 1,200 CCAs working through retailers. Enhanced and expanded consulting and advisory services to farmers and landowners through ag product retailers and CCAs are needed. Develop new roles for CCAs to assist farmers and landowners in accountability and certification of achieving water quality and soil sustainability goals. Encourage and facilitate consulting service fees to CCAs for advisory services and future roles to assist accountability and certification, apart from crop input product sales."

Green Comment: This paragraph should be separated into bullets. The last sentence, please explain who would be accountable for what, and why would producers pay consulting services from a CCA to help them reduce nutrient loads?

"Opportunities need to be identified and actions supported to achieve the rapid adoption of nutrient reduction practices and actions that occur through market-driven solutions. Private and public sector support of market-driven initiatives needs to be aligned to maximize progress through market forces."

Yellow Comment: This statement is vague. It is also difficult to reconcile the statement about market-driven forces and the call for expanded and enhanced public-sector role. The agricultural market is highly influenced by policy and the government's role. All indications are that the public sector's funding will be reduced into the future. The reliance on additional government support is not the kind of thinking this Strategy needs to be successful.

"This strategy involves increased collaboration among the states within the Mississippi River Basin and networking/sharing information on the efforts and successes within the states for achieving reductions of nutrients to water resources. Continue and expand previous efforts such as the Iowa-Minnesota Farmer-to-Farmer Exchange, which focused on sharing technologies within the two states on reducing nutrients to local and Gulf waters."

Yellow Comment: Please expand on the how this will be accomplished. We need specific, measurable milestones and/or goals.

"Increased Public Awareness and Recognition

To increase public recognition of farmers and landowners who are leaders in achieving reduction of nutrients leaving their farms and entering Iowa's and Gulf waters, this strategy includes the development of a watershed or farmer recognition program. This program could be similar to the Rathbun Land and Water Alliance's Lake Protection Program, which encourages and recognizes actions by individuals to protect Rathbun Lake. The program will be delivered in prioritized watersheds."

Yellow Comment: Again, we need to see more specificity here to understand how this could be effective.

"This new program will build on the Iowa Farm Environmental Leader Award program that began as an initiative of Iowa Governor Terry Branstad and Iowa Secretary of Agriculture Bill Northey. Beginning in 2012, 67 farmers were recognized for their environmental and conservation actions. Additional awards will be presented annually at the Iowa State Fair.

The Iowa Watershed Quality Planning Task Force recommended in 2007 a statewide marketing or public educational campaign be undertaken by public agencies and other organizations to rekindle the conservation ethic in all Iowans. The WRCC will consider how to prioritize or reallocate existing funds to implement this recommendation."

Yellow Comment: DNR is already pursuing parts of this yet there is no mention of that. In fact it is in DNR's Strategic Plan as well as part of the NPSMP. Also, this paragraph is not a commitment to do anything more than "look into it." Since this idea is 5 years old, what has changed that will allow the state to find the $1 million needed to develop this WQPTF recommendation, not to mention the additional funds needed to implement it?

"Funding

Initially, Iowa will rely on existing funding sources, or as applicable, reallocation of existing funding sources, to fund implementation of this strategy. The WRCC will make recommendations to the executive and legislative branches on the most effective use of these limited resources."

Yellow Comment: DNR is already pursuing parts of this yet there is no mention of that. In fact it is in DNR's Strategic Plan as well as part of the NPSMP.

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"It is recognized in this strategy and as a matter of state policy that these funds are often limited and over-subscribed by citizens who desire to make further progress in addressing their soil and water resource needs. The pace of the strategy's

implementation will be subject to available financial and human resources. A variety of watershed grants are available to local interested groups. Individual farmers, industries and communities may apply for a variety of state and federal cost-share programs. A summary of nonpoint source funding programs can be found at this link."

Yellow Comment: No tangible strategy has been proposed in this document. The pace, once a more detailed strategy with tangible steps and actions is proposed, should be based on existing available resources. Additionally, qualifiers can be added to the text to indicate that progress may be impeded or accelerated depending on availability of future funding.

5. "Storm Waters, Septic Systems, Minor POTWs
Since nutrient loading in Iowa from these three sources is minor, emphasis will be on monitoring, inspections and upgrades as needed.

Stormwater
No specific nutrient reductions have been targeted for municipal or industrial stormwater discharges. Due to the intermittent nature of such discharges and their relatively small contribution to the statewide nutrient load (Libra et al. 2004), this document does not address specific stormwater reduction targets. It is anticipated, however, that implementation of municipal separate storm sewer system (MS4) permits and industrial stormwater permits will result in some nutrient reduction. Further targeting of activities designed to reduce stormwater nutrient loads will come through development and implementation of stream and lake TMDLs."

Yellow Comment: Despite what is said, "urban stormwater" may have a significant contribution and there is a lot more that can be done here. Reference to MS4 permits needs to be in element 3. Also, we need to be specific about the activities (meaningful and measureable).

"Private Sewage Disposal Systems
Iowa currently has more than 300,000 private sewage disposal systems and their associated impact on nutrient loadings in Iowa is considered marginal (Libra et al. 2004). Therefore, no specific nutrient reductions have been targeted for private sewage disposal systems. Much of Iowa's efforts with private reductions have been targeted for private sewage disposal systems. Much of Iowa's efforts with private reductions have been targeted for private sewage disposal systems. Much of Iowa's efforts with private sewage disposal systems consist of upgrading failing systems through routine inspections by counties and through Iowa's "time of transfer" septic system inspection law that took effect in 2009. This law required that every home/building served by a septic system have the system inspected prior to sale or deed transfer. The law is intended to eliminate sub-standard or polluting septic systems. Since taking effect, there have been approximately 18,000 time of transfer inspections and 6,000 new septic systems installed as a result of inspections. The state offers the On-Site Wastewater Assistance Program (OSWAP), a unique low-cost financing option for septic system replacement. The OSWAP program has administered 1,361 loans totaling $10.4 million. Other efforts include working with Iowa's 500+ unsewered communities to ensure basic wastewater treatment is occurring."

Yellow Comment: Specifically what is being done with Iowa's unsewered communities? What is the timeframe for completion? What are the benchmarks and milestones?

"Minor POTWs
There are many more minor POTWs in Iowa than "majors" but the majority of the wastewater is discharged by major POTWs both in terms of volume and the amounts of nutrients. Cost estimates developed for this strategy and elsewhere indicate nutrient removal would likely be unaffordable for smaller communities. Most minor POTWs within the state utilize lagoon or fixed film technologies, which are more difficult to retrofit for biological nutrient removal than the processes, employed by major POTWs. Also, many of the State's controlled discharge lagoon facilities likely already achieve significant nitrogen and phosphorus reductions but data to confirm this is not currently available. Due to the high cost in relation to the amount of nutrient reduction that could be achieved by minor POTWs, this strategy focuses only on major facilities. However, minor POTWs will be required to evaluate total nitrogen and phosphorus as "Pollutants of Concern" within Iowa's Antidegradation Implementation Procedure and implement the least degrading reasonable treatment alternative when designing new or expanded treatment facilities."

Yellow Comment: It may be useful to recheck and see if that data are available. Stands to reason that as a first step, this document commit to gathering the data needed to close the gap to verify their nutrient contribution levels. Putting this requirement in future minor POTW permits seems like an easy and minimal cost way to capture the needed information.

*"**Funding***
Publically funded incentives for point sources such as community wastewater facilities and stormwater control can be found at this link. Iowa's Clean Water State Revolving Fund (CWSRF) offers loan funding to assist in financing design for these facilities' improvement. The CWSRF program is jointly administered by IDNR and the Iowa Finance Authority. IDNR oversees the specific aspects of the CWSRF program."

Yellow Comment: Please mention the new CWSRF sponsored project initiative here.

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6. "Accountability and Verification Measures
Regarding point sources, the IDNR will convene a technical workgroup to define the process for providing a regular nutrient load estimate for point sources. The IDNR will track progress for implementing the point source nutrient reduction strategy using several measures:

1. *Number of permits issues that require nutrient reduction feasibility studies*
2. *Number of nutrient reduction feasibility studies submitted*
3. *Number of permits amended with nutrient removal/reduction construction schedules*
4. *Number of nutrient removal/reduction facilities in place/in design/under construction*
5. *Number of facilities monitoring nutrient in their effluent*
6. *Total nitrogen and phosphorus loads discharged from point sources*
7. *Results from comprehensive annual ambient stream monitoring and analysis utilizing existing permanent monitoring locations and focused study areas*

Yellow Comment: The technical workgroup should likely have been convened before or as this strategy was created to ensure the tracking and reporting of meaningful and measurable nutrient load reductions. Bullet points 1-3 are not "meaningful and measurable" as the Stoner Memo expects. Bullet 5 does not seem to be a useful measure.

"Regarding nonpoint sources, develop new and expanded frameworks to track progress, beyond the traditional ambient water quality monitoring networks. Encourage expansion of aerial coverages and frequency of statistical surveys that characterize on-farm actions to adopt nutrient-reduction practices. Seek to develop new frameworks through ag retailers and CCAs to characterize farmer and landowner adaption of new technologies and practices that reduce nutrient transport to water from nonpoint source."

Red Comment: Who will be responsible for this? What do these look like? How will they inform the strategy? What will they tell us? Can this be effectively implemented? Is the state empowered to make this happen? These are the questions to answer first, and then write a strategy.

"The WRCC will collaborate with Iowa State University CALS nutrient science assessment team to support science and technical assessments of success measurement for the strategy.

The WRCC member agencies will apply their data, programs and resources to help implement this strategy within targeted/priority sub-watersheds to reasonably assure reductions will occur.

The WRCC will establish and refine a public-private reporting system that documents current nutrient management and conservation system application within watersheds."

Yellow Comment: More explanation needed on the success measurement point. Please be more specific on how these WRCC member agencies will assure implementation. Finally, the public-private reporting system should be figured out first and then written into a strategy.

"This system has these elements:

1. *Private sector tracking system of conservation practices, structures, fertilizer sales and other farm inputs and outputs by HUC 12s. Privacy rights of individual farms shall be maintained.*
2. *Conduct a regular, periodic Iowa Natural Resource Inventory to establish HUC 12 baselines, monitor progress and verify effectiveness.*

3. *Enhance the state's water monitoring to support watershed implementation strategies and to be useful in verifying performance.*
4. *Use appropriate modeling to project expected performance of implementation strategies."*

Yellow Comment: Bullet 1 – exactly what does "privacy rights of individual farms" mean? If one can see the practice from the ground or air, it is not private information. If the cost of a practice was paid for in part by public dollars, is it private information? Bullet 2 – what are we establishing baselines for and why, and what are we monitoring? Bullet 3 – How will we do this and with what funding source? Bullet 4 – what models are appropriate? When will you use them? Who will do this? These are all questions that need to be answered.

"7. Public Reporting
WRCC annual reports will document calculated or modeled load reductions from quantified best management practices.

The WRCC will use survey data, a new Iowa Natural Resource Inventory of management practices, and physical landscape structures aggregated at the HUC 8 scale. The following shall be incorporated into the reports:

a. *Watershed implementation plans shall include strategies to assess/demonstrate progress in implementing and maintaining management activities and achieving load reduction goals. These strategies shall include baselines of existing N and P loads and current BMPs, including in-field and edge-of-field technologies, and shall be implemented in each targeted/priority HUC 12 sub-watershed. An evaluation of BMP effectiveness will be used in making future plan adjustments"*

Red Comment: No mention of "biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds." (see Stoner Memo element #7) No mention of reporting progress in absolute reductions in in-stream N and P. No mention of reporting against outputs, outcomes, measurables, milestones within the strategy.

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b. *"The WRCC shall annual report publically on the state's website with request for comments and feedback for an adaptive management approach to improve implementation, strengthen collaborative local, county, state, and federal partnerships, and identify additional opportunities for accelerating cost effective N and P load reductions"*

Red Comment: This bullet simply echoes the Stoner memo verbatim.

"8. Develop Work Plan and Schedule for Numeric Criteria Development

This strategy emphasizes implementation of technology-based nutrient reductions in the near-term, with the understanding numeric nutrient criteria will remain a longer-term goal."

Red Comment: Iowa already has numeric nutrient criteria for N for drinking water uses and we have TMDLs associated with that standard for the Raccoon, Cedar and Des Moines rivers that address how to achieve the load reductions needed to achieve that numeric nutrient WQ standard. Yet none of that is mentioned here. Beyond that, this section inadequately addresses the expectations of the Stoner Memo in regards to "developing a work plan and schedule for numeric criteria development."

"As this strategy is implemented, nutrient loads will be reduced in the near term with the application of technology-based total N and P discharge limits on the major treatment facilities and with implementation of a nonpoint source nutrient reduction strategy. The response of streams to the reductions in nutrient loads will be evaluated on a site-specific basis."

Yellow Comment: We need more information here. Site-specific numeric nutrient criteria may make sense, but biological indices (a measure of stream response) is already somewhat site-specific because it incorporates reference stream index values. It is the stream response that is important to Iowa water quality, not numeric nutrient levels. Every reach/lake has a unique ability (and need) to assimilate certain amount of nutrients. For Gulf hypoxia, numeric nutrient levels may be helpful and even necessary.

"If the stream does not meet the nutrient response criteria, additional nutrient load reduction alternatives will be evaluated and implemented. Once the nutrient load has been adequately reduced such that the nutrient response criteria are met, site-specific numeric total N and/or P criteria will be adopted for the stream. If the stream does meet the nutrient response criteria, then appropriate site-specific total N and/or P numeric criteria will be adopted for the stream."

Yellow Comment: What are these criteria? Existing IDNR biological indices? If not, what? Have they already been developed, or will that need to be done? If they have been developed, document the "who/how/what." If they are yet to be developed, document the" who/how/when."

"Similar to how the IDNR deals with nutrient-related impairments in lakes and streams, point source nutrient limits can be determined in the context of an adaptive watershed management plan, which is solution-driven and provides flexibility in setting load reduction targets for point and nonpoint sources. Section 3.4 shows a conceptual flow model in which point source nutrient limits can be set as part of a watershed-based nutrient assessment. The assessment incorporates the analysis of ambient stream monitoring data and wastewater effluent monitoring data to evaluate stream nutrient status."

~END POLICY DOCUMENT~

Response to Science Assessment – Below are specific comments on the Science Assessment, identified by section number, page, and paragraph. The comment is highlighted based on the significance of the issue, as indicated in the Key below:
Key

4. Red highlight = Significant comment on a critical issue, or a possible inaccuracy that appears to be a factual or numerical error.

5. Yellow highlight = indicates comment that asks for more clarification of a potentially important issue, or a comment on an issue of significance to the overall theme

6. Green highlight = indicates comment that asks for more clarification of a non-critical issue, or a comment on an issue that is likely of low importance to the overall document.

Section 2.1 – Executive Summary of Science Assessment

- Red Comment- Pg 1, par 3:

  - As expressed/stated, the reductions in PS and NPS N and P are not cumulative and do not add up to meet the 45% reduction goals. A 67% reduction and 75% reduction in PS N and P, respectively, are stated as having overall reductions of 4% for the total (PS+NPS) N load, and 16% for the total (PS+NPS) P load. This means that point sources comprise 6% of the baseline N and 21.3% of the baseline P loads.

    $N_{PS}(0.67) = N_{total}(0.04) \rightarrow N_{PS} = (0.04/0.67)N_{total} \rightarrow N_{PS} = 6.0\%$ of N_{total}

    $P_{PS}(0.75) = P_{total}(0.16) \rightarrow P_{PS} = (0.16/0.75)P_{total} \rightarrow P_{PS} = 21.3\%$ of P_{total}

    The text states that NPS reduction of N must be 41% and NPS reduction of P must be 29% in order to meet the 45% reduction goal for both. The percent reductions for PS and NPS, as expressed, are not additive because PS and NPS loads are not equal. Either the calculation is currently incorrect, or more likely, the language in the text needs to be re-stated. To meet the 45% reduction goal, NPS N must be reduced by 43.6% (not 41%) and NPS P must be reduced by 36.9% (not 29%).

    The N and P reductions for NPS loads in the scenarios quantified in the Science Assessment all shoot for the 29%N and 41% P reduction targets. Those must be based on the overall N and P loads, not just the NPS N and P loads, in order to meet the goal. If the reductions are calculated correctly, then the required NPS reductions (43.%-N and 36.9% P) should either be clearly expressed in these paragraphs, or the following revision could be made to the 2nd paragraph on Page 2: "Accounting for potential load reduction from point sources, nonpoint sources would need to achieve 41% of the total or overall load reduction in nitrate-N and 29% of the total/overall load reduction in phosphorus…"

- Yellow Comment- Pg 2, par 7, last sentence:

  - "Edge-of-field practices through buffers or sedimentation basins/ponds whose potential for dramatic reductions in phosphorus load, 58% and 85%, respectively."

    - We believe that a comprehensive literature review would show that P reduction in ponds is highly variable, and assuming an 85% reduction is optimistic. At a minimum, the

importance of proper design (depth, length:width ratio, drainage area ratio, etc.) in achieving an 85% reduction in P should be emphasized.

- Green Comment- Pg 3, par 2, sentence 2:
  - "The estimated average nitrogen..."
    - Text should clarify whether the 151 lb-N/ac and 201lb-N/ac includes all N (including manure and chemical fertilizer applied, or just chemical fertilizer alone).
- Green Comment- Pg 3, par 2 and par 4:
  - Par 2, sentence 3, "The MRTN for corn following soybean..."
  - Par 4, sentence 7, "The price of corn was assumed..."
    - A sensitivity analysis of how the cost of related practices vary with varying corn and N fertilizer prices would have been very helpful.
- Yellow Comment- Pg2, par 2; Section 2.2, p. 4, Timing and Sidedress nitrogen; Section 2.2, pp. 26-27 Sidedress nitrogen
  - The sections on switching from fall to spring N application and on sidedressing nitrogen appear to underestimate the potential nitrogen load reduction (4%) of switching to spring and sidedress nitrogen, but there's not enough time in our review to cite research data that contradicts these assertions.
- Yellow Comment- Page 5, Table 1:
  - The "% Corn Yield Change" column
    - This heading indicates that a central theme of this strategy (and Science Assessment) is to preserve corn yields. One can be an advocate of agriculture and continued productivity without giving special treatment to corn. Simply using "On-Farm Costs" or changes to on-farm profits (as was done elsewhere in the Science Assessment) would have been more objective and perhaps added to the credibility of the Nutrient Reduction Strategy as a whole.
    - The problem with the % Corn Yield Change is perhaps most clearly illustrated with the Land Use practices of Perennial, Extended Rotations, and Grazed Pastures, since other economic opportunities would take the place (at least to some extent) of the drop in corn production.
- Yellow Comment- Page 7, Table 3:
  - Table caption includes "A positive $/lb N reduction, total cost, or EAC is a cost. A negative $/lb N reduction, total cost, or EAC is a benefit"
    - No cost of any kind is reported in this table. Remove the above sentence.
  - " Nitrate-N Reduction % (from baseline)"

- Per earlier comment about meeting the 45% reduction goals, the reported reduction will not meet the goal unless the baseline includes both PS and NPS contributions. We saw no clear statement in the text or table that confirms this. Please ensure the goals are met, and if they are, consider adding this clarification to the footnotes.

- o Footnote: **"Acres impacted for buffers are acres of buffers implemented per acre of buffer."
  - This needs rewording – doesn't make sense. Should the last word be something other than "buffer?"

- Yellow Comment- Page 8, Table 4:
  - o "% Reduction from baseline"
    - Per earlier comment about meeting the 45% reduction goals, the reported reduction will not meet the goal unless the baseline includes both PS and NPS contributions. We saw no clear statement in the text or table that confirms this. Please ensure the goals are met, and if they are, consider adding this clarification to the footnotes.
  - o General comment on costs reported:
    - Please clarify that on-farm costs include fuel (possibly embedded within the cost of tillage or application activities). Volatile fuel prices could have potentially large impacts on costs.
  - o NCS8 under Cost of N Reduction from baseline ($/lb)
    - Please include a dollar amount ($), since NCS7 is not included in the table.

- Yellow Comment- Page 9, Table 5:
  - o Table caption includes "A positive $/lb N reduction, total cost, or EAC is a cost. A negative $/lb N reduction, total cost, or EAC is a benefit"
    - No cost of any kind is reported in this table. Remove the above sentence.
  - o " Phosphorus Reduction % (from baseline)"
    - Per earlier comment about meeting the 45% reduction goals, the reported reduction will not meet the goal unless the baseline includes both PS and NPS contributions. We saw no clear statement in the text or table that confirms this. Please ensure the goals are met, and if they are, consider adding this clarification to the footnotes.
  - o Footnote: **"Acres impacted for buffers are acres of buffers implemented per acre of buffer."
    - This needs rewording – doesn't make sense. Should the last word be something other than "buffer?"

Section 2.2

- Green Comment- Page 3, par 1:
  - Everything is based on nitrate-N rather than all N sources. We understand the rationale, since quantifying all N components and sources would be impossible. Locally, ammonia/ammonium can be important. For Gulf hypoxia issues, organic N could potentially be important/significant. May want to better defend rationale for excluding organic-N from the analysis.
- Green Comment- Page 4, par 3:
  - There are two references to "Table" with no Table identifier and no table present.
- Green Comment- Page 5, par 2:
  - "The research indicated a small (4%) in nitrate-N concentration when comparing liquid swine manure to fertilizer nitrogen…"
    - Small reductions shown were for a short-term study, but what about long-term reductions due to improved soil structure and increased soil organic matter, which tends to hold nutrients?
- Green Comment- Page 6, "Living Mulches":
  - Include language about the added benefits of a leguminous living mulch (e.g., clover), which can offset the negative impacts of stover harvest, and is often removed from the field to provide additional winter forage for cattle.
- Yellow Comment- Page 7, par 5, "Wetlands":
  - "Wetlands restored specifically for habitat benefit are not being considered in this effort as they may or may not receive nitrate-N, and as a result, the primary water quality benefit is from land being taken out of production."
    - More explanation as to why these wetlands may not receive nitrate-N would be helpful. It seems likely that potholes and depressions in the middle of corn fields would receive nitrate in runoff and in shallow subsurface flow. What about the benefits of these types of wetlands obtained by capturing and treating non-nitrate forms of N? Could these systems capture and "treat" TKN, for example?
- Yellow Comment- Page 7-8 and Page 32-33, Bioreactors sections
  - No mention is made that bioreactors do not treat bypassed water, which bypasses during heavy flow events, which is when we can get the highest nutrient loads.
  - No mention is made of the newly-emerging technology of "saturated buffers", for which the research by Dan Jaynes at USDA in Ames is showing a 99% N reduction. If saturated buffers were combined with buffers, they could treat both overland runoff and subsurface flow.
  - This would address the science assessment's statement commenting on the limited effectiveness of buffers on p. 33 that, "the nitrate-N load reduction will be limited by the amount of shallow groundwater intercepted by the buffer."

- Green Comment- Page 8, par 3:
  - There are two references to "Table" with no Table identifier. Should refer to Table 1.
- Yellow Comment- Page 10, par 4, "Nitrate-N Reduction Mean":
  - The explanation of how mean values were calculated is not easily understood. There is a concern about averaging nitrate concentrations between years, because the flows in each year could be dramatically different. If concentrations are used instead of loads, then flow-weighted averages would be more appropriate. And reducing loads is the goal.
- Green Comment- Page 13, par 3, last sentence:
  - "For the combined practice scenarios, it must be noted these are not recommendations, but rather example scenarios."
    - Consider adding a sentence or two that describes/suggests a process by which actual implementation decisions (i.e., scenario development) will likely be made. What role with various state agencies have in this process, in collaboration with landowners?
- Yellow Comment - Page 13, par 5, last 3 sentences:
  - "This document primarily includes farm level costs associated with the practices. It should be noted there could be additional costs for some of the practices or scenarios if implemented at a broad scale. These types of considerations are included in a separate document."
    - First, consider replacing "separate document" with a Section number so the read can find that analysis.
    - Might be helpful to include a brief list of some of these other costs.
    - Along with additional costs, there may be other savings and economic opportunities created with implementation. These should be included as well, not just potential costs.
- Yellow Comment- Page 13, par 6, sentence 1:
  - "Practice/scenario costs...calculated by Major Land Resource Area (MLRA) and then accumulated for a statewide cost and reduction amount."
    - It would be very beneficial to calculate and report these costs (and nutrient reductions) by MLRA. This would illustrate whether the costs to each MLRA are "equitable" on a per pound of nutrient removed and an aggregate basis. MLRAs that have a relatively small contribution should not be faced with high implementation costs (and vice versa).
- Green Comment- Page 18, par 1, sentence 3:
  - "Total stream water yield used..."

- Where did the water yield data come from (e.g., USGS gages, past studies, etc.)? Needs better documentation. Cite sources.

- Yellow Comment- Page 18, par 2, sentence 1:
  - "Nitrogen application rates for each MLRA were determined using Equation 2."
    - Needs clarification. Was Equation 2 used to distribute countywide data N application data to MLRAs? If so, that could be stated more clearly. If not, is this a typo?
- Green Comment- Pg 19, par 1, Turfgrass nitrogen application
  - The percent of lawn appears to be allocated by MLRAs (metro areas) per landform region. Depending upon how this is calculated, this formula may underestimate the percent of lawn in rural areas, as many farms, small towns, rural subdivisions, and rural businesses have huge lawns.
- Green Comment- Page 21, last par:
  - There appears to be potential for underestimation of actual N application rates in the Science Assessment due to outdated data, and due to the assumption that N is applied at agronomic rates and that manure is not applied as "insurance" or for the purposes of disposal, and therefore not included in the total N (and P) application.
- Green Comment- Page 22, last lar and Eq 11:
  - A more detailed explanation should be included for this regression analysis. Regression plots would be helpful, if applicable.
- Green Comment- Page 23, par 1, sentence 4:
  - "In one case, β_1 was not significant..."
    - If not significant at alpha = 0.05, it would be good practice to report the level of significance (alpha = 0.10, etc.).
- Green Comment- Page 23, last par, sentence 3:
  - "Based on this analysis,..."
    - It is not clear, given the information in this paragraph and the preceding one (including Figure 3 on page 24), that attributing 83% of nitrate to subsurface flow and 17% to runoff is a valid assumption. Further explanation is required.
- Red Comment- Page 23, last par, sentence last sentence:
  - "For the baseline load scenario..."
    - Why not report the baseline nitrate-N load here (307,000 tons per year) and clearly state that it includes all point and nonpoint sources. As indicated in previous comments, if the baseline load of 307,000 tons does not include both PS and NPS, then the reductions reported (for example scenarios) do not meet the 45% targets. If PS are not included in the baseline load, then further reductions in NPS are needed.

- Red Comment- Page 26, Table 14:
  - Baseline total load and reduction from baseline
    - As noted previously, these must include both PS and NPS to meet the 45% reduction goals.
- Green Comment- Page 26, Table 14:
  - Land Use Changes EC and P/LR
    - Is the large discrepancy in Potential Area Impacted for Practice (5.9 vs. 1.9 million acres) correct?
- Yellow Comment- Page 26, Table 14:
  - The table does not account for the beneficial role of increased soil organic matter provided by some practices (cover crops, manure), nor the lack of it provided by other practices (anhydrous ammonia). The cience assessment does not adequately consider the benefits of adding to soil organic matter levels.
- Green Comment- Page 27, "Other services" par:
  - This bullet requires further explanation. It reads as though not adding N fertilizer could result in decreased SOM. But that ignores other means of increasing SOM, such as cover crops, tillage, etc.
- Red Comment- Pg 27, Reducing Nitrogen Application Rate section, Practice limitations, concerns, or considerations
  - The document argues that reducing nitrogen application rates will mine soil nitrogen and reduce soil quality. This point is not agreed upon by soil scientists, but is stated in the document as factual.
- Yellow Comment- Page 29, "Cover Crops" par, "Practice limitations..."
  - "Row crop out of production to meet rye demand."
    - Wouldn't land in rye production offer additional N and P reduction benefits worth mentioning here (and accounted for in the reduction tables)?
    - This section does not mention the benefits of increased soil organic matter, increased infiltration, and increased carbon sequestration from cover crops, and overestimates the so-called negative impact on the seed industry due to increased demand for rye seed.
- Green Comment- Page 30, "Other services" par:
  - Consider adding an additional bullet for the benefits to soil health and increased organic matter.
- Red Comment- Page 30, last par, last sentence:
  - "...$235,986,000/year (Table 17)."

- Table 17 should be Table 14
- Table 14 reports $227 million/year.

- **Red Comment- Page 31, par 1, last sentence:**
  - "..$1,066,617,000/year..."
    - Table 14 reports 1,025 million/year
- Yellow Comment- Pg 31, Costs/benefits par, sentence 3:
  - "...(net present value cost of #321/treated acre)..."
    - With potential application for 12.8 million acres as reported in Table 14, the total net present value cost is $4.1 billion! That is a very large up-front capital cost that seems unlikely to get funded. This is pointed out later (in Table 29 on page 44). Perhaps that table/section should be cited here so the reader knows more detail is provided later).
- Yellow Comment- Pg 31, Edge of Field Practices section omission: Oxbows and stream meanders
  - Oxbow restoration and stream meanders are two nutrient BMPs are not mentioned at all in this section, and research on both have shown nutrient load reductions. Oxbow restoration is currently one of the BMPs being using in the Lyon Creek watershed to reduce nitrate loads. Both of these practices have other ecosystem service benefits, besides nutrient reductions.
- Yellow Comment- Pg 32, par 1, sentence 6:
  - "however, land taken out of production is factored into the cost of the practice..."
    - How much yield is really lost in from these acres. The wetlands are likely located in areas that routinely flood and have reduced yields in most years and insignificant yields in many years.
    - Are crop insurance premium "savings" considered when calculating on-farm costs for this practice, or other practices that take frequently flooded land out of production?
- Yellow Comment- Pg 32, "Costs/benefits" par, last sentence:
  - "The resulting EAC was $10.23/treated acre per year..."
    - This equates to a $2.2 billion up-front cost for bioreactors. Very large capital cost that is probably not likely to get funded. This is pointed out later (in Table 29 on page 44). Perhaps that table/section should be cited here so the reader knows more detail is provided later).
- Yellow Comment- Pg 33, "Costs/benefits" par, sentence 2:
  - Cost of establishment assumed to be $300/acre

- What actual costs are considered in the establishment of a buffer? It would be helpful to document some of these costly activities (e.g., grading, tilling, planting/seeding, etc.), and whether native seed was considered since it is more expensive.
- Are insurance premium savings to the farmer considered (as a benefit) in the calculation of costs?

- Yellow Comment- Pg 34, par 1 ("Installing buffers on all applicable areas" par):
  - EAC is estimated at $87,679,000/year.
    - A large share of this is due to corn being taken out of production. But how much yield is actually lost? Buffers could likely be in areas that flood frequently. Actual yield losses are most likely not commensurate with the number of acres taken out of production.
    - Also, are insurance premium savings to the farmer considered (as a benefit) in the calculation of costs?

- Green Comment- Pg 34, "Costs/benefits" par:
  - ..."farmer management time..."
    - Was this included in the cost calculation? If so, how much time does it take for farmer to adjust gates every year, and what is the hourly rate? It seems likely that this is more of an inconvenience, rather than a cost.

- Yellow Comment- Pg 34, "Other services" bullet:
  - "Managing the water table at a shallower depth could result in increased surface runoff, ..."
    - Not in flat landscapes with many enclosed depressions (i.e., most areas in the Des Moines Lobe).

- Green Comment- Pg 34, last par, sentence 2:
  - "Controlled drainage is limited to areas with land slopes less than 1%."
    - Some explanation/illustration to this physical constrain would be helpful to many readers.

- Yellow Comment- Pg 37, Table 24:
  - A more detailed explanation of EAC values for this practice (Energy Crops) would be helpful.
  - Why is the per acre EAC so much greater than for Land Retirement? It would seem as though there should be a larger profit potential (and hence, lower cost) for Energy Crops than for Land Retirement.

- Why is the applicable land area so different for P/LR and EC (per Table 14).

- Green Comment- Pg 38, "Practice limitations" par:
  - Consider adding "Increased agricultural/economic diversity" to the list of bullets.
- Green Comment- Pg 39, "Other services" par:
  - Consider adding "Increased soil health" to the list of bullets.
- Green Comment- Pg 40, first par:
  - 4th sentence: "…nonpoint source load reductions would need to achieve 41% of the overall 45%..."
    - The wording is accurate here, but for clarity, considering adding a sentence that says that NPS-N loads must be reduced by 44%.
  - 6th sentence: "…nonpoint source load reductions would need to achieve 29% of the overall 45%..."
    - The wording is accurate here, but for clarity, considering adding a sentence that says that NPS-P loads must be reduced by 37%.
- Green Comment- Pg 40, par2, "Scenario NCS1, sentence 2:
  - "…approximately a 41% overall…"
    - Table 28 reports 42%
- Yellow Comment - Pg 40, par3, "Scenario NCS2, sentence 1:
  - "…in all MLRAs except 103 and 104,…"
    - It would be helpful to the reader if a rationale for excluding MLRAs 103 and 104 from cover crop implementation was provided.
- Yellow Comment- Pg 47, 2nd to last par, last sentence:
  - Consider adding the following: "Specifically, HUC-12 scale watershed studies should be pursued to monitor, assess, model/predict, and track water quality. Priority should be given to HUC-12 watersheds targeted for nutrient reductions by the WRCC and/or HUC-12 watersheds that include impaired waterbodies and/or completed TMDLs. "
- Yellow Comment- Pg 55, "Drainage Water Management and Shallow Drainage" literature reviewed:
  - Consider including (and incorporating results) from Sui and Frankenberger (2008). They found higher potential for nitrate-N reductions by drainage water management: "Drainage water management decreased the average annual (1985-2009) predicted drain flow from 11.0 to 5.9 cm, and the total nitrate load through subsurface drainage from 236 to 126 ton (both about 47% reduction). The percent reduction in nitrate load varied between 40% and 53% for all combinations of drain spacing, soil parent material and

cropping patterns, with drain spacing and soil parent material having a greater effect than cropping pattern."

- Citation: Ale, S., L. C. Bowling, P. R. Owens, S. M. Brouder, and J. R. Frankenberger. 2012. Development and application of a distributed modeling approach to assess the watershed-scale impact of drainage water management. Agricultural Water Management. 107: 23-33.

Section 2.3

Red - NOTE: Many of the comments made in Section 2.2 also apply to the equivalent parts of Section 2.3. These comments are not necessarily repeated in this summary of comments, but should still be addressed, where applicable.

- Green Comment- Pg 3, par 3, between sentence 3 and 4:

  "...Allen and Mallarino, 2008)." Consider adding this sentence: "Additionally, dissolved P is more readily available for biological uptake, and therefore has a more immediate and potentially larger impact on eutrophication, than sediment-attached forms of P." "Phosphorus dissolved..."

- Yellow Comment- Pg 5, par 2, Phosphorus Application Rate and Timing

  The middle sentence stating "The soil test levels being maintained often exceed those recommended by Iowa State University, however, which explains the high proportion of soils testing high and very high in the state" is evidence that a corresponding high proportion of farmers are not following P application rate recommendations. NRCS recommends adding P only when soil P rates are at medium or below, not high or very high. This ongoing over application of P is probably a legacy from years ago when many agronomists said that P could not be lost from the soil, and that adding more was like "money in the bank." This shows that there is still a large public education and marketing effort that needs to target farmers about proper soil P application rates.

- Green Comment -Pg 6, par 1, sentence 2:
  - "In the long term, however, manure compared with inorganic P forms can reduce runoff by increasing soil organic carbon and improving soil structure."
    - The same could be said in Section 2.2 on nitrogen reduction, but this point was not emphasized there. Little difference/reduction was attributed to the N source (manures vs. chemical) and this important benefit was not pointed out as clearly in Section 2.2.
- Green Comment- Pg 6, par 3, last sentence:
  - "...lost as dissolved P."
    - Consider adding ", especially in tile-drained areas." at the end of the existing sentence.
- Yellow Comment- Pg 9, Table 1:
  - Brackets, "[]" are confusing. Are data in brackets means or standard devations. If means, which values are utilized in calculation of P reductions (those in brackets, or those above the brackets?
- Green Comment- Pg 10, last par, sentence 3 and preceding:
  - "This approach was used..."

- It is not clear to the reader what "this approach" means. It is apparent that some literature values were not applicable and not used, but the rationale (description) used is not easily understood. Please clarify.

- Green Comment- Pg 11, par 3, sentence 3:
  - "…with a 62 kg P2O5/ha (56 lbs/ac) rate, which is the average annual removal for a corn-soybean rotation…"
    - This value does not appear to be consistent with the average values reported in Table 9 on page 19, which show removal rates around 65 kg/ha (on average) for corn, but much lower – around 40 kg/ha on average – for soybeans. Please double-check and fix (or explain) the apparent discrepancy.

- Yellow Comment- Pg 11, par 3, 2nd-to-last sentence:
  - "A trend line…"
    - Please include the regression plot, trend line, regression equation, R2 value, etc.

- Green Comment - Pg 12, par 1, 3rd-to-last sentence:
  - "…of 65 kg P2O5/ha and 90 kg P2O5/ha,…"
    - Text indicates that these rates are from Sawyer et al., 2002, but this reference is not included in the list and description of references in Appendix A – Literature Reviewed. Please add so the reader can understand the rationale for these rates. Also confirm that these rates are higher than P removal rates for each crop in order to more quickly reach the recommended STP levels.

- Red Comment- Pg 16, par 1, sentence 3:
  - "…tile drainage tends to reduce surface runoff and, thus, erosion."
    - Cite source for this assertion.
    - Tile drainage may reduce sheet and rill erosion, but impacts of tile on sediment delivery to streams is likely very small because much of the sediment is captured by potholes/depressions. Additionally, some literature suggests that tile drainage contributes to the "flashiness" of the stream, which can increased bed and bank erosion.

- Green Comment- Pg 16, par 1, last sentence:
  - "Tile drainage was used for MLRA 103, and…"
    - "Tile Drainage" is not an option in the list of categories in the preceding sentence. Consider "Areas assumed to have tile drainage were classified as Drained Land."

- Green Comment- Pg 18, Table 8:

- Are P2O5 rates for each MLRA annual averages? Please clarify.

Red Comment- Pg 19, par 1:

- Are 6.7, 13.3, and 6.3 actually kg P2O5/kg crop removed (rather than grams, as currently reported)?

Green Comment- Pg 21, par 3, sentence 1:

- "...estimated based on best professional judgment..."
  - State whose judgment was used: ISU Extension, IDALS, collective judgment of the entire Science Assessment Team?

Red Comment- Pg 22, only par:

- "...approximately -$737,161,000/year..."
  - Table 13 reports -%263.5 million. Please correct the discrepancy in the appropriate location(s).
  - Table 132 should be labelled "Table12".

Red Comment- Pg 23, Table 13:

- It appears that data listed for CCa is actually for CCb, and data for CCa is omitted from the table. Please revise.
- Total EAC for RR (-263.5) and IN (70.4) conflict with the text on page 22 (-$737.1) (benefit) and page 24 ($770.4) (cost), respectively.
- P Reduction % (18) reported for BF conflicts with the value reported in the text (29%)

Red Comment- Pg 24, "Potential for Phosphorus..." par:

- "...$770,412,000/year.."
  - Table 13 reports $70.4 million. Please correct in the appropriate location(s).

Red Comment- Pg 29, par 1, last sentence:

- "...$216,265,000/year..."
  - Table 13 reports $1,022.9 million.

Red Comment- Pg 29, par 2:

- CCb is not reported in Table 13, although it appears as data for CCa is actually for CCb.

Red Comment- Pg 30, par 1, last sentence:

- Table 13 reports a reduction of 18%, rather than the 29% reported here in the text. Please revised in the appropriate place(s).

Red Comment- Pg 30, first non-bullet par, last sentence:

- Table 14 should be Table 13.

Section 2.4

- Red Comment - Page 4, "Extended Rotations," last par, sentences 5-6:
  - "Gross income to crop farmers selling these three commodities is expected to decline. And while dairy and beef producers may benefit because of lower-priced alfalfa, beef feedlots, hog, and poultry producers are negatively impacted by higher corn and soybean prices."
    - Why not trust the market to sort this out? Producers are free to adjust their operation to meet changing market demands. Unless hindered by mandates (e.g., biofuels production) or discouraged by competing incentives (e.g., commodity subsidies that favor production of certain crops over others), farmers have the ability to adapt surprisingly quickly and efficiently to changing market conditions. Additionally, Extended Rotations, if widely adopted, would diversify Iowa's ag economy, which, according to free-market principles, is good for producers, consumers, and nutrient reduction in this case.
    - Also dairy and beef producers who utilize land in hay and pasture are less negatively impacted by higher corn and soybean prices.
- Yellow Comment - Page 5, "Possible benefits" bullet list:
  - Why not include a bullet for increasing economic and agricultural diversity as well? The last bullet describes some new opportunities that might arise, but it does not describe the overall benefits of this new-found diversity in Iowa's state economy (and local economies).
- Red Comment - Page 5, "Possible costs" bullet list, bullet 4:
  - "Using controlled drainage to manage the water table at a shallower depth could result in increased surface runoff, which would have implications for soil erosion and transport of other surface runoff contaminants (e.g. phosphorus).
    - This is not necessarily true. While it is possible that runoff would be reduced, this would not necessarily have a direct and equivalent effect on sediment and P transport (i.e., delivery) to streams in flat, depressional landscapes. In areas with extensive depressions and surface intakes, tile water can (and does) exhibit characteristics more similar to runoff, which includes turbidity/sediment, and higher levels of P than "true" subsurface flow.
- Green Comment - Page 5, "Possible costs" bullet list:
  - There is no direct mention of fuel costs, or the sensitivity of the costs of Nutrient Reduction scenarios to fuel price fluctuations. Perhaps that is beyond the scope of this strategy, but it should at least be mentioned.

IDNR Comments on October 8, 2012 Draft of the Iowa Nutrient Reduction Strategy

November 6, 2012

This document is IDNR's comments to the October 8th draft of the Iowa Nutrient Reduction Strategy. The comments are organized to match the flow of the document. The comments are wide ranging including format, flow, context, clarifying questions, suggested revisions, and critical issues. Any comment highlighted in yellow is considered a critical issue that coordination and discussion will be required prior to DNR supporting release of the draft strategy (This does not include comments in Section 2.2 & 2.3 as formatting would not allow the change of color for whatever reason). With limited time provided to comment, this document should be considered an initial comment, not a final comment.

Know that the DNR is not expecting the draft strategy to be perfect for public release. While this comment document is extensive, DNR feels that many of the suggested revisions, comments and questions will make for a more solid, defensible document for the public comment phase and will give the strategy a better chance to be successfully implemented.

Below is a summary list of major issues and a brief description of each:

Problem Statement - From reading this document, one would think that the reasons the State is putting forth the strategy is to address the Gulf Hypoxia problem, to avoid adoption of numeric nutrient criteria (NNC) and environmental requirements/regulations for nonpoint sources. The strategy does not present a compelling argument for why the average Iowan should support nutrient reductions partly because the nutrient problem description does not include localized WQ nutrient impacts in Iowa or potential benefits in the context of local or state water quality. There needs to be an admission that there is a WQ problem. Compromise is needed here. Compromise language can also discuss that fact that point source discharges may have a significant impact on stream water quality during low stream flow conditions. This is contrasted with nonpoint sources that have significant impacts on annual N and P load to Gulf of Mexico during wet weather periods and high stream flow conditions.

Section 3 – Point Source Nutrient Reduction Technology Assessment. A new section 3 is included in these comments to replace the current section 3. The new section 3 reorganizes the PS implementation closer to its original form and restores references.

References. A reference page is needed for Section 1 and Section 3. As it stands only Section 2 lists references cited and only those cited in that section are included.

Critical issues with PS related and other joint policy statements in the ES and Section 1. Details are provided in the document, but issues include cost numbers in ES, NPS Cost Description EAC + initial investment, NNC Poole paragraph, replacement of paragraph 8 in NNC section, Farm Bureau paragraph

citation, INRS Development – retitle, paid for by Iowa Farm families, Petition for federal rules, Existing Agencies – add DNR or focus it on nonpoint, No Appendix A, & Iowa Conservation Progress

Storm water and Septic Systems. Bolstering language to include a discussion regarding scale and other efforts with urban storm water coordinated through IDALS. Need to add discussion to PSDS regarding scale as well.

Restore technical workgroup commitment on nutrient budget by DNR. This was all but removed in this draft. Details in document.

WQS Language Replacement. The WQS was significantly modified from earlier drafts and not acceptable to DNR in its current form. New language is included in this document to replace the language in the current draft.

NPS Strategy Issues. NPS Strategy has incomplete goals, objectives, no milestones or measurable actions, and is unclear on the responsible parties identified. There is no path explained as to how meaningful and measurable reduction in N + P for NPS will be achieved. The draft document, as written, provides little confidence much will be done to reduce N and P loads.

This was discussed extensively at the PS/NPS Leadership Group meeting in Amana on November 5th. Ideas were discussed to improve this area. For each element listed in the document the goal, objectives of that goal, measurable actions, and responsible parties should be identified. For example under Element #1, the goal is to prioritize watersheds as recommended in the Stoner memo. The process and some discussion of objectives are discussed in the element description of what things will be considered in prioritization. It states that the WRCC will do this, but there is no timeline for completion. Without a timeline there is no measure for success/accountability for this element to be achieved. This is true for each element including PS.

As agreed in concept at the November 5th meeting, goals, objectives, milestones/measurable actions, and responsible parties are needed for each element (where possible) for the DNR to be comfortable moving forward. This does not need to be extensive or detailed, but a measureable path forward is needed. Discussion will be needed here.

Use of Scientific Assessment. The document does not discuss the potential use of the nonpoint source practices information. This is arguable most important component of the nonpoint source effort, but the relevance of this information or how it could be used in any meaningful way is not discussed. A section could be added that discusses how this information can be utilized in formulating government policy and USDA programs. The department is committed to helping deploy the assessment moving forward as a part of this strategy. One concept that was discussed was creating a science team of IDALS/DNR/ISU to help establish goals, baselines and recommendations to target BMP practices using the scientific assessment once watersheds were prioritized. Doing this would then set a logical path for accounting, tracking, and monitoring progress.

The strategy should also seize the opportunity to include implementing recommendations from the science assessment. The take home message is that the science document showed that there is no silver bullet to address the NPS nutrients and a combination of practices are needed. The 45% reduction can

be achieved but it will come at a price using a combination of point and nonpoint source reductions. We need to be able to document locations of conservation practices and application rates, measure their effectiveness on the landscape and quantify the nutrient loads and future reductions at different watershed scales.

Establish firm commitment to review & update the strategy. A process and dates needs for strategy review needs to be included and clear.

Public Reporting. Add PS for a combined report in public reporting. Include progress in absolute reductions in in-stream N and P. Should have reporting against outputs, outcomes, measurables, and milestones within the strategy

Specific Comments:

Executive Summary

Format and Flow:

[NOTE: Underlining is used to show suggested changes, not to suggest that text should be underlined unless so noted.]

- Page 1. Several 'paragraphs' resemble more a series of disconnected bullet statements, which makes the section read a little stiff and stilted. Suggest reworking the section to create better paragraph structure and flow. Same comment applies to the "Nonpoint Sources" and "Summary" parts of the Executive Summary (page 2).

- Page 1, paragraph 1, sentence 1. Suggest clarifying the wording to something like: *' ... and reduce nutrient loads to Iowa's waters and the Gulf of Mexico'* instead of just *"reduce nutrients"*.

- Page 1, paragraph 5, sentence 1 could use clarification. Suggest change wording to: *'This is the first time such an integrated approach involving both point sources and nonpoint sources has been attempted to solve a major water quality problem in Iowa'*.

- Page 1, paragraph 8. The readability of the second sentence might be improved by inserting the pronoun "that" after the word "recognizes".

- Page 1, paragraph 9, sentence 1. Suggest change wording to: *'All Iowans contribute to nutrient loads entering Iowa's surface and ground water resources, and all can play a role in reducing these impacts over time'*.

- Page 1, paragraph 10 (Point Sources), sentence 1. Change wording to: *'The nutrient strategy outlines specific steps to achieve significant reductions.....'*. For better flow, move paragraph 11 up to paragraph 10 and inserting immediately after first sentence. Then paragraph 12 (last on page 1) can follow immediately after the following (modified) sentence: *'Among permitted industrial facilities, there are 28 that discharge the greatest amounts of nitrogen and phosphorus to Iowa's waters'*.

- Page 2, "Summary", there is an extra space between the first and second paragraphs.

- Page 2, "Summary". Suggest moving last paragraph to just after first paragraph in this section. It might work to combine it with the second paragraph since they seem related.

- Page 1, Paragraph 1. The phrase "cost effective" should be hyphenated (cost-effective); other instances of this phrase in the document should be changed as well.

- Page 1, Paragraph 11. The second (and last) sentence in the paragraph begins with an indefinite "it". Whatever "it" refers to (portions of the strategy related to point sources or the technology assessment of practices) is unclear.

- Page 2, Paragraph 8. First sentence: as there are separate reduction objectives for N and P, suggest using the plural form of this word at the end of this sentence ("objectives").

- Page 2, Paragraph 12. Last sentence: the adverb clause that begins "as new information, data, and science" needs a plural verb; thus, "is" should be changed to "are".

Substance and Context Considerations

- Page 1, Paragraph 2. Is the statement that the nutrient reduction strategy was solely a response to the 2008 Gulf Hypoxia Action Plan accurate? Seems that other factors, such as law suits and EPA's ongoing push to have states adopt nutrient criteria have some role in Iowa's efforts to prepare the strategy. The second paragraph of page 1 of the Executive Summary states that the strategy was prompted by the 2008 Gulf Hypoxia Action plan, period. This gives—or could give —the impression that local nutrient problems do not exist in Iowa; only the Gulf of Mexico is a nutrient problem and thus is the primary driver behind the reduction strategy. No mention is made of EPA's push to have states adopt numeric nutrient criteria to protect against local water quality problems caused by nutrients.

- Page 1, Paragraph 4. General comment. Several key elements of the Stoner memo are not addressed in this draft strategy while other elements simply echo, verbatim, language right from the memo itself. Plus, how was the Draft Strategy developed over a "two-year period" when the memo wasn't released until March of 2011.

- Page 1, Paragraph 6. No clear steps were outlined or adequately described for prioritizing watersheds or limited resources.

- Page 1, Paragraph 7. Regarding Iowa's "many successes": just what "successes" are being referred to? Be specific on what kind of successes this strategy thinks are worthy of replicating. To be sure, Iowa has experienced localized, small scale water quality improvement in projects with a dedicated watershed management plan and local water quality professionals working with citizens and landowners. Is that what is referred to here? Also include an explanation of "Market-based" approaches here in the Executive Summary as brought up on Page 15, paragraph 5.

- Page 1, Paragraph 8. The technologies that are available to use have demonstrated they can help achieve the reductions needed, as detailed in the science assessment. In fact, there are examples of farmers demonstrating just how viable these technologies are while remaining – or increasing – their economic viability. We should tread carefully here as "we need new technology" is too often used as an excuse for inaction when many of the common sense land management decisions could be incorporated without the need of a government program (i.e. conversion to no-till or ridge-till, use of cover crops, employment of beneficial crop rotations, timely fertilizer application, etc.) and would have huge benefits to those farmers while

improving water quality. Additionally, the Stoner Memo clearly and repeatedly talks about the need for the Strategy to "achieve meaningful and measurable near-term reductions in nitrogen and phosphorus pollution".

- Page 1, Paragraph 10. In the last sentence, change the amount of N & P discharged by the other 28 industrial facilities to "significant" from "greatest".

- Page 1, Paragraph 10, First sentence. Change as follows: "For the first time, permits issued to the 130 facilities will require implementation of technically and economically feasible process changes for nutrient removal ~~evaluation and implementation of process changes, and construction of additional wastewater treatment processes.~~"

- Page 1, Paragraph 11. Change as follows: "The portions of this strategy related to point sources are built on a technology assessment of practices that ~~will be the most effective~~ offer the most "bang for the buck" at reducing loading of nitrogen (N) and phosphorus (P) to Iowa surface waters from Iowa's wastewater treatment plants and major industrial facilities that discharge N and P to Iowa waters".

- Page 1, Paragraph 12. At the beginning of the first sentence, insert the word "discharge" in front of permits.

- Page 2, Paragraph 1. "Accounting for potential load reduction from point sources, nonpoint sources would need to achieve 41% load reduction in nitrate N and 29% load reduction in phosphorus to meet the overall 45% reduction goal." - The reader is left guessing at the numbers in terms of targets relative to PS and NPS. Yes, 29% + 16% = 45% of the unspecified total State export number but what value does this add to the document in terms of understanding the targets as they pertain to NPS & PS sources? The table below (or something like it) is recommended for insertion into the summary.

Nutrient Load Summary Table (tons/year)						
	N	% of total	% of Category (PS, NPS)	P	% of total	% of Category (PS, NPS)
Total State Export	280,000			13,800		
Target State Export	154,000	55%		7,590	55%	
Point Source Est.	21,800	8%		3,500	25%	
Point Source Major POTWs	16,360	6%	75%	2,620	19%	75%
Point Source Industries	1,930	1%	9%	310	2%	9%
Point Source Minor POTWs	3,420	1%	16%	550	4%	16%
Point Source Semi-Publics	110	0%	1%	20	0%	1%
Target Point Source Load	10,800		50%	1,300		37%
Target Point Source Reduction	11,000	4%	50%	2,200	16%	63%
Nonpoint Source Est.	258,200	92%		10,300	75%	
Target Nonpoint Source Load	143,200		55%	6,290		61%
Target Nonpoint Source Reduction	115,000	41%	45%	4,010	29%	39%

- Page 2, Nonpoint Sources. General Comment. This section never explains how we are going to achieve meaningful and measurable reductions in N and P, nor is it found in the document itself.
- Page 2, Paragraph 4 & 5. A similar explanation of the author(s) of the policy piece would be helpful as well.
- Page 2, Paragraph 8. The NPS section here includes costs. Need to either add PS costs or remove NPS costs to maintain consistency and flow. It is recommended to move costs estimates out of the summary to maintain focus on "what's possible" with the strategy.

  If added, then include these sentences: "If implemented in full, it is estimated to have a total present worth cost (includes capital costs and operation & maintenance cost) of approximately $1.5 billion. The annual cost of this approach is approximately $114 million."
- Page 2. Paragraph 8. "One has an annual cost of $756 million and initial investment cost of $3.2 billion..." - The phrasing here is misleading and warrants clarification of what the annual costs as cited consist of. The term "plus" should not be used as the costs expressed ARE NOT ADDITIVE. Per Section 2 of the document, the annual cost (e.g. $756 million) is the EAC or annualized cost which INCLUDES the "initial investment amount" (e.g., $3.2 billion). Reading the document as-is leads one to believe that both the initial expenditures PLUS the EAC costs are required to implement the scenarios. The EAC is an expression of all costs associated with the scenario on an annualized basis as described in Section 2.

- Page 2, Paragraph 8. "Three examples" are mentioned – it should be stated what they are if they are to be discussed here.

- Page 2, Paragraph 9 & 10. This strategy may in fact encourage those elements above, but it does not recommend any nonpoint source strategies that will result in meaningful and measurable nonpoint source reductions in N and P.

- Page 2, Paragraph 11. Recommend changing this sentence as follows: *"The path forward to reducing nutrient impacts on aquatic life, drinking water supplies, and recreational use of Iowa's waters will not be easy, but this strategy is a key step towards improving Iowa's water quality while ensuring the state's continued, ~~reasonable~~ economic growth and prosperity."*

- Page 2, Paragraph 12. This was not the expectation that was laid out originally. Milestones, timelines, and responsible parties were expected to be included throughout the strategy.

Table of Contents

- A section titled *'References Cited'* or similar heading needs to be added after Section 3. Of course, this means a reference section would also need to be prepared to hold the cited references in the strategy document, but this is important.

- The Nutrient Strategy as it is currently organized encompasses Sections 1-3. Suggest changing the title of Subsection 1.4 from *"Nutrient Reduction Strategy"* to something like: *'Nutrient Reduction Strategy Elements'* or *'Elements of the Nutrient Reduction Strategy'*.

- Page numbering makes it difficult to quickly turn to a particular area because each section begins with page #1. Suggest alternative page numbering scheme such as 1-1, 1-2, 2-3,3-5

Specific comments on Section 1 – Policy Considerations and Strategy:

1.1 Introduction

Format and Flow

- Page 2. Paragraph construction mostly consisting of single sentences reads stiff/stilted.

- Page 2, Paragraph 8. This seems to have a subject-verb agreement problem. The adverb clause that begins "as new information, data, and science" needs a plural verb; thus, "is" should be changed to "are". Suggest changing to something like: *"This is a dynamic strategy and science/technology assessment document that will change as new data, information, and scientific discoveries are incorporated in the strategy"*

Substance and Context Considerations

- Page 2. Paragraph 2. If the strategy is going to refer to Iowa's "many successes" and Iowa's "good results" in protecting and improving water quality, the reader deserves a couple of examples of these "many successes" and "good results" where these statements are used. It may be useful to include data or a citation to the actual measured reductions that are alluded to.

- Page 2, paragraph 4, sentence 2. To be fair to the message of the 'Stoner memo' suggest rewording the last part of the sentence to acknowledge the need to continue nutrient criteria work: *'....eight elements that emphasize implementation of existing nutrient reduction practices and technologies for point and nonpoint nutrient sources, <u>while continuing to work toward the development and adoption of appropriate nutrient standards</u>.'*

- Page 2, Paragraph 3. There is no evidence in this document that the nonpoint side of the equation does any of this.

- Page 2, Paragraph 5. There are no proposals, or even recommendations, of targeted practices to reduce nonpoint loads. In fact, on several occasions the text of the Strategy notes that scenarios are not recommendations, only examples. While it is appropriate for specific implementation plans to be locally-driven, it is critical for the Strategy to, at a minimum, outline a process for developing successful scenarios, and milestones for successful implementation and nutrient reduction.

- Page 2, Paragraph 5. Suggest adding the following underlined text to the sentence ".....in combination with targeted practices designed to reduce loads from nonpoint sources <u>as appropriate nutrient water quality standards are developed long-term</u>."

- Page 2, paragraph 6. This may be perceived as overstating success in water quality protection. Suggest rewording to something like: *"Iowa's many positive <u>steps in water quality protection can be replicated and expanded using existing tools</u>, such as targeted, voluntary conservation measures, in conjunction with research, development and demonstration of new approaches"*.

- Page 2, Paragraph 6. This statement regarding Iowa's "many successes" using "tools known to work, such as targeted, voluntary conservation measures" may be perceived as: we (the ag community) are doing a great job of protecting water quality already. The statement can make one wonder why the NPS science assessment was ever performed; just for the sake of appearances? That doesn't seem to be the message, but that's how some might read it. There is a segment of the population that does not buy the assessment to duplicate current efforts – that we need a new approach, not

continuation. Therefore if a case needs to made that things are working – it's wise to offer evidence.

- Page 2, Paragraph 7. Second to last paragraph/sentence seems vague and might benefit from elaboration – e.g., *"Current investments in nutrient management practices and technologies will continue paying dividends, and with implementation, the policies and actions outlined in this strategy will accelerate progress towards reducing nutrient loads to local and Gulf waters".*

- Page 2, Paragraph 8. Does the strategy include an actual commitment/schedule to review and update the strategy or is there just a general belief that it will happen? This commitment should be made clear so the strategy doesn't wither on the vine. Suggest a process for review.

- Page 2, Paragraphs 6, 7, & 8. The three final sentences/paragraphs of the Introduction read more like conclusion statements than introductory ones, and they should probably be moved to the executive summary or a conclusion section to be added after element 8 (page 18). Also is it clear that the strategy sufficiently backs up these claims? How would that be justified currently?

1.2 Background

- Problem statement rework: The examples of nutrient problems in Iowa need to be included to demonstrate the need for nutrient reductions right here in Iowa, and emphasize the water quality benefits that can be realized by Iowans if the strategy is successful.

- Page 3, Paragraph 3, 2nd sentence. Insert the word "negative" between "to" and "impacts".

- Page 3, Paragraph 3. Last sentence "There's concern a lawsuit against EPA or states will result in the same outcome...." Why is this bad? Can this be a good thing? Recommend reworking to briefly describe/discuss the "concerns". Something like: "There is a concern that legal actions could result in inappropriate, very stringent numeric nitrogen and phosphorus water quality standards for the Mississippi River basin that result in discharge permit limits for wastewater treatment facilities that are not technically or economically achievable. This could lead to extensive additional litigation that will delay implementation of nutrient reduction practices."

Numeric Nutrient Criteria Limitations

- Page 3, Paragraph 7, second sentence. "The inability of states to establish...."
  The Poole (2004) reference is problematic. We can't find a copy to verify the statements attributed to it, and it is pretty dated. Replace with the following paragraph:

  'Concern over states "uneven" progress in establishing and implementing numeric nutrient criteria according to the timeframe set by EPA was raised in a 2007 memorandum from Benjamin Grumbles, Assistant Administrator, U.S. EPA, Office of Water. Grumbles called upon

EPA and its partners to "take bold steps" to accelerate the pace. In its response letter (July 18, 2007), the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) point to a number of factors confounding the nutrient criteria development process including variability of nutrient responses in aquatic ecosystems, and the lack of strong linkages and clear thresholds between nutrient causal and response variables.'

- Page 3, Paragraph 7. It may be useful to reference the situation in Florida here.

- Page 4, Paragraph 2 & 4. Generally, you can tell by the length of this background section, it is pretty obvious the strategy is strongly against numeric nutrient criteria. It might be good to consolidate it to the most relevant points and eliminate the extra fluff. Some of the paragraphs in the section are not related to the topic and should be moved or incorporated in other sections. For example, Paragraph 2 could be moved to Page 3, prior to section on nutrient criteria.

- Page 4, Paragraph 2 specifics - In discussing PS vs. NPS contributions of N & P to Iowa streams, the strategy states that only 5% of all NPS nitrogen outputs and 4% of all phosphorus sources are lost to streams and rivers. Is this true? This would seemingly indicate that there are no NPS nutrient issues. If point sources contribute 8% and 20% of the nitrogen and phosphorus respectively that means nonpoint sources contribute 92% and 80% but these percentages aren't mentioned except by the statement that "nonpoint sources account for the rest." Also, the statement about "nonpoint source outputs" of 5% and 4% isn't referring to the percentage contribution to total nutrient loads but to the percentage of the total amounts of nutrients put on the land that don't stay there but there is no context for these percentage. How many pounds of nitrogen and phosphorus do 5% and 4% represent?

  Without going into the details of the 2004 nutrient budget (input vs. output vs. stream load & an apparent typo) it may be simpler to say that both N and P stream loads are estimated to be to be approximately 5% of inputs. These estimates are for the "relatively dry 2000 – 2002 period". The budget also states that at least for N the "percentage is likely higher during more typical or wetter-than-average climatic conditions." Is this relevant for the strategy? Are the 5% loss rates good values compared to losses that might be expected from a baseline or best-practices standpoint?

- Page 4, Paragraph 1. Last sentence needs clarification. Suggest rewording to something like: "Nonpoint source stakeholders do not have this requirement, but instead work to achieve water quality standards through use of voluntary state and federal conservation programs".

- Page 4, Paragraph 7. "Nonpoint sources face another set of equally challenging technological and financial limitations" – What are they? There are 5 paragraphs on point sources to this effect.

- Page 4, Paragraph 7. Change this sentence to add the following: *"At that point, any further reduction required by a TMDL would need to be accomplished through voluntary controls placed on nonpoint sources or possibly even more stringent limits on point sources. Nonpoint sources face another set of equally challenging technological and financial limitations."*

- **Page 5, General Comment: Nutrient problems are not due to agricultural fertilizers:** The strategy makes the following multi-point argument that agricultural fertilizers are not a primary cause of nutrient problems:

  Paragraph 1: it's the weather;

  Paragraph 2: it's the historic changes in land use and hydrology due to conversion of prairie to cropland;

  Paragraph 3: reducing fertilizer inputs will ruin the soil;

  Paragraphs 4 & 5: Iowa State University is wrong about WQ impacts of over-application of nitrogen fertilizer;

  Paragraph 6: We can deal with nutrient problems off-site;

  Paragraph 8: stream channel scouring and streambank erosion [which are largely due to changes in land use and hydrology due to conversion of prairie to cropland] contribute a high percentage of phosphorus.

  This argument (i.e., arguing that nutrient problems are not due to agricultural fertilizers) seems an odd approach for a nutrient reduction strategy. Is this stating that Jim Baker and other ag-engineers at ISU wasted their time trying to remedy the non problem of loss of nitrogen fertilizer? May need to consider that perception as currently worded.

- Page 5, Paragraph 1, first complete sentence at top of page 5 (last sentence of section on Numeric Nutrient Criteria Limitations). The sentence seems to say that Iowa should continue developing a statistically based stressor-response relationship approach to nutrient standards, but this type of approach is not appropriate for addressing nonpoint sources of nutrients. Following this sentence, however, no explanation is offered indicating what the best standards approach would be for nonpoint.

- Page 4/5, Paragraph 8. The last sentence of this paragraph states that, in terms of numeric nutrient criteria, and while Iowa should continue to explore the stressor/response, "a different approach is warranted to address nonpoint sources in Iowa." What, exactly, does that statement mean? Does it mean that any nutrient stressor/response-based criteria should be/will be only applicable to point sources? This statement should not be in the nutrient reduction strategy. Substitute the following paragraph for the final paragraph page 4 / first paragraph page 5:

"Because of the lack of confidence in EPA's (2000) statistically-derived criteria recommendations and the substantial financial costs associated with implementing nutrient removal technologies, legitimate concerns about the value of numeric nutrient criteria have been raised. Other criteria derivation approaches such as nutrient stressor-response analysis and reference condition modeling are better alternatives that Iowa will continue pursuing as a basis to establish appropriate nutrient standards for implementation within an adaptive watershed management framework".

Challenges of Best Management Practice Adoption to Address Nonpoint Sources

- General comment on this subsection: This section generally seems to take a defensive posture designed to deflect criticism of existing farming practices. The text under this heading does not address the challenges to practice adoption. It makes no mention of the social and cultural barriers that are obstacles to broad-scale adoption. Some of the points seem unnecessary and overly defensive. For example, I don't think anyone will be recommending that farmers apply zero nitrogen or even lower nitrogen rates than ISU recommends, which would result in "mining" the soil for nutrients. With some work, I think some of the main messages about weather and other 'natural' factors that are outside of the producers control can be made without coming off defensive or even a little condescending to the reader. Furthermore, there is really no need to go through pseudo-science when there is an 80-page science assessment. Recommend reworking paragraphs 1 – 5.

- Page 5, Paragraph 1 - under heading begins with "The science from ...." - Science is a systematic process of discovery not a specific finding or set of findings. As such, "science" does not say or indicate anything. Citations are appropriate here. Suggest rewording to: "*Scientific findings reported at the Iowa Governor's Water Summit (2003).....*".

- Page 5, Paragraph 1 - under heading that begins with "The science from...." –cont.
  A questionable assertion that science points to variability in weather as the "dominate" (misspelled? Probably meant 'dominant'?) short and long term influence for nutrients. Specific citations are needed to back up this statement. I think most people would accept that weather is a dominant influence in the short-term (e.g., less than a year to several years). However, that claim is not universally accepted for long-term nutrient trends or patterns. In fact, the next paragraph contradicts this claim by stating that nutrient impairment problems are caused by historic changes in land use and hydrology associated with agricultural development. A USGS study from Iowa (Schnoebelen et al., 1999) suggested that increased nitrate loads in some Iowa rivers between 1970-1995 might have been caused, not by the weather, but rather by increased nitrogen fertilizer use and nitrification of ammonia at wastewater treatment plants. Also, suggest inserting the words "amounts of" between "variable" and "nutrient" in the last sentence.

- Page 5, Paragraph 1. First, the paragraph above is a word for word copy of a comment letter from Iowa Farm Bureau regarding the Raccoon River Master Plan. Farm Bureau's comments were submitted on June 9, 2011 and are a part of a public document available to the public online. Please provide a citation here if this language is to remain in its current form. Second the

weather can account for differences in year to year changes (this year's drought is an example of this variable impact), but there are significant issues that need to be dealt with here and using the weather in this manner will be perceived as disingenuous. Weather patterns do add uncertainty in tracking water quality trends after implementation of best management practices, but weather patterns do not, over a period of years, override the impacts of tillage, altered hydrology, and on-farm nutrient balance.

- Page 5, Paragraph 2. The statement that nutrient impairment problems are not mainly due to mismanagement of fertilizers is very important; thus, a citation for the science supporting this statement is needed here. This paragraph may come off as too dismissive of a legitimate issue – recommend revision or removal. Also, the first sentence of this paragraph comes from Farm Bureau's June 9, 2011 comment letter for citation purposes.

- Page 5, Paragraph 3. Second sentence: this sentence may benefit from inserting the word "fertilizer" between "nitrogen" and "rates".

- Page 5, Paragraph 4. The first sentence suggests that neither voluntary nor regulatory approaches will fail in our attempts to address nutrient problems. Is that what the strategy intends to say? This would directly contradict the results of the scientific assessment too. Also, there doesn't seem to be a connection between the first sentence in the paragraph and the following two sentences.

  Starting with "For example" this text is word for word from Farm Bureau's comment letter, as described above. Please cite the source. The weather needs to be handled carefully. Also, the example nitrate concentrations used (22-45) is a huge range and more details on this data would be useful to see the frequency of results. It would seem that this example is an extreme case and not the typical experience on the landscape. This paragraph is misleading to the reader.

  A simple first step to a "Strategy" would be to require nitrogen application at this optimal rate since it protects the economic best interests of the farmer. This strategy could potentially qualify as "meaningful and measurable" as defined in the Stoner Memo and would provide the opportunity to engage Ag Retailers and CCA's in the strategy.

- Page 5, Paragraph 5. Regarding the statement "unfortunately, that isn't the way it works." What is the point of this digression into nitrogen dynamics in the soil? Is this paragraph intended to discount what Iowa State University recommends in the preceding paragraph? Suggest change to: "Unfortunately, not all applied nitrogen stays in the ammonium form."

- Page 5, Paragraph 5. The text is word for word from Farm Bureau's 6/9/11 comment letter, as described above. Please cite Farm Bureau as the source. As for the statement itself, this describes a problem of the dual-crop landscape, as a thick, deep, fibrous root system – similar to that of native prairie grasses and forbs – would utilize nitrogen in a way that corn and soybeans cannot. This appears to be the perfect chance to discuss incorporation of native plantings in strategic areas, citing research findings by Iowa State University Cooperative Extension Service (Zhou et al., 2010; also: http://www.nrem.iastate.edu/research/STRIPs/research/index.php?page=Ecohydrological).

- Page 5, Paragraph 6. Suggest rephrasing the first sentence as "Improvement in in-field nitrogen management is needed in most cases..." as there an opportunity for significant improvement throughout the state.

- Page 5, Paragraph 8 - Starts with "Ongoing research...."
  The paragraph, as written, seems to try to "shift blame" from agricultural practices to "natural conditions" when the current conditions are not natural and are a direct result of the agricultural landscape. A more objective perspective may help illuminate issues that can be addressed. Also, is this completed research? If so, are there citation(s)? If it is in-progress, it probably should not be stated as fact in the strategy. As a compromise, recognizing this important work is being done and a willingness to acknowledge it, perhaps the strategy could reference a personal communication from the principal investigator(s) and get a direct statement from them.

    - Also suggest changing "a previously unrecognized higher contribution" to "substantially" in this paragraph.

- Page 6, Paragraphs 1 & 2 - "Iowa and many...." And, "There is debate...".
  These paragraphs are probably unnecessary and don't belong in the section. Most, if not all of the discussion in these paragraphs was covered previously in the section titled, "Numeric Nutrient Criteria Limitations". Recommend deleting these paragraphs and reviewing the information to see if any of it should be incorporated in the nutrient criteria section. Minor correction - suggest changing "drinking water supplies" to "drinking water supply" in the last sentence of paragraph 1; i.e., this is more consistent with the other two designated uses cited ("fishing and swimming").

Mississippi River/Gulf of Mexico Watershed Nutrient Task Force

- Page 6, Paragraph 4. 1st sentence. Why is it necessary to "document past success" in the context of this strategy?

- This whole section could move to the executive summary.

Iowa Nutrient Reduction Strategy Development

- General point: The title should reflect that this only discusses development of the nonpoint side of the nutrient reduction strategy or the section should be restructured to include the IDALS and IDNR coordination and involvement of impacted stakeholders.

- Page 6, Paragraph 8. The first sentence in this paragraph could benefit by moving the clause "with the support of EPA Region 7" to the front of the sentence. Also, should the Sec. of Agriculture be changed to "IDALS" – seems to make more sense.

- Page 6, Paragraph 9, first sentence. "The initial step...".
  Suggest clarification that sentence is referring to scientific assessment of practices for reducing nutrients *from agricultural nonpoint sources*. Suggest referring to "nutrient delivery" rather than just "nutrients". Also suggest replacing "environmental goals" with "nonpoint source nutrient reductions".

- Page 6. Paragraph 9, last sentence. Is it important to know where the money for development of the strategy came from and can this claim be verified? If so, there should be a section of the document that lists all the contributors to the strategy and all of the funding sources utilized in its development. The latter phrasing seems unnecessarily emotion-laden and perhaps inaccurate. After all, aren't farms small businesses in the same way other small business in Iowa are family-owned? Also, many of Iowa's farms are incorporated or controlled by out-of-state landowners? At a minimum, to be fair it should indicate that the costs of studies and implementation of municipal point source nutrient removal technologies will be paid for by Iowa families through sewage service fees.

- Page 7, Paragraph 1. The strategy should have a page containing all the acronyms used in it. This paragraph provides a good example of why this would be useful.

- Page 7, Paragraphs 2 & 3. Lots of jargon in these paragraphs makes it hard to read and understand. For example, there is talk about "practices" and "treatment" but the strategy never defines what a practice or a treatment is. It uses the short-hand term "adoption rate" but many readers may not understand this refers to an estimate of how frequently a given practice might be used. Recommend replacing "coefficient" with "estimate" also.

- Page 7. Paragraph 3. The example highlighted in the sentence starting with "For instance" doesn't appear to be an economic example as the previous seems to introduce. Consider using a different example or intro sentence.

- Page 7, Paragraph 3. Insert this paragraph between paragraphs 3 & 4. This will help set the tone for utilizing the scientific assessment and demonstrate that the science assessment is not just an interesting thought exercise; it can be extremely useful in developing watershed plans.

  "The science assessment is particularly useful in demonstrating the relative effectiveness of various practices in achieving N and P reductions. For example, ranking the 15 nitrate-N reduction practices suggests that cover crops (28% reduction), wetlands (22%), bioreactors (18%) and perennial crops (18%) offer the greatest potential for N reductions. In contrast, a commonly highlighted practice such as moving fall fertilizer applications to spring only resulted

in a nitrate-N reduction of 0.1%. However, the science assessment goes beyond simply listing practice effectiveness by including the number of acres that a practice can impact and estimating the cost of N reduction per pound. So, while perennial crops are associated with higher N reductions, the practice is also the most expensive practice ($21.46 per pound of N reduced). Hence, the science assessment can be used by the NPS community to identify appropriate N and P practices that align with specific watershed goals in terms of nutrient reductions, area impacted by a practice and potential practice cost. Details provided in the science assessment can form the basis for developing specific nutrient reduction plans in watersheds that achieve the necessary 41% and 29% reductions in N and P".

- Page 7, Paragraph 7. "Three examples" are mentioned – it should be stated what they are if they are to be discussed here. Also, the ISU/IDALS-led science assessment is described on page 7 as the final item in Section 1.2 (Background). The way the costs of the three science assessment scenarios for NPS nutrient reduction are presented is a concern (i.e., annual costs of 10s of millions to billions of dollars; initial investments of billions of dollars). It is my understanding that there are less frightening cost estimates of these scenarios when presented on a per-acre basis. The inclusion of only the millions/billions estimate seems like a scare tactic designed to undercut and dismiss the recommendations of the science assessment.

- Page 7, Paragraph 8. This paragraph could be perceived to imply that nothing can be done until more research is performed which is not the message of the strategy. Suggest rephrasing to make sure that it clear.

1.3 Regulatory and Administrative Framework

General comment: Suggest the title to be revised to "Regulatory and Administrative Framework for Non Point Sources" as there is no mention of any of the point source laws and administrative rule structure in this section.

Recent EPA Guidance to States

- Page 8, Paragraph 3. "This approach....." – recommend deleting paragraph – very defensive.

- Page 8, Paragraph 3. Consider adding the next sentence of the quote. "Nonetheless, EPA went on to state that they have established a framework of 8 key elements "that state programs should incorporate to maximize progress."

Petition for Federal Rules Denied

- Page 8. General Comment. Petition for Federal Rules Denied - What is the relevance of this section to the strategy? This will quickly become out of date. Recommend deletion. If not deleted there are a series of comments from DNR that we ask be considered.

Existing Agencies – Roles and Responsibilities

- General Point: Recommend adding a section that describes IDNR responsibilities: develop WQS, direct WQ monitoring programs, direct NPDES, etc.
- Page 9, Paragraph 6. Suggest moving paragraph 9 to be #1 under discussion of the Surface Water Protection and Flood Mitigation Act.
- Page 9, Paragraph 6. No Appendix A is in the strategy
- Page 9, first paragraph below heading, second sentence. Suggest modifying sentence to read *"The WRCC is represented by 19 state and federal agencies"*.
- Page 9, Paragraphs 5 -8. Regarding descriptions of "existing agencies-roles and responsibilities": My first reaction to these two-plus pages was that this was extraneous information that didn't seem connected to the previous discussion. Then I realized that all of this verbiage was placed in the strategy in response to the Stoner memo's call to "build on existing efforts". Again, this all seems like an attempt to argue away the need for NNC.

Conservation and Water Quality Funding

- Page 9, first sentence under above heading. Suggest modifying sentence to read *"Soil and water* conservation funding".

Federal Farm Bill Contributions

- Need to add a section describing funding and activities associated with CWA/319 program for sure, possibly also SRF?

Federal Farm Bill Contributions

- Page 10. Paragraph 1. How is "help America promote agricultural production and biotechnology exports as America works to increase food security" related to nutrient reductions or this strategy?
- Page 10, Paragraph 2. "water soil"? Should this just read soil?
- Page 10, Paragraph 2. No link is listed. Not everyone will be reading this electronically.
- Page 10, Paragraph 2. There is a subject/verb disagreement in the first sentence: "most. . .funding. . .comes (not "come").

- Page 10, Paragraph 3. What are the CRP figures are for 2011 and 2012 given the super-high commodity prices? This topic should be treaded carefully.

- Page 10, Paragraph 3. 1.8 million to 1 million is reduced. Is that the point we're trying to make?

- Page 10, Paragraph 4. Citation needed. This truly is a huge range. A better stat may be an annual average. Additionally, please explain the type of funds we are talking about and what kind of cost-share does the farmer pay. This may help better paint the picture the sentence seems to be aiming for.

Iowa Conservation Progress

General comment: If the strategy is to provide a forum for touting past successes and money's allocated and spent on behalf of nonpoint nutrient reduction perhaps it should do the same for point source success in removing ammonia and the tax dollars, loans and grants that contributed to those successes. If the strategy is meant to achieve future nutrient reductions then this entire section is seemingly irrelevant. Recommend removal. If not, then DNR has several comments for consideration.

- Suggest adding a statistics for:

  Reduction of N application per bushel of corn produced
  Reduction of P application per bushel of corn produced
  Reduction of P application per bushel of soybeans produced

1.4 Nutrient Reduction Strategy

- General comment: Generally speaking, it is hard to find the specific actions that will be taken within the eight individual elements. Suggest one of two solutions to this. Either use a common format (e.g., tabular) under each individual element that identifies the action steps, the parties responsible for taking action, and milestones/dates for tracking progress. Or, alternatively, one master table could be prepared that combines all the action steps, responsible parties, and milestones under the various strategy elements.

- There is not much knowledge about the Water Resources Coordinating Committee (WRCC), but this group certainly looms large in the NPS-side of the strategy (see page 17 of the Policy Considerations document). Who is on this committee? What is their commitment to water quality and water resources? How susceptible is the WRCC to outside influence from special interest groups? The strategy seems to be placing the WRCC in charge of NPS assessment and tracking progress in meeting nutrient reduction goals. Who, if anyone, has oversight on the WRCC? Is this appropriate (i.e., having a non-governmental or quasi-governmental group in charge of NPS in Iowa)? Is the law clear on this?

- Page 12, Paragraph 2, first sentence. I suggest modifying the sentence to read: *"This strategy follows the eight-element framework provided by...."*.

1. Prioritization of Watersheds

General Comment: This section seems to only echo what is in the Stoner Memo with no real strategy or approach provided. The focus of this entire discussion is on nonpoint sources but the Stoner Memo says the states should prioritize based on both point and nonpoint. The WRCC has had a similar charge since 2008, is there any progress that can be cited or discussed? The DNR delivered HUC-8 assessments of nutrient loadings in April of 2009, has there been any action taken by the WRCC? There needs to be more detail and recognition of existing and future efforts to address N and P.

- Page 12, Paragraph 4 & 5. The Water Quality Planning Task Force report was issued in November of 2007, not 2006.

  This paragraph is vague and leaves the reader wondering how prioritization will be performed, what data will be used, etc. These questions seem like they should be discussed or answered in this document: Will current impairments be considered? What about outstanding water resources? What objective metrics could/should/will be utilized to determine high vs. low priorities? What water quality data is available? What about stakeholder and landowner interest? What about the likelihood of success from a technical &/or sociological &/or political perspective?

  The DNR has existing information that could be used to help answer this question, such as Nitrate TMDLs for the Cedar, Raccoon, and Des Moines Rivers, which all contain numeric load reduction targets and have identified critical HUC-12 or HUC-8 subwatersheds where efforts could be focused and prioritized to achieve meaningful and measurable results in reducing nitrate loads to Iowa's drinking water systems. Additionally, we already have a process in place that deals with P issues through lake TMDLs and the actions and activities of the DNR's nonpoint source program. That is a great place to start.

  How and when will the WRCC accomplish this responsibility? Need to outline milestones.

- Page 12, Footnote. Suggest making sure that, as the footnote claims, the 8-digit HUC is the largest watershed scale within the Hydrologic Unit Code framework. The "hydrologic unit map" (USGS, 1976) also shows a two-digit HUC called the "region" (e.g, Missouri basin vs. Upper Mississippi basin), a four-digit HUC called the "subregion (e.g, southern Iowa river basins;

western Iowa river basins), and a six-digit HUC. There may be a need to revise this footnote accordingly.

2. Determine Watershed Goals

General Comment: It seems the indicators should already be in this element. It is possible that existing nutrient-based portfolio of TMDLs could be used to guide goal setting because they all have set load reduction targets to achieve the water quality goal in question. Also there are no numeric goals even though that is a condition of the Stoner Memo (especially as it pertains at the HUC-12 scale).

- Page 12, Paragraph 6. Regarding "determining watershed goals", is the WRCC really going to *develop indicators that enable Iowa watershed stakeholders to establish baselines and report water nutrient reduction goal progress*? How does the WRCC setting watershed goals mesh with the science assessment and a technology-based approach to nutrient reduction?

- Page 12 – Determine watershed goals – This should not be overlooked. If we cannot set good goals, we will not have a way to measure success. If this were truly a strategy, it would have included goals. Goals should be numeric. Mutually agreed-to indicators – by who?; "examples are soil and water indicators" –conc.? Load? Categories may work better here. Water QUALITY indicators – this is about hypoxia and local WQ issues.

- How will goals be met? Who is responsible? Who will pay for it?

- How and when will the WRCC accomplish this responsibility? Need to outline milestones.

3. Ensure Effectiveness of Point Source Permits

- Page 12, Intro statement. Change to "Reduction in nitrogen and phosphorus discharges from major wastewater treatment facilities will be accomplished via the National Pollutant Discharge Elimination System (NPDES) permit process."
- Page 13, Paragraph 1. "The primary mechanism IDNR will use in assessing "reasonableness"" – the same standard can be applied to NPS.

- Page 13, Paragraph 4. Replace first sentence with ""NPDES permit renewals for major treatment facilities will include a requirement for evaluating the feasibility for BNR and to develop a schedule for BNR installation."

- Page 13, Paragraph 6. Change the "levels currently discharged" to "*amounts* currently discharged".

- Page 13, Paragraph 7. "If successful...." – not 45%, where are the other guarantees in the strategy for NPS?

- Page 13, Paragraph 7. Replace "amounts of nitrogen" at the end of the last sentence with "nutrient loads".

- Page 13, Paragraph 7. Add (1) the phrase "discharged to streams and rivers" and (2) a period at the end of the last sentence in this paragraph.
- Add the "Minor POTWs" section on page 16 and place after Paragraph 7 on Page 13.
- Insert this sentence after Paragraph 7. "This technology-based approach also benefits point sources by 1) providing flexibility for implementation considering cost and permit structure, 2) regulatory certainty, and 3) limits that can be met by technology available today."

Animal Feeding Operations

- Page 13, Paragraph 9. Insert "livestock" between the words "All" and "farms" in the first sentence.

Credit Trading

- Page 14 – Water Quality Trading – the chances for a trading program are very slim considering legal issues and current requirements. We can leave it in there, but we should be careful not to offer false hope as well. Change the word "will" last sentence in paragraph 2 to "may".

4. Agricultural Areas

- Page 14. General Comment. So who or what organization will do all of this developing of a conservation program infrastructure, coordination and partnering and under what authorities. It's easy to write this on a piece of paper quite another to put it all into practice and I don't see the level of detail on implementation on the nonpoint side that I see on the point source side. (Ag Areas – general comment).

- Page 14, Paragraph 4. Sentence starting with "Accounting....". Suggest providing perspective to this statement, something like: "Nonpoint sources contribute an estimated 92% of the total annual nitrogen load and 80% of the total phosphorus load. If the point sources reduce the total point source nitrogen load by 50% and total point source phosphorus load by 80%, then the

total nonpoint source nitrogen load must be reduced by 44.6% and total nonpoint source phosphorus load must be reduced by 36.2% to meet the overall 45% reduction goal."

Setting Priorities

- Suggest a paragraph be added that defines WRCC responsibilities for setting priorities and the concept of targeting expenditures for highest benefit projects:

  "WRCC will assist with identifying highest priority watersheds. WRCC will direct any government funding to highest priority watersheds and projects with the greatest benefit to cost ratios for economically efficient allocation of any public resources."

- Page 14, Paragraph 4. The strategy refers in several places to percentage reductions in N and P loads but I don't find any reference to the baseline that will be used to assess whether these reductions are achieved or not. Seems that someone needs to establish what the existing loads are and the year of the estimates to know how much a 45%, 41% or 4% reduction amounts to.

- Page 14, Paragraph 5. This section needs an introductory sentence. The paragraph contains a series of action statements without anything linking them together.

- Page 14, Paragraph 5. None of the three sentence fragments in this paragraph is a complete sentence.

- Page 14, Paragraph 5. "Develop a conservation program infrastructure" Elaborate on what this is; this section does not seem to represent a change in anything. Opportunity here: "local stakeholders" could be the IDALS/DNR/ISU science team, need infrastructure for driving this forward (1 – Funding, 2 – Science Team, 3 –Good ground game)

- Page 14, Paragraph 7. At some level this is already being done, yet in many cases, especially where N is the problem, no one seems to be able to get locals to embrace this strategy. Therefore, what will be done differently in the future to overcome this social/cultural barrier? That is the key question that should be answered by this strategy in this area.

Research and Technology

General Comment: This section does not say very much; recommend deleting or retooling. More research, while good in principle, will not achieve near-term nutrient reductions. A focus on current technologies and knowledge that can make a significant impact in nutrient levels. Implementation of technologies currently shown to be viable for soil and water quality and economical feasible can go a long way. Adoption of no-till, cover crops, and other practices would help reduce input costs and produce a lot of benefits on the landscape.

- Page 14, Paragraph 7. [Research and Technology:] The second sentence is not a complete sentence.

- Page 15, Paragraph 1. There is no need for a comma between "Gulf of Mexico" and "which" in the first sentence.

Strengthen Outreach, Education, Collaboration

- General Comment: Lots of vague, unsupported ideas – maybe will come in later strategy updates.

- Page 15, Paragraph 3. Good, but too general. The last sentence, please explain who would be accountable for what, and why would producers pay consulting services from a CCA to help them reduce nutrient loads?

- Page 15, Paragraph 3. The last two sentence fragments in this paragraph are not complete sentences. Perhaps this paragraph should be bulleted.

- Page 15, Paragraph 4. There is a subject/verb disagreement in the last sentence "costs and risks" are [not "is"] "critical needs".

- Page 15, Paragraph 5. This statement is vague. The agricultural market is highly influenced by policy and the government's role. All indications are that the public sector's funding will be reduced into the future. What does this mean and look like?

- Page 15, Paragraph 6. The last sentence in this paragraph is a fragment and not complete.

- Page 15, Paragraph 6. Please expand on the how this will be accomplished. What are the measurable milestones and/or goals.

Increased Public Awareness and Recognition

- Page 15, Paragraph 7. – Increased Public Awareness and Recognition – development of a watershed or farmer recognition program – this is the first concrete action. More specificity would be useful to understand how this would be effective.

- Page 15, Paragraph 8. Paragraph sounds like political campaign material. Not sure if a more general description might be appropriate for this strategy.

- Page 15, Paragraph 9. Since this idea is 5 years old, what has changed that will allow the state to find the funds needed to develop and implement this WQPTF recommendation. This paragraph does not seem to be a commitment to do anything more than "look into it." Regarding the rekindling of the conservation ethic in Iowans it might be useful to address head on the perception of a "profit" ethic due super-high commodity prices.

Funding

General comment: This is very weak: annual costs are $77 million and current funding is only $24 million. Also, The pace should be based on existing available resources if the strategy contained more detail (tangible steps and actions proposed). Additionally, qualifiers can be added to the text to indicate that progress may be impeded or accelerated depending on availability of future funding.

- Page 16, Paragraph 1. There is a subject/verb disagreement in the third sentence: "A variety" is [not "are"] available.

5. Storm Water, Septic System, Minor POTWs

Storm Water

Replace current storm water section with revised version below:

"No specific nutrient reductions have been targeted for municipal or industrial storm water discharges. Due to the intermittent nature of such discharges and their relatively small contribution to the statewide nutrient load this document does not address specific storm water reduction targets. It is anticipated that implementation of municipal separate storm sewer system (MS4) permits, industrial storm water permits will result in some nutrient reduction. While statewide the contribution is small it may be more significant at smaller watershed scales and should factor in to any watershed planning effort.

An emphasis will continue to be placed on encouraging low impact development and utilization of green infrastructure for new growth and re-development projects throughout Iowa. The focus will continue to be on infiltration of the water quality volume – or the runoff from up to 1.25 inches of rainfall. While there is a trend toward more large storms, it is likely that the large majority of annual precipitation will continue to occur as frequent, small rainfall events. (Historically, about 80% of rainfall has been 0.5 inch/24 hour events or smaller and 90% of rainfall events have been less than 1 inch/24 hours).

By managing the water quality volume, reductions of 80 to 85% of annual runoff volumes could be achieved. By focusing on reducing runoff volumes we could significantly reduce loading of nutrients and other pollutants common in storm water flows (sediment, hydrocarbons, heavy metals, bacteria, floatable litter, thermal pollution, etc). Flashiness of flows in urban streams would also be significantly reduced, which would reduce stream corridor erosion and address the largest contributor to sediment loading".

Further targeting of activities designed to reduce storm water nutrient loads will come through development and implementation of stream and lake TMDLs".

Private Sewage Disposal Systems

- Page 16, Paragraph 3. There is a subject/verb disagreement in the third sentence. "Much of Iowa's efforts" consists [not "consist"]. Replacing "Much" with "Most" might be a good idea.

- Page 16 – Storm water/PSDS – add discussion regarding scale; could be important in smaller watersheds.

Minor POTWs

- Page 16, Paragraph 4. In the third sentence, there is no need for the comma between "technologies" and "which".

Funding

- It would be useful to mention the new CWSRF sponsored project initiative here.

6. Accountability and Verification Measures

- Page 17: Report-wise, this page is one of the choppier in the policy document; looks like a bunch of bulleted items from several documents that were crammed together. Is there a reason for the bolded type regarding the WRCC (mid-page)?

Regarding Point Sources

- Restore the commitment to convene a technical workgroup to define the process for providing a regular nutrient load estimate to be placed before the paragraph that starts as "regarding point sources" as follows:

  "The IDNR will convene a technical workgroup beginning in 2013 to define the process for providing a regular nutrient load estimate (i.e. nutrient budget). This will include specifying the most appropriate mathematical model, the acceptability of the data, and a process for making future adjustments based on the latest information and advancements in science and technology".

  This is also an opportunity to have this be a joint workgroup with IDALS, if IDALS is interested.

Regarding Non-Point Sources

- Page 17, Paragraph 2. The section on "Regarding nonpoint sources" is composed of sentence fragments.

- Page 17, Paragraph 2. Who will be responsible for these NPS frameworks? What do these look like? How will they inform the strategy? What will they tell us? Can this be effectively implemented? Is the state empowered to make this happen? Is ISU CALS committed to this?

- Page 17, Paragraph 5. Public/private reporting system – When? How? Process?

7. Public Reporting

- General Comment: Seems like this is opportunity to have a combined report on the nutrient strategy that includes point source progress.
- Page 17, Intro Sentence. Insert "non point source" between the words "modeled" and "load"
- Page 17, Subpart a. Needs mention of "biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds." (see Stoner Memo element #7) Should have reporting of progress in absolute reductions in in-stream N and P. Should have reporting against outputs, outcomes, measurables, milestones within the strategy.
- Page 18, Paragraph 1 (top). The word "publically" is misspelled; should be "publicly".

8. Develop Work Plan and Schedule for Numeric Criteria Development

Page 18. Replace "8. Develop Work Plan and Schedule for Numeric Criteria Development" with the revised version highlighted below:

8. Develop Work Plan and Schedule for Numeric Criteria Development
This strategy emphasizes implementation of technology-based nutrient reductions in the near-term, with the understanding that numeric nutrient criteria will remain a longer-term goal.

While it is critical that immediate progress is made in reducing Iowa's nutrient contributions to the Gulf of Mexico, these efforts will not eliminate the need to adopt numeric nutrient criteria for the protection of Iowa's water resources. The IDNR is the designated agency with responsibility to establish and periodically update Iowa's water quality standards. Under the Federal Clean Water Act (CWA), the U.S. EPA also has the authority to promulgate water quality standards for Iowa when it is necessary. In the last five years IDNR has made significant progress toward developing nutrient criteria for lakes and streams.

Lakes:

In 2011, the IDNR developed a water quality rule proposal including nutrient criteria designed to protect "swimming" uses in a specific set of recreational lakes. The proposal has been tabled to consider research being conducted by Iowa State University that will assist in defining appropriate nutrient criteria for protection of lake aquatic communities. The focus of this work is development of biological assemblage indicators (e.g., algae, invertebrates, and fish) that quantify the biological health of Iowa's lake ecosystems. Lake biological assemblage indicators will be calibrated against several measures of lake condition, including nutrient status, and will provide an objective basis for determining whether or not a lake is supporting aquatic life use goals under the Clean Water Act. ISU researchers have completed the field work part of the project and the final report is scheduled to be completed in December, 2012. After receiving the final report, IDNR will review the information and work products

and determine how best to utilize them in the nutrient strategy and for nutrient standards development.

Rivers and Streams;

In 2010, the IDNR convened a technical advisory committee (TAC) to assist with development of nutrient criteria for the protection of stream aquatic life. The TAC is examining many technical issues concerning nutrients and their effects in streams and will develop criteria recommendations that represent the best available scientific information. The recommendations are expected to be completed in 2013, after which the IDNR will determine their appropriate use in the nutrient strategy and for development of water quality standards.

For the reasons described in Section 1.2, IDNR is considering a site-specific, nutrient stressor-response approach for stream nutrient standards. The approach would involve the application of nutrient response indicator criteria (e.g., dissolved oxygen, chlorophyll A) as a means to establish appropriate site-specific numeric nutrient criteria, which together would form the basis for identifying nutrient-related impairments of beneficial water uses.

Section 3.4 shows a conceptual flow chart outlining steps for determining nutrient status and management actions within a watershed context. Similar to how the IDNR currently addresses nutrient-related impairments of lakes and streams, the model allows point source nutrient limits to be established as part of an adaptive watershed management plan that is solution-driven and provides flexibility in setting load reduction targets for point and nonpoint sources. Ambient water monitoring and effluent monitoring are key components of the assessment framework, allowing tracking of point source and nonpoint source nutrient load reductions and supporting the establishment and application of site-specific numeric nutrient criteria.

As this strategy is implemented, nutrient loads will be reduced in the near term with the application of technology-based total N and P discharge limits on the major treatment facilities and with implementation of a nonpoint source nutrient reduction strategy. The response of streams to the reductions in nutrient loads will be evaluated on a site-specific basis. In the conceptual model, if the stream ***does not*** meet the nutrient response criteria, additional nutrient load reduction alternatives will be evaluated and implemented. Once the nutrient load has been adequately reduced such that the nutrient response criteria are met, site-specific numeric total N and/or P criteria will be adopted for the stream. If the stream ***does*** meet the nutrient response criteria, then appropriate site-specific total N and/or P numeric criteria will be adopted for the stream.

The site-specific approach along with others will be further evaluated as part of the DNR's triennial water quality standards review process. Nutrient criteria development approaches continue to evolve as many states explore the best alternatives for establishing appropriate nutrient standards.

Section 2 – Nonpoint Source Nutrient Reduction Science Assessment

General comment: This may be a minor point, but the nonpoint sections refer to "nitrate-N" load reductions. A more technically correct term would be "total nitrogen" as ammonia and biodegradable organic nitrogen also contribute to the total nitrogen load.

Executive Summary. Page 2, Paragraph 7, last sentence. Edge-of-field practices through buffers or sedimentation basins/ponds whose potential for dramatic reductions in phosphorus load, 58% and 85%, respectively." It is felt that a comprehensive literature review would show that P reduction in ponds is highly variable, and assuming an 85% reduction is optimistic. At a minimum, the importance of proper design (depth, length:width ratio, drainage area ratio, etc.) in achieving an 85% reduction in P should be emphasized.

Executive Summary. Page 3, Paragraph 2, 2nd sentence. Text should clarify whether the 151 lb-N/ac and 201 lb-N/ac includes all N (including manure and chemical fertilizer applied, or just chemical fertilizer alone).

Cost Tables – Below is an analysis of PS vs. NPS costs on a basis of the mass of pollutants (N+P) removed. Different design lives are used in the estimates, so they were compared using Least Common Multiple present worth calculations assuming that the WWTFs and practices would need to be replaced completely at the end of 20 and 50-year design lives, respectively. No salvage values were included and a 4% interest rate over an LCM period of 100 years was used. There is potential interest in the apparent cost of NPS Scenario NCS8 relative to the other NPS and PS cost scenarios. This is due to its negative annual O&M cost. This indicates that the NPS scenario NCS8 has the biggest monetary return on investment. This would be similar to the installing new windows (or a high efficiency furnace) in your home. The initial capital outlay is the highest of the four, but that is deceiving in terms of how attractive it looks in terms of long-term cost. If this can be funded initially, it looks to be the best bang for the buck alternative to meet the reduction goals. This being said, should the strategy place special emphasis or give priority to the suite of practices in this alternative? There is currently no recognition in the strategy portion of the document of just how special this scenario seems to be in terms of meeting goals at what appears to be a very low relative long-term cost.

	Estimated Capital Cost	Annual O&M	Least Common Multiple Present Worth	LCM PW/tons per year N & P removed
Point Source (10/1)	$1,000,006,000	$39,000,000	$2,769,634,403	$209,821
NPS NCS1	$3,218,000,000	$606,000,000	$18,520,842,588	$155,624
NPS NCS3	$1,222,000,000	$1,156,000,000	$29,721,729,657	$249,741
NPS NCS8	$4,041,000,000	-$111,000,000	$1,889,564,790	$15,877

Note that the yellow highlights for the rest of the comments in Section 2.2 and 2.3 below could not be removed.

- Executive Summary Pg 3, par 2 and par 4:
  - Par 2, sentence 3, "The MRTN for corn following soybean..."
  - Par 4, sentence 7, "The price of corn was assumed..."
    - A sensitivity analysis of how the cost of related practices varies with varying corn and N fertilizer prices would be very helpful.
- Executive Summary - Pg2, par 2; Section 2.2, p. 4, Timing and Sidedress nitrogen; Section 2.2, pp. 26-27 Sidedress nitrogen
  - The sections on switching from fall to spring N application and on sidedressing nitrogen appear to underestimate the potential nitrogen load reduction (4%) of switching to spring and sidedress nitrogen, but there's not enough time in our review to cite research data that contradicts these assertions.
- Page 5, Table 1:
  - The "% Corn Yield Change" column
    - This heading indicates that a central theme of the Science Assessment is to preserve corn yields. One can be an advocate of agriculture and continued productivity without giving perceived special treatment to corn. Simply using "On-Farm Costs" or changes to on-farm profits (as was done elsewhere in the Science Assessment) would be more objective.
    - The problem with the % Corn Yield Change is perhaps most clearly illustrated with the Land Use practices of Perennial, Extended Rotations, and Grazed Pastures, since other economic opportunities would take the place (at least to some extent) of the drop in corn production.
- Page 7, Table 3:
  - Table caption includes "A positive $/lb N reduction, total cost, or EAC is a cost. A negative $/lb N reduction, total cost, or EAC is a benefit"
    - No cost of any kind is reported in this table. Recommend removing the above sentence.
  - Footnote: **"Acres impacted for buffers are acres of buffers implemented per acre of buffer."
    - This needs rewording – doesn't make sense. Should the last word be something other than "buffer?"
- Page 8, Table 4:
  - "% Reduction from baseline"

- The reported reduction will not meet the goal unless the baseline includes both PS and NPS contributions. We saw no clear statement in the text or table that confirms this. Please ensure the goals are met, and if they are, consider adding this clarification to the footnotes.

- General comment on costs reported:
  - Please clarify that on-farm costs include fuel (possibly embedded within the cost of tillage or application activities). Volatile fuel prices could have potentially large impacts on costs.
- NCS8 under Cost of N Reduction from baseline ($/lb)
  - Please include a dollar amount ($), since NCS7 is not included in the table.

Page 9, Table 5:

- Table caption includes "A positive $/lb N reduction, total cost, or EAC is a cost. A negative $/lb N reduction, total cost, or EAC is a benefit"
  - No cost of any kind is reported in this table. Recommend removing the above sentence.
- " Phosphorus Reduction % (from baseline)"
  - The reported reduction will not meet the goal unless the baseline includes both PS and NPS contributions. We saw no clear statement in the text or table that confirms this. Please ensure the goals are met, and if they are, consider adding this clarification to the footnotes.
- Footnote: **"Acres impacted for buffers are acres of buffers implemented per acre of buffer."
  - This needs rewording – doesn't make sense. Should the last word be something other than "buffer?"

Section 2.2

- Page 3, par 1:
  - Everything is based on nitrate-N rather than all N sources. We understand the rationale, since quantifying all N components and sources would be impossible. Locally, ammonia/ammonium can be important. For Gulf hypoxia issues, organic N could potentially be important/significant. May want to better defend rationale for excluding organic-N from the analysis.
- Page 4, par 3:
  - There are two references to "Table" with no Table identifier and no table present.
- Page 5, par 2:
  - "The research indicated a small (4%) in nitrate-N concentration when comparing liquid swine manure to fertilizer nitrogen..."
    - Small reductions shown were for a short-term study, but what about long-term reductions due to improved soil structure and increased soil organic matter, which tends to hold nutrients?
- Page 6, "Living Mulches":
  - Recommend including language about the added benefits of a leguminous living mulch (e.g., clover), which can offset the negative impacts of stover harvest, and is often removed from the field to provide additional winter forage for cattle.
- Page 7, par 5, "Wetlands":
  - "Wetlands restored specifically for habitat benefit are not being considered in this effort as they may or may not receive nitrate-N, and as a result, the primary water quality benefit is from land being taken out of production."
    - More explanation as to why these wetlands may not receive nitrate-N would be helpful. It seems likely that potholes and depressions in the middle of corn fields would receive nitrate in runoff and in shallow subsurface flow. What about the benefits of these types of wetlands obtained by capturing and treating non-nitrate forms of N? Could these systems capture and "treat" TKN, for example?
- Page 7-8 and Page 32-33, Bioreactors sections
  - No mention is made that bioreactors do not treat bypassed water, which bypasses during heavy flow events, which is when we can get the highest nutrient loads.
  - No mention is made of the newly-emerging technology of "saturated buffers", for which the research by Dan Jaynes at USDA in Ames is showing a 99% N reduction. If saturated buffers were combined with buffers, they could treat both overland runoff and subsurface flow.

- This would address the science assessment's statement commenting on the limited effectiveness of buffers on p. 33 that, "the nitrate-N load reduction will be limited by the amount of shallow groundwater intercepted by the buffer."

- Page 8, par 3:
  - There are two references to "Table" with no Table identifier. Should refer to Table 1.
- Page 10, par 4, "Nitrate-N Reduction Mean":
  - The explanation of how mean values were calculated is not easily understood. There is a concern about averaging nitrate concentrations between years, because the flows in each year could be dramatically different. If concentrations are used instead of loads, then flow-weighted averages would be more appropriate. And reducing loads is the goal.
- Page 13, par 3, last sentence:
  - "For the combined practice scenarios, it must be noted these are not recommendations, but rather example scenarios."
    - Consider adding a sentence or two that describes/suggests a process by which actual implementation decisions (i.e., scenario development) will likely be made. What role with various state agencies have in this process, in collaboration with landowners?
- Page 13, par 5, last 3 sentences:
  - "This document primarily includes farm level costs associated with the practices. It should be noted there could be additional costs for some of the practices or scenarios if implemented at a broad scale. These types of considerations are included in a separate document."
    - First, consider replacing "separate document" with a Section number so the read can find that analysis.
    - Might be helpful to include a brief list of some of these other costs.
    - Along with additional costs, there may be other savings and economic opportunities created with implementation. These should be included as well, not just potential costs.
- Page 13, par 6, sentence 1:
  - "Practice/scenario costs...calculated by Major Land Resource Area (MLRA) and then accumulated for a statewide cost and reduction amount."
    - It would be very beneficial to calculate and report these costs (and nutrient reductions) by MLRA. This would illustrate whether the costs to each MLRA are "equitable" on a per pound of nutrient removed and an aggregate basis. MLRAs that have a relatively small contribution should not be faced with high implementation costs (and vice versa).

- Page 18, par 1, sentence 3:
  - "Total stream water yield used..."
    - Where did the water yield data come from (e.g., USGS gages, past studies, etc.)? Could use better documentation/sources.
- Page 18, par 2, sentence 1:
  - "Nitrogen application rates for each MLRA were determined using Equation 2."
    - Could use clarification. Was Equation 2 used to distribute countywide data N application data to MLRAs? If so, that could be stated more clearly. If not, is this a typo?

Pg 19, par 1, Turfgrass nitrogen application:

- The percent of lawn appears to be allocated by MLRAs (metro areas) per landform region. Depending upon how this is calculated, this formula may underestimate the percent of lawn in rural areas, as many farms, small towns, rural subdivisions, and rural businesses have huge lawns.

- Page 21, last par:
  - There appears to be potential for underestimation of actual N application rates in the Science Assessment due to outdated data, and due to the assumption that N is applied at agronomic rates and that manure is not applied as "insurance" or for the purposes of disposal, and therefore not included in the total N (and P) application.
- Page 22, last par and Eq 11:
  - A more detailed explanation could be included for this regression analysis. Regression plots would be helpful, if applicable.
- Page 23, par 1, sentence 4:
  - "In one case, β_1 was not significant..."
    - If not significant at alpha = 0.05, it would be good practice to report the level of significance (alpha = 0.10, etc.).
- Page 23, last par, sentence 3:
  - "Based on this analysis,..."
    - It is not clear, given the information in this paragraph and the preceding one (including Figure 3 on page 24), that attributing 83% of nitrate to subsurface flow and 17% to runoff is a valid assumption. Further explanation is would be useful.
- [redacted]
  - "For the baseline load scenario..."

- Why not report the baseline nitrate-N load here (307,000 tons per year) and clearly state that it includes all point and nonpoint sources. As indicated in previous comments, if the baseline load of 307,000 tons does not include both PS and NPS, then the reductions reported (for example scenarios) do not meet the 45% targets. If PS are not included in the baseline load, then further reductions in NPS are needed.

- [redacted]
  - Baseline total load and reduction from baseline
    - As noted previously, these must include both PS and NPS to meet the 45% reduction goals.
- Page 26, Table 14:
  - Land Use Changes EC and P/LR
    - Is the large discrepancy in Potential Area Impacted for Practice (5.9 vs. 1.9 million acres) correct?
- Page 26, Table 14:
  - The table does not account for the beneficial role of increased soil organic matter provided by some practices (cover crops, manure), nor the lack of it provided by other practices (anhydrous ammonia). The science assessment does not seem to consider the benefits of adding to soil organic matter levels.
- Page 27, "Other services" par:
  - This bullet requires further explanation. It reads as though not adding N fertilizer could result in decreased SOM. But that ignores other means of increasing SOM, such as cover crops, tillage, etc.
- [redacted]
  - The document argues that reducing nitrogen application rates will mine soil nitrogen and reduce soil quality. This point is not agreed upon by soil scientists, but is stated in the document as factual.
- Page 29, "Cover Crops" par, "Practice limitations..."
  - "Row crop out of production to meet rye demand."
    - Wouldn't land in rye production offer additional N and P reduction benefits worth mentioning here (and accounted for in the reduction tables)?
    - This section does not mention the benefits of increased soil organic matter, increased infiltration, and increased carbon sequestration from cover crops, and overestimates the so-called negative impact on the seed industry due to increased demand for rye seed.
- Page 30, "Other services" par:

- Consider adding an additional bullet for the benefits to soil health and increased organic matter.

- [redacted]
  - "...$235,986,000/year (Table 17)."
    - Table 17 should be Table 14
    - Table 14 reports $227 million/year.

- [redacted]
  - "..$1,066,617,000/year..."
    - Table 14 reports 1,025 million/year

- Pg 31, Costs/benefits par, sentence 3:
  - "...(net present value cost of #321/treated acre)..."
    - With potential application for 12.8 million acres as reported in Table 14, the total net present value cost is $4.1 billion! That is a very large up-front capital cost that seems unlikely to get funded. This is pointed out later (in Table 29 on page 44). Perhaps that table/section should be cited here so the reader knows more detail is provided later).
- Pg 31, Edge of Field Practices section omission: Oxbows and stream meanders
  - Oxbow restoration and stream meanders are two nutrient BMPs are not mentioned at all in this section, and research on both have shown nutrient load reductions. Oxbow restoration is currently one of the BMPs being using in the Lyon Creek watershed to reduce nitrate loads. Both of these practices have other ecosystem service benefits, besides nutrient reductions.
- Pg 32, par 1, sentence 6:
  - "however, land taken out of production is factored into the cost of the practice..."
    - How much yield is really lost in from these acres. The wetlands are likely located in areas that routinely flood and have reduced yields in most years and insignificant yields in many years.
    - Are crop insurance premium "savings" considered when calculating on-farm costs for this practice, or other practices that take frequently flooded land out of production?

- Pg 32, "Costs/benefits" par, last sentence:
  - "The resulting EAC was $10.23/treated acre per year..."
    - This equates to a $2.2 billion up-front cost for bioreactors. Very large capital cost that is probably not likely to get funded. This is pointed out

later (in Table 29 on page 44). Perhaps that table/section should be cited here so the reader knows more detail is provided later).

- Pg 33, "Costs/benefits" par, sentence 2:
  - Cost of establishment assumed to be $300/acre
    - What actual costs are considered in the establishment of a buffer? It would be helpful to document some of these costly activities (e.g., grading, tilling, planting/seeding, etc.), and whether native seed was considered since it is more expensive.
    - Are insurance premium savings to the farmer considered (as a benefit) in the calculation of costs?
- Pg 34, par 1 ("Installing buffers on all applicable areas" par):
  - EAC is estimated at $87,679,000/year.
    - A large share of this is due to corn being taken out of production. But how much yield is actually lost? Buffers could likely be in areas that flood frequently. Actual yield losses are most likely not commensurate with the number of acres taken out of production.
    - Also, are insurance premium savings to the farmer considered (as a benefit) in the calculation of costs?
- Pg 34, "Costs/benefits" par:
  - ..."farmer management time..."
    - Was this included in the cost calculation? If so, how much time does it take for farmer to adjust gates every year, and what is the hourly rate? It seems likely that this is more of an inconvenience, rather than a cost.
- Pg 34, "Other services" bullet:
  - "Managing the water table at a shallower depth could result in increased surface runoff, ..."
    - Not in flat landscapes with many enclosed depressions (i.e., most areas in the Des Moines Lobe).
- Pg 34, last par, sentence 2:
  - "Controlled drainage is limited to areas with land slopes less than 1%."
    - Some explanation/illustration to this physical constrain would be helpful to many readers.
- Pg 37, Table 24:

- A more detailed explanation of EAC values for this practice (Energy Crops) would be helpful.
- Why is the per acre EAC so much greater than for Land Retirement? It would seem as though there should be a larger profit potential (and hence, lower cost) for Energy Crops than for Land Retirement.
- Why is the applicable land area so different for P/LR and EC (per Table 14).

- Pg 38, "Practice limitations" par:
  - Consider adding "Increased agricultural/economic diversity" to the list of bullets.
- Pg 39, "Other services" par:
  - Consider adding "Increased soil health" to the list of bullets.
- Pg 40, first par:
  - 4th sentence: "...nonpoint source load reductions would need to achieve 41% of the overall 45%..."
    - The wording is accurate here, but for clarity, considering adding a sentence that says that NPS-N loads must be reduced by 44%.
  - 6th sentence: "...nonpoint source load reductions would need to achieve 29% of the overall 45%..."
    - The wording is accurate here, but for clarity, considering adding a sentence that says that NPS-P loads must be reduced by 37%.
- Pg 40, par2, "Scenario NCS1, sentence 2:
  - "...approximately a 41% overall..."
    - Table 28 reports 42%
- Pg 40, par3, "Scenario NCS2, sentence 1:
  - "...in all MLRAs except 103 and 104,..."
    - It would be helpful to the reader if a rationale for excluding MLRAs 103 and 104 from cover crop implementation was provided.
- Pg 47, 2nd to last par, last sentence:
  - Consider adding the following: "Specifically, HUC-12 scale watershed studies should be pursued to monitor, assess, model/predict, and track water quality. Priority should be given to HUC-12 watersheds targeted for nutrient reductions by the WRCC and/or HUC-12 watersheds that include impaired waterbodies and/or completed TMDLs. "

- Pg 55, "Drainage Water Management and Shallow Drainage" literature reviewed:
    - Consider including (and incorporating results) from Sui and Frankenberger (2008). They found higher potential for nitrate-N reductions by drainage water management: "Drainage water management decreased the average annual (1985-2009) predicted drain flow from 11.0 to 5.9 cm, and the total nitrate load through subsurface drainage from 236 to 126 ton (both about 47% reduction). The percent reduction in nitrate load varied between 40% and 53% for all combinations of drain spacing, soil parent material and cropping patterns, with drain spacing and soil parent material having a greater effect than cropping pattern."
        - Citation: Ale, S., L. C. Bowling, P. R. Owens, S. M. Brouder, and J. R. Frankenberger. 2012. Development and application of a distributed modeling approach to assess the watershed-scale impact of drainage water management. Agricultural Water Management. 107: 23-33.

Section 2.3

[redacted] Many of the comments made in Section 2.2 also apply to the equivalent parts of Section 2.3. These comments are not necessarily repeated in this summary of comments, but should still be addressed, where applicable.

- Pg 3, par 3, between sentence 3 and 4:

  "...Allen and Mallarino, 2008)." Consider adding this sentence: "Additionally, dissolved P is more readily available for biological uptake, and therefore has a more immediate and potentially larger impact on eutrophication, than sediment-attached forms of P." "Phosphorus dissolved..."

- Pg 5, par 2, Phosphorus Application Rate and Timing

  The middle sentence stating "The soil test levels being maintained often exceed those recommended by Iowa State University, however, which explains the high proportion of soils testing high and very high in the state" is evidence that a corresponding high proportion of farmers are not following P application rate recommendations. NRCS recommends adding P only when soil P rates are at medium or below, not high or very high. This ongoing over application of P is probably a legacy from years ago when many agronomists said that P could not be lost from the soil, and that adding more was like "money in the bank." This shows that there is still a large public education and marketing effort that needs to target farmers about proper soil P application rates.

- Pg 6, par 1, sentence 2:
  - "In the long term, however, manure compared with inorganic P forms can reduce runoff by increasing soil organic carbon and improving soil structure."
    - The same could be said in Section 2.2 on nitrogen reduction, but this point was not emphasized there. Little difference/reduction was attributed to the N source (manures vs. chemical) and this important benefit was not pointed out as clearly in Section 2.2.
- Pg 6, par 3, last sentence:
  - "...lost as dissolved P."
    - Consider adding ", especially in tile-drained areas." at the end of the existing sentence.
- Pg 9, Table 1:

- Brackets, "[]" are confusing. Are data in brackets means or standard deviations. If means, which values are utilized in calculation of P reductions (those in brackets, or those above the brackets?

- Pg 10, last par, sentence 3 and preceding:
  - "This approach was used..."
    - It is not clear to the reader what "this approach" means. It is apparent that some literature values were not applicable and not used, but the rationale (description) used is not easily understood. Please clarify.

- Pg 11, par 3, sentence 3:
  - "...with a 62 kg P2O5/ha (56 lbs/ac) rate, which is the average annual removal for a corn-soybean rotation..."
    - This value does not appear to be consistent with the average values reported in Table 9 on page 19, which show removal rates around 65 kg/ha (on average) for corn, but much lower – around 40 kg/ha on average – for soybeans. It would be useful to double-check and fix (or explain) the apparent discrepancy.

- Pg 11, par 3, 2nd-to-last sentence:
  - "A trend line..."
    - Consider including the regression plot, trend line, regression equation, R2 value, etc.

- Pg 12, par 1, 3rd-to-last sentence:
  - "...of 65 kg P2O5/ha and 90 kg P2O5/ha,..."
    - Text indicates that these rates are from Sawyer et al., 2002, but this reference is not included in the list and description of references in Appendix A – Literature Reviewed. Please add so the reader can understand the rationale for these rates. Also confirm that these rates are higher than P removal rates for each crop in order to more quickly reach the recommended STP levels.

- [redacted]
  - "...tile drainage tends to reduce surface runoff and, thus, erosion."
    - Recommend citing source for this assertion.
    - Tile drainage may reduce sheet and rill erosion, but impacts of tile on sediment delivery to streams is likely very small because much of the sediment is captured by potholes/depressions. Additionally, some

literature suggests that tile drainage contributes to the "flashiness" of the stream, which can increased bed and bank erosion.

- Pg 16, par 1, last sentence:
  - "Tile drainage was used for MLRA 103, and..."
    - "Tile Drainage" is not an option in the list of categories in the preceding sentence. Consider "Areas assumed to have tile drainage were classified as Drained Land."
- Pg 18, Table 8:
  - Are P2O5 rates for each MLRA annual averages?
- [redacted]
  - Are 6.7, 13.3, and 6.3 actually kg P2O5/kg crop removed (rather than grams, as currently reported)?
- Pg 21, par 3, sentence 1:
  - "...estimated based on best professional judgment..."
    - State whose judgment was used: ISU Extension, IDALS, collective judgment of the entire Science Assessment Team?
- [redacted]
  - "...approximately -$737,161,000/year..."
    - Table 13 reports -%263.5 million. Please correct the discrepancy in the appropriate location(s).
    - Table 132 should be labeled "Table12".
- [redacted]
  - It appears that data listed for CCa is actually for CCb, and data for CCa is omitted from the table.
  - Total EAC for RR (-263.5) and IN (70.4) conflict with the text on page 22 (-$737.1) (benefit) and page 24 ($770.4) (cost), respectively.
  - P Reduction % (18) reported for BF conflicts with the value reported in the text (29%)
- [redacted]
  - "...$770,412,000/year.."

- Table 13 reports $70.4 million. Consider correcting in the appropriate location(s).

- [redacted]
  - "...$216,265,000/year..."
    - Table 13 reports $1,022.9 million.
- [redacted]
  - CCb is not reported in Table 13, although it appears as data for CCa is actually for CCb.
- [redacted]
  - Table 13 reports a reduction of 18%, rather than the 29% reported here in the text. Consider revision in the appropriate place(s).
- [redacted]
  - Table 14 should be Table 13.

Section 2.4 Other Considerations Beyond Farm-Level Costs of Nutrient Reduction Practices

General comment: The strategy is proposing changes implemented over many years so it seems clear these costs/consequences will be moderated significantly. This section seems to focus on what will happen if large-scale changes occur quickly which is unrealistic. This fact should be accounted for in this section.

Also, the section seems overtly focused on negative consequences to agriculture, specifically yields. This section should include estimated economic benefit for balance to meet the intent of its title.

Page 1, Paragraph 7, 3rd Sentence. Insert "that" between "important" and "individual".

Cover Crops

Page 2, Paragraph 5. Recommend including a % of total in analysis of amounts to provide perspective.

Page 2, Paragraph 5. Farmers get paid to grow rye seed. This factor should be included in the evaluation.

Page 2, Paragraph 8. "$0.20 per bushel on corn" is 4% of total; "$0.09 per bushel on soybeans" is 0.7% of total. % of total helps the reader understand the significance of these estimates.

Page 2-3, Paragraph 9. There is income that should be accounted from rye seed and wood chips. The prices farmers are paid for these should be included in the analysis.

Fall to Spring N Application

Page 3, Paragraph 2. Was only one example used in this analysis or was the analysis more holistic?

Page 3, Paragraph 2. What is infrastructure cost – more storage?

Page 3, Paragraph 2 & 3. These two paragraphs are very confusing as written. Also consider changing "#" to "lbs." or something most readers will understand.

Extended Rotations

Page 4, Last Paragraph, sentences 5-6. Why not trust the market to sort this out? Producers are free to adjust their operation to meet changing market demands. Unless hindered by mandates (e.g., biofuels production) or discouraged by competing incentives (e.g., commodity subsidies that favor production of certain crops over others), farmers have the ability to adapt surprisingly quickly and efficiently to changing market conditions. Additionally, Extended Rotations, if widely adopted, would diversify Iowa's ag economy, which, according to free-market principles, is good for producers, consumers, and nutrient reduction in this case. Also dairy and beef producers who utilize land in hay and pasture are less negatively impacted by higher corn and soybean prices.

Possible Benefits

General Comment: It would be nice to quantify some of these benefits: tourism, hunting, river trips, etc. Other benefits include slowing runoff and decreasing peak flow to minimize flooding.

A bullet could be included for increasing economic and agricultural diversity as well. The last bullet describes some new opportunities that might arise, but it does not describe the overall benefits of this new-found diversity in Iowa's state economy (and local economies).

Possible Costs

Page 5, Bullet List, Bullet #4. This is not necessarily true. While it is possible that runoff would be reduced, this would not necessarily have a direct and equivalent effect on sediment and P transport (i.e., delivery) to streams in flat, depressional landscapes. In areas with extensive depressions and surface intakes, tile water can (and does) exhibit characteristics more similar to runoff, which includes turbidity/sediment, and higher levels of P than "true" subsurface flow.

Page 5, Bullet List. There is no direct mention of fuel costs, or the sensitivity of the costs of Nutrient Reduction scenarios to fuel price fluctuations. Perhaps that is beyond the scope of this strategy, but it could be mentioned.

Section 3 – Point Source Nutrient Reduction Technology Assessment:

Replace current Section 3 with the revised version below (reference section will need to be restored):

Point Source Nutrient Reduction Technology Assessment and Implementation Details

3.1 Establishing Effluent Limits

The following describes the applicable federal and state laws and regulations pertaining to the establishment of effluent limits in NPDES permits. There are two bases for establishing effluent limits: technology and water quality. Technology-based limits establish the floor or minimum level of treatment a facility must provide. More stringent water quality-based limits must be imposed in permits when the technology-based limits will not assure compliance with state water quality standards.

3.2 Technology-Based Limits for POTWs

Technology-based limits for POTWs have been established by EPA in 40 §CFR 133 under authority of Section 304(d) of the Clean Water Act and represent the degree of reduction attainable through the application of secondary wastewater treatment technology. Technology-based effluent limits for a pollutant not covered by federal effluent standards may be imposed on a case-by-case basis (IAC 567-62.8(5)). Such limitation must be based on the effect of the pollutant in water and the feasibility and reasonableness of treating such pollutant.

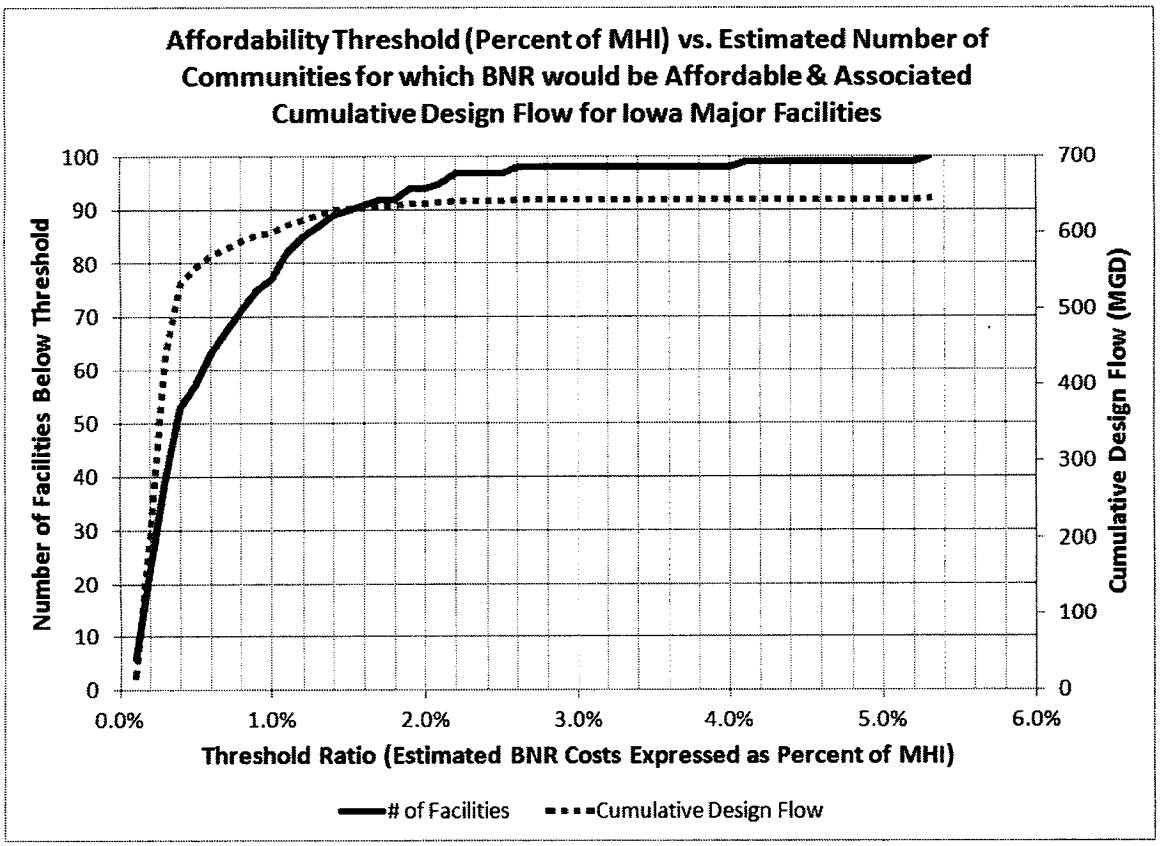
Although continuously evolving, many nutrient removal technologies in wastewater treatment are already proven and well-established. Thus, nutrient removal for Iowa's wastewater treatment facilities is technologically feasible. The primary mechanism IDNR will use in assessing the "reasonableness" of nutrient removal for individual facilities is the estimated costs for improvements and the ability of end users to afford those costs.

Affordability of wastewater treatment improvements is dependent upon a number of factors including capital costs, existing and projected debt service, and operation and maintenance costs. Without detailed financial information from a facility it is not possible to determine affordability. Screening criteria are available to indicate the likelihood that a project will be affordable with minimal information.

EPA economic guidance (U.S. EPA 1995) and proposed rules to implement the new disadvantaged communities' law (455B.199B) suggest that if the ratio of projected total wastewater costs to a community's Median Household Income (MHI) is less than one percent, then a project is affordable barring very weak community economic indicators. If the ratio is greater than two percent then a project is not affordable unless economic indicators are strong. Projects resulting in a ratio between one and two percent may or may not be considered affordable dependent upon the strength of secondary economic indicators such as comparison of county MHI to statewide MHI, bond rating, etc.

Nutrient reduction costs are generally affordable for most of Iowa's major municipal facilities based on the ratio of estimated project cost to Median Household Income (MHI). These same facilities also have the largest design flows and, in general, the greatest point source nutrient contribution. If the communities served by major municipal facilities can afford a project cost/MHI ratio of 0.5%, the design flow treated by those facilities for which nutrient reduction is affordable is over 550 MGD, or roughly 86% of the total design flow for all major municipal facilities. This relationship is shown in Figure 3-1 below.

Figure 3-1:



3.3 Three Tiers of Nutrient Removal

The three most commonly cited "tiers" of nutrient removal are Biological Nutrient Removal (BNR), Enhanced Nutrient Removal (ENR) and the Limit of Technology (LOT).

Biological Nutrient Removal is commonly associated with sequenced combinations of aerobic, anoxic and anaerobic processes which facilitate biological denitrification via conversion of nitrate to nitrogen gas and "luxury" uptake of phosphorus by biomass with subsequent removal through wasting of sludge (biomass). Effluent limits achievable using BNR at wastewater treatment facilities that treat primarily domestic wastewater are 10 mg/L of total nitrogen (TN) and 1.0 mg/L of total phosphorus (TP).

Enhanced Nutrient Removal typically uses BNR with chemical precipitation and granular media filtration to achieve lower effluent nitrogen and phosphorus concentrations than can be achieved through BNR alone. ENR systems are capable of producing effluent with nitrogen and phosphorus values of about 6 mg/L of total nitrogen and 0.2 mg/L of total phosphorus (Falk et al. 2011).

The term "Limit of Technology" (LOT) is generally associated with the lowest effluent concentrations that can be achieved using any treatment technology or suite of technologies. It is commonly referenced as an upper bound in nutrient removal performance. However, there is no consensus or regulatory definition establishing specific treatment requirements for the LOT. As such, effluent values associated with the LOT are debatable. Some have proposed statistical approaches that define the LOT as the minimum effluent concentrations that can be expected to be reliably met over a specific averaging period using widely available and proven treatment processes (Neethling et al. 2009, Bott et al. 2009). Commonly referenced thresholds for the LOT for BNR are 3 mg/L for total nitrogen and 0.1 mg/L for total phosphorus (U.S. EPA 2007, Jeyanayagam 2005). Lower effluent values are possible using tertiary chemical addition & filtration, advanced effluent membrane filtration, ion exchange and/or adsorption processes but may not be practical.

3.4 Technology Based Limits for Industries

Technology-based limits for industrial discharges are established by federal effluent guidelines adopted in 40 CFR subchapter N, under the authority of CWA Sections 304 and 306, and are adopted in the state of Iowa by reference in IAC 567-62.4. Where EPA has not promulgated a federal standard for a particular industrial category, technology-based limits must be developed on a case-by-case basis at the time of permit issuance (CWA section 402(a)(1)(B) and IAC 567-62.6(3)(a)). In developing case-by-case technology-based limits for industries, the limits must conform to 40 CFR Part 125 Subpart A – Criteria and Standards for Imposing Technology-Based Treatment Requirements.

EPA has promulgated federal effluent guidelines for 57 classes of industries but, with few exceptions, such effluent standards do not establish technology-based requirements for total nitrogen or total phosphorus. Where there are promulgated federal guidelines for TN or TP, the NPDES permit will contain effluent limits consistent with those guidelines.

Data on the amounts of nitrogen and phosphorus discharged by industries is not readily available but likely varies significantly based on the type of industry. For example, process wastewater discharged by

a meat processing facility will likely contain significantly higher nutrient concentrations than the discharge from a steam electric power plant. Most industries do not operate biological wastewater treatment plants because the nature of their wastewater makes biological treatment infeasible so requiring all industries to install BNR is not reasonable. All major industries and minor industries with existing biological treatment systems will be required to collect data on the source, concentration and mass of total nitrogen and total phosphorus in their effluent and to evaluate alternatives for reducing the amounts of both pollutants in their discharge. IDNR will use the results of these evaluations to establish case-by-case technology-based effluent limits in NPDES permits except in cases where the industry is subject to a federal effluent standard for total nitrogen or total phosphorus. The nitrogen and phosphorus effluent limits for industries and for POTWs with significant industrial loads will be determined consistent with 40 CFR Part 125 Subpart A and IAC 567-62.8(5).

3.5 Water Quality-Based Limits

The second basis for establishing NPDES permit limits is through state water quality standards; this is the "water quality-based" process. NPDES permits must contain requirements as needed for discharges to meet water quality standards (IAC 567-62.8(2)). Where implementation of technology-based limits for a wastewater treatment plant (WWTP) will not assure compliance with the water quality standards, permits must specify more stringent water quality-based effluent limits. While Iowa has not yet adopted numeric standards for total nitrogen or total phosphorus from which water quality-based effluent limits can be derived, permits must still contain necessary requirements to assure compliance with (1) narrative "free-from" water quality criteria in the Iowa Water Quality Standards that are applicable to all surface waters at all places and at all times (IAC 567-61.3(2)) and with (2) Iowa's antidegradation policy (IAC 567-61.2(2)).

When a facility proposes to discharge a new or increased amount of any pollutant, an antidegradation "alternatives analysis" must be performed. The alternatives analysis must consider non-degrading and less degrading alternatives to the increased discharge, and the facility must implement the least-degrading alternative that is practicable, affordable and cost efficient. Iowa's antidegradation policy applies on a pollutant-by-pollutant basis, meaning that the alternatives analysis must consider each pollutant that will be discharged in an increased amount. These pollutants would include any new or increased discharge of total nitrogen or total phosphorus.

3.6 Total Maximum Daily Loads

A total maximum daily load (TMDL) is a calculation that determines the maximum amount of a pollutant that can enter a stream or lake from different sources and still allow the stream or lake to meet the Iowa water quality standards. The IDNR is required by the CWA to determine the TMDL for all waters identified on the state's CWA Section 303(d) impaired waters list. These TMDL calculations must be reviewed and approved by EPA.

One part of the TMDL calculation is the point source wasteload allocation (WLA), which may be used to calculate water quality-based effluent limitations to include in an NPDES permit. When determining the

appropriate point source WLA to be used in the TMDL calculation, the IDNR will consider this point source nutrient strategy as the basis for setting the WLA for point sources. The IDNR will not impose effluent limitations in NPDES permits that require load reductions beyond the reductions achieved by implementation of this strategy unless it is determined necessary to allow the stream or lake to meet Iowa water quality standards.

3.7 Monitoring in NPDES Permits

The Iowa Administrative Code (567 IAC 63.3(1), Table II) specifies the minimum monitoring requirements that must be included in NPDES permits issued to POTWs and industries with continuous discharge wastewater treatment plants that treat organic waste. These requirements include final effluent monitoring for total nitrogen and total phosphorus using 24-hr composite samples with the sampling frequency determined by the size (design Population Equivalent - PE) of the treatment works. The sampling frequency is once every 3 months for plants with a design PE of 3,001 to 15,000 and once every 2 months for larger plants. Permits issued since 2009 to POTW's and to industries with biological treatment plants have specified these minimum requirements. At present there are seven NPDES permits (6 for POTWs, 1 for an industrial WWTP) issued to major wastewater treatment facilities in Iowa that require either total nitrogen or total phosphorus monitoring or both. The IDNR will continue to specify total nitrogen and total phosphorus monitoring in permits issued to continuous dischargers with biological treatment including both POTWs and industries. Facilities are strongly encouraged to begin monitoring programs for TP and TN prior to NPDES permit reissuance to better assess current nutrient loading and removal capabilities that are possible with their existing treatment systems.

The minimum monitoring frequencies for total nitrogen and total phosphorus for industries that do not discharge an organic waste will be determined using the rule-referenced *Supporting Document For Permit Monitoring Frequency Determination*, August 2008 but will not be less frequent than once per quarter.

IDNR will identify the appropriate total nitrogen and total phosphorus lab testing methods for wastewater and ambient stream water quality to ensure consistent data and allow for accurate accounting of removal of nutrients from wastewater treatment plants. These lab methods may be specified in NPDES permits with total nitrogen and total phosphorus testing requirements.

3.8 Construction Schedules

Permits can contain construction schedules for installing or modifying facilities to remove nutrients. Two possibilities exist for specifying technology-based limits and schedules, permittees will be given the opportunity to select which option they prefer: (1) the NPDES permit will include a schedule for installing or modifying facilities to reduce nutrients. Following construction completion and an optimization and performance evaluation period, final limits will be added to the NPDES permit or, (2) final limits will be included in the NPDES permit and a consent administrative order will be issued concurrently that would establish the schedule for installing or modifying facilities to remove nutrients to comply with permit limits.

3.9 Implementation Plan

All major wastewater treatment facilities and minor industrial facilities that already treat process wastewater using biological treatment will be required to evaluate the economic and technical feasibility for installing BNR. It is expected that most major municipal wastewater treatment facilities (>1 MGD AWW Flow) can economically meet technology-based TN limits of 10 mg/L and TP limits of 1 mg/L on an annual average basis with BNR technology. Technology-based nutrient limits for industrial facilities and municipal facilities that have significant industrial loads will be developed on a case-by-case basis due to the differing amounts of nutrients present in these wastewaters. Nutrient reduction will be required for major industries where it is found by IDNR to be feasible, reasonable and cost effective using the procedures specified in 40 CFR Part 125 Subpart A.

Permit limits for TN and TP will be expressed as an **annual average**. Since biological treatment processes are more efficient at reducing nutrients at higher water temperatures, higher quality wastewater effluent is typically produced in the spring, summer, and fall than in the winter. Thus, while properly designed and operated biological treatment systems may not be capable of meeting TN and TP limits of 10 mg/L and 1 mg/L respectively during winter months, data averaged for the year should yield results at or below these limits.

The basis for implementation of this approach is that the technology-based effluent limits for a pollutant not covered by federal effluent standards may be imposed on a case-by-case basis (IAC 567-62.8(5)). Such limitation must be based on the effect of the pollutant in water and the feasibility and reasonableness of treating such pollutant.

If a permitted discharger installs nutrient reduction processes and technology-based TN and TP limits are included in the NPDES permit, then it is the position of the IDNR that the TN and TP discharge limits will not be made more restrictive for a period of at least 10 years after the completion of the nutrient reduction process construction. Iowa Code section 455B.173(3C) establishes the moratorium on more restrictive limits for municipal dischargers. For non-municipal discharges, this prohibition can be enforced through the permitting process or as a part of the adoption of any future nutrient limitation. An evaluation of the nutrient removal performance and future optimization will be submitted to IDNR once facilities are constructed and have operated for a period of five years.

3.10 Implementation Plan Details

Technology-based nutrient requirements will be specified in municipal and industrial NPDES permits for major facilities, and minor industrial facilities with existing biological treatment systems, at the next permit renewal. NPDES permits will be amended or reissued to include effluent limits for TN and TP according to the following: 1) BNR already installed; 2) BNR not installed and no capacity increases are planned; 3) BNR not installed and capacity increases are planned:

Category 1) BNR already installed

a) Installed and Operating: If BNR is installed at a given plant and operating, then the NPDES permit will specify technology based limits (no more stringent than 10 mg/l TN; 1 mg/l TP) and will require influent and effluent monitoring for both parameters.

b) Installed and NOT Operating: If BNR is installed at a given plant and NOT operating, then the NPDES permit will require the BNR facilities to be operated. Final limits for TN and TP (no more stringent than 10 mg/l TN; 1 mg/l TP) will be incorporated into the NPDES permit at the end of a one year process optimization and performance evaluation. The NPDES permit will require influent and effluent monitoring for both parameters according to 567 IAC Chapter 63.

Category 2) BNR not installed and no capacity increases are planned

If BNR is not installed and no increases in treatment facility design capacity are planned, then the renewed NPDES permit will include a requirement for the facility to submit a report with the results of a study, within two years of reissuance of the NPDES permit, evaluating the costs and feasibility of installing BNR at a given wastewater treatment facility. The report will also include a proposed schedule for when BNR will be installed at a given wastewater treatment facility. The negotiated schedule will be incorporated into the NPDES permit or administrative consent order. The TN and TP discharge limits will be determined at the end of a one year process optimization and performance evaluation following the BNR process startup. The performance evaluation will include the determination of technologically achievable TN and TP concentrations. The NPDES permit will be amended to include the TN and TP limits as determined from the performance evaluation. The permit limits will be no more stringent than 10 mg/L TN and 1 mg/L TP. The NPDES permit will require influent and effluent monitoring for both parameters according to 567 IAC Chapter 63.

Category 3) BNR not installed and capacity increases are planned

If BNR is not installed and increases in treatment capacity are planned, then the evaluation of installing nutrient removal will be conducted as a part of the construction permitting process through current antidegradation procedures. Nutrient removal will be encouraged at this stage. If nutrient removal is not included with the plant expansion, then the NPDES permit will be written using the procedure in Category 2 above. If nutrient removal is included in the plant expansion, then the NPDES permit will be amended after a one year optimization and performance evaluation following BNR process startup, similar to the Category 2 procedures. The permit limits will be no more stringent than 10 mg/L TN and 1 mg/L TP. The NPDES permit will require influent and effluent monitoring for both parameters according to 567 IAC Chapter 63.

For an industrial wastewater facility with nutrient discharges but **no** biological treatment, a schedule will be incorporated into the next permit. The schedule will require the industry to assess the feasibility,

reasonableness and cost of nutrient reductions. If nutrient reduction is found to be feasible, reasonable, and affordable, the permit will be revised to incorporate technology-based effluent limits based on the assessment.

Replace current industrial and total cost tables with tables below:

Estimated Costs for BNR Improvements for all Industries with Biological Treatment (Target Effluent TN = 10 mg/L Target Effluent TP = 1 mg/L)

Treatment Type	# of Facilities	Combined Design Flow (MGD)	Total Capital Cost ($M)	Total Annual O&M Cost ($M)	Total Present Worth Cost ($M)[1]	Total Annual Cost ($M)	$/1,00 gallons Treate
Activated Sludge	20	44.2	29.3	2.0	56.1	4.2	0.
Fixed Film	1	0.6	2.7	0.04	3.3	0.2	1.
Aerated Lagoon	7	5.8	86.5	2.20	116.0	8.6	4.
Totals	28	50.7	118.5	4.2	175.5	13.1	0.

1. Present worth values calculated using discount rate of 4.125% and a 20-year design life.
2. Based on design flow.

Estimated Costs for BNR Improvements for Major Municipals + all Industries with Biological Treatment (Target Effluent TN = 10 mg/L, Target Effluent TP = 1 mg/L)

Treatment Type	# of Facilities	Combined Flow (MGD)[2]	Total Capital Cost ($M)	Total Annual O&M Cost ($M)	Total Present Worth Cost ($M)[1]	Total Annual Cost ($M)	$/1,00 gallons Treate
Activated Sludge	76	399.5	377.3	27.2	742.5	55.2	0.
Fixed Film	38	67.8	432.3	7.1	527.5	39.2	1.
Aerated Lagoon	16	13.5	196.3	5.0	263.1	19.6	3.
Totals	130	480.8	1,005.8	39.2	1,533.1	114.1	0.

Replace current industries list with the list below:

Industries with biological treatment for process waste:

	NPDES NO.	FACILITY NAME	TREATMENT TYPE
1	2326101	ARCHER DANIELS MIDLAND CORN PROCESSING	ACTIVATED SLUDGE
2	6800100	CARGILL, INC.	ACTIVATED SLUDGE
3	7048101	GRAIN PROCESSING CORP.	ACTIVATED SLUDGE
4	5800100	TYSON FRESH MEATS, INC. - COLUMBUS JUNCTION	ACTIVATED SLUDGE
5	2500100	TYSON FRESH MEATS, INC. - PERRY	ACTIVATED SLUDGE
6	2900900	IOWA ARMY AMMUNITION PLANT	TRICKLING FILTER
7	7000102	MONSANTO COMPANY	ACTIVATED SLUDGE
8	5640101	ROQUETTE AMERICA, INC.	ACTIVATED SLUDGE
9	8670100	TAMA PAPERBOARD	ACTIVATED SLUDGE
10	2326112	EQUISTAR CHEMICALS, LP	ACTIVATED SLUDGE
11	0375102	AGRI STAR MEAT AND POULTRY LLC	ACTIVATED SLUDGE
12	9083101	CARGILL MEAT SOLUTIONS CORPORATION	OXIDATION DITCH
13	8670101	IOWA PREMIUM BEEF	AERATED LAGOON
14	1178105	TYSON FRESH MEATS, INC. - STORM LAKE	ACTIVATED SLUDGE
15	7856100	OAKLAND FOODS, L.L.C.	SEQUENCING BATCH REACTOR
16	5600105	PINNACLE FOODS GROUP LLC	ACTIVATED SLUDGE
17	8748102	MICHAEL FOODS, INC.	ACTIVATED SLUDGE
18	9500102	REMBRANDT ENTERPRISES, INC. - THOMPSON	AERATED LAGOON
19	8400120	AGROPUR INC.	SEQUENCING BATCH REACTOR
20	3621100	MANILDRA MILLING CORPORATION	ACTIVATED SLUDGE
21	9700101	GELITA USA, INC.	AERATED LAGOON
22	6800113	AJINOMOTO HEARTLAND LLC	ACTIVATED SLUDGE
23	2200100	SWISS VALLEY FARMS	ACTIVATED SLUDGE
24	2500103	NORTHERN NATURAL GAS CO – REDFIELD	AERATED LAGOON

25	3300100	ASSOCIATED MILK PRODUCERS	AERATED LAGOON
26	3405100	CAMBREX	ACTIVATED SLUDGE
27	3900103	GUTHRIE CENTER EGG FARM	AERATED LAGOON
28	5200104	TWIN COUNTY DAIRY, INC.	AERATED LAGOON

August 2012

Progress Toward Clean Water Act Adopted Numeric Nutrient Criteria