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Gulf of Mexico Hypoxia Working Group
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Re: Comments on the Integrated Assessment of Hypoxia
In the Northern Gulf of Mexico

The North Central Region (NCR-195) Committee titled "Mississippi River Watershed Nutrient Sources and Control" was formulated a little over three years ago. Originally the group operated under a NCT-167 designation. The Committee has three basic objectives:

1. Serve as a central information source and coordinating body for agricultural issues relating to nutrient loading from the Mississippi River to the Gulf of Mexico.

2. Coordinate, promote and facilitate multi-state research, educational and extension programs to help individual states deal with their impacts of surface water loading from nutrients.

3. Continuously review current knowledge and technologies with respect to their impact on nutrient management for water quality.

The committee will be linked electronically to facilitate communication. The committee will meet at least yearly to assess issues around the region and progress toward action items. The meetings will, when possible, be coordinated with other hypoxia-related meetings in the region and nationally, and with policy meetings in Washington. The committee will also sponsor scientific exchanges and will provide a talent pool for other regional efforts directed toward hypoxia. The committee will assemble available research information that pertains to the problem and will develop educational and demonstration programs that will aid in problem solving.

Given the expertise on this topic, we believe it is appropriate to make the following observations about the Integrated Assessment of Hypoxia in the Northern Gulf of Mexico Report. Our comments are as follows.

As we look at this section titled, "Reduction Effects and Approaches," we are concerned about the overall approach of this report.

Comments

Page 8 The two paragraphs in the "Potential futures if current activities are unchanged" section are really pessimistic and does not even suggest the possibility of improvement over time. Verbs such as "could produce", "may increase", "may be offset", "will tend to increase", and "could lead" all suggest to the reader that hypoxia will get worse. This seems a bit speculative, especially since these large biological systems are so slow to respond.

Page 18 We were pleased to see the paragraph addressing "climate change." However, it seems unlikely that climate change has had greater impact over the long run than has human activities. Most likely both have had an impact. It should be acknowledged, however, that it is difficult to disaggregate these impacts, at least in any precise or scientific terms given our current state of knowledge.

Page 20 The last paragraph on page 20 and continued on top of page 22 describes the long-term drainage basin changes very well. This is very important future research issue.

Page 22 The last sentence in the middle paragraph comments on the size of the hypoxic zone in 1999. We have not seen any 1999 nitrate concentration or flux data from the MARB to support this statement. If the data exist, then they should be cited. However, if it is speculation, then the sentence should be deleted.

Page 23 The second to last paragraph states that "precipitation leaches the highly soluble nitrate from the soil into streams via overland runoff, ground-water discharge, and agricultural drains". Research consistently shows ground-water discharge and agricultural drains to contribute much more nitrate to streams than overland runoff. In fact, nitrate losses in overland runoff are usually discounted because they are so small.

About the only exception is a scenario where a nitrate source of fertilizer is applied to the soil surface and not incorporated and is quickly followed by an intense rainfall event that would result in some runoff of the fertilizer N. That scenario is not likely because most N fertilizers applied are ammonium-based and need to be nitrified in the soil to nitrate. Second, most nitrate on the soil surface will be incorporated into the soil by the first 5 to 10 mm of rain.

Page 23 In the last paragraph it is stated that "soils in this region contain large amounts of nitrogen,...". It would be more correct, and informative, and less confusing if the sentence said "soils in this region contain large amounts of organic matter, a portion of which converts to soluble nitrate each year."

Page 34 The first bullet at the bottom of the page under "Reducing Inputs" is understandable for those of us that know what "agronomically recommended rates" entail. However, to many this statement taken by itself could easily imply regulatory limitation rather than BMP adoption to achieve the applications of agronomic rates. The first bullet in the middle of page 35 does a good job of explaining the major BMPs to achieve the application of proper agronomic rates; unfortunately, it is disconnected from the bullet on page 34. These two points should be integrated together in one place.

Page 35 The first bullet suggests that discharge of nitrogen to streams can be reduced by switching from conventional tillage systems to ridge-till or other reduced tillage practices. This is true if you are only concerned about total N, because less erosion occurs with conservation tillage systems. However, if the primary form of N relating to hypoxia is nitrate, the literature does not suggest or support any consistent effect of tillage system on nitrate losses/flux in subsurface drainage water. All of the other bullets in this section relate to nitrate, so including tillage and total N in this section is not appropriate as it stands in this draft.

Page 35 The second bullet suggests that tile lines are normally spaced at 5 to 10 meters. This is not true as lateral lines are frequently spaced at 20 to 30 meters. The point of the discussion in chapter 5 was to point out the likely probability of increased nitrate losses with reduced spacings between tile lines. As stated in section 3.1.8, "inferences drawn from this work suggest that narrowing drain tile spacing to <20 m could result in greater losses of nitrates compared to wider spacings".

Page 35 The last bullet discusses "Improved management of feedlot runoff". We are very uncomfortable with this discussion. In chapter 5, very little was said about feedlot runoff. It was not mentioned in the Executive Summary or in the Conclusions section (section 6). There was a small section (paragraph 1.3.2 and Table 1.2) that dealt with feedlot discharges. Also, in this paragraph, manure/feedlot contributions of N were cited in Table 1.1 and were calculated to be about 40% of the fertilizer N used in the MARB.

Unfortunately, in section 4 of Chapter 5 (specifically 4.2 and Table 4.1), improved management of animal manure and subsequent runoff in livestock producing areas..... and feedlot runoff were co-mingled. The result was a statement in Table 4.1 indicating a 0.5 million metric ton N/year reduction with "improved manure management" and does not mention feedlot runoff. Yet, this bullet in the Integrated Assessment indicates "a 20% decrease in feedlot runoff could decrease edge-of-field nitrogen loss by 0.5 million metric tons/year". This illustrates how the terms "feedlot runoff" and "manure management" have been interpreted to mean one and the same when they are different measurements. They are really apples and oranges.

Our concerns with this bullet are:

1. The confusion between the terms "feedlot runoff" and "manure management."

2. To most, feedlot runoff implies a discharge from an animal feedlot or housing area, and in this situation, is reaching a stream or river via overland flow/runoff. Because this is a direct discharge into surface water policies and rules have been directed at preventing this from happening during the last 10+ years. The permitting process for siting of new feedlots or expansion of existing feedlots has greatly curtailed these types of potential discharges. Consequently, we question whether enough feedlot runoff exists in the MARB to generate a 0.5 million metric ton/year decrease if the runoff was to decrease 20%.

3. To most people, improved manure management implies BMPs associated with land application of animal manure. In our opinion, improved manure management such as rate, time, and method of application/incorporation, could generate edge-of-field N losses by 0.5 million metric tons/yr. However, "improving management of manure" also appears as part of the first bullet in this set. Therefore, we would suggest deleting "improving manure management" in the first bullet. In our opinion, edge-of-field N losses could still be reduced about 1 million metric tons/year by reducing "insurance" rates, applying appropriate credits for previous crops and manure, and using improved soil N testing methods.

Page 35 Footnote 1 suggests a 10 to 15 bushels per acre corn yield response to an extra 10 to 20 pounds of N fertilizer in a good year. This is ridiculous for at least two reasons. First, we can expect a response of 1 bushel per pound of fertilizer N applied at the low end of the response curve but not at the high end. The curve flattens following the law of diminishing returns in good years and bad years. The corn yield response to an extra 10-20 pounds of N (above the recommended rate of N) will likely range from 0 to <5 bushel per acre. Second, the optimum rate of N has been shown to be similar in both good and poor years in a number of long-term trials. This is because the plant gets its N from both soil reserves and added fertilizer/manure.

In a poor year, dry climatic conditions frequently limit the availability of soil N because of slower mineralization of soil organic matter, leaching, denitrification, etc. The plant may also be less efficient with respect to N use; hence, a high N rate is needed even though the yield is low. In a good year, climatic conditions normally optimize the availability of soil N and plant N use efficiency is high. Therefore, high yields can be obtained with the same rate of supplemental fertilizer/manure N as in a poor year because of enhanced availability of soil N. The University of Wisconsin does not even include yield goal in their equation to determine recommended N rates for corn. We suggest deleting this part of the footnote.

Page 36 Models may suggest that "fertilizer taxes were predicted to be economically inefficient, with a 500% tax required to reduce edge-of-field losses by 20%". This runs counter to our experiences. When N prices go from 12¢ to 18¢/pound of N (only a 50% increase), farmers start to complain about the high cost of N and begin to reexamine their application rates. Maybe they do not cut them, but they do give thought to it.

We believe that a 100% increase would get their attention and that N rates would be trimmed somewhat. This price increase/tax would also get them thinking about optimum times of application, manure credits, etc. In other words, the whole issue of better N management would be elevated to center stage if N prices were to double. Our experience suggests that a behavioral change toward N management would take place.

On the other hand, a 500% fertilizer tax would cause bedlam and would definitely result in a whole new approach to N management. We would like to see the authors comment on the effect of a fertilizer tax on N management -- not just on the N rate vs. yield response curve. If the extra 30-lb N rate applied as "insurance" returns no extra yield, the "insurance value" of the extra N takes on a different look and value when the cost of the "insurance" is twice as high.

Also, we would like to see the authors discuss the effect of a fertilizer tax on fall-applied N. It could be prorated depending on both geographic location and the time of N application. For instance, earlier fall applications (warm soil temps on October 15) in southern Corn Belt regions could have a higher tax than late-fall applications (cool soil temps on October 15) in the northern regions.

Page 37 The 500,000 metric ton/yr reduction in N inputs for a 20% decrease in feedlot runoff is too high in our opinion. See earlier comments.

Page 41 The last two paragraphs dealing with "adaptive management" and "substantial time lags" are very refreshing. They are facts of reality and should be emphasized in the Executive Summary.

Page 42 This message is well stated.

Pages 44-50 The Monitoring Needs and Research Needs sections are well done within this NCR-195 Committee and are prioritized appropriately.

Sincerely,

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