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Thanks for the opportunity to review the draft SAB Report. Overall, I think they have done an excellent job in updating the results of the Hypoxia Integrated Assessment with new research and analysis. I do have a few concerns over the report that I think require a substantial revision of position by the SAB Panel:

1. I do not accept the premise that 0% of the NANI to the MARB comes from urban non-point sources. This assessment does not cite any research that documents an analysis of non-point N (or P) contributions from urban septic systems and/or leaking pipes from municipal sewage waste infrastructure. They simply make a statement that urban sources are not a significant contributor. I think the SAB Panel should be specifically tasked to search the literature for studies that quantified N and P losses from urban areas. Has anyone ever published research that examined human population concentrations in a context similar to CAFO analyses? Why would you not consider humans in the same context as any other animal unit? One could take such an estimate and compare the predicted N and P loads to the measured removal capacities of municipal sewage treatment systems and (at least) ask whether those systems account for 100% of the potential load coming from the "Human CAFO".

2. I do not accept the SAB Panel's basic leap to conclusion that P reduction should be at a priority equal to that of N. They jump to this conclusion based on the finding that P has become a limiting nutrient BECAUSE of the large increase in N loading that has occurred historically. Well…of course! If you increase the loading of one limiting nutrient, then another will at some point become limiting. There would be no P limitation if N were not so high. That does not alter the fact that decreases in N loading will still reduce the extent of hypoxia. The system cannot respond to further increases in P unless there is more N added. Reduction in P can have no substantial effect unless you reduce it at a rate greater than the reduction in N that is roughly equal to the Redfield ratio for N and P. The focus should be to identify the most cost-effective means of reducing the N load first. If there are reduction strategies that first meet the N reduction priority and then are also effective at reducing P, then I say, "Go ahead and give such reduction strategies a bump in priority". However, do not waste precious dollars going after P-only reduction when it's not going to give you the outcome you seek. In addition to the fact that the SAB must keep the ratio of N:P as their primary focus, also remember that P is stored in the Gulf sediments in bound and organic forms. This SAB report correctly points out that the hysteresis related to P redistribution from sediments is much longer than for N…due to its sediment-bound nature. I would pose that reducing the N from non-point sources and reducing P from point sources is the right mix to pursue. Mixing and redistribution of sediment (and P) in Gulf sediments will be facilitated in the long-run by hurricane turbulence, once again making N the primary nutrient of concern.

3. Although I am not an economist, I think the base assumptions of the economic analysis fall short in a critical area. The Panel makes the assumption that increases in fertilizer costs will be offset by increases in commodity prices and that the producer will essentially break even. However, this assumption seems to be based on a closed system where all goods come from the U.S. We have seen repeatedly in recent years that when the cost of producing goods in the U.S. increases, the source of the commodities shifts to cheap overseas providers. I do not think this economic analysis can be accepted until the panel considers options that include trade protections for U.S. producers in addition to all the tax and sanction options being proposed against American producers.

4. This Report makes only general reference to the distribution of costs among multiple sectors both inside and outside of the MARB. I think a more detailed analysis is required, especially because of the (correct) observation that the Ohio and Tennessee River Basins are contributing most of the N loads during the critical spring flux period. Who should suffer economically? The Illinois farmer, the Texas shrimper, or the New Jersey breadwinner? This is an issue that was glossed over in the previous IA, and it is not appropriate that it be glossed over again.

5. The Panel should provide a prioritization scheme indicating how it thinks the Government should proceed in reducing hypoxia. Simply putting out a laundry list of possible solutions is not the most efficient way to get things done. It inevitably ends up just getting the easiest, least controversial steps accomplished. We have already realized the benefits from the easy steps. It's time to prioritize where the money goes for remediation.

I also have some more specific comments related to the presentation in the body of the report:

P8, lns 14-17: I agree that the panel should emphasize the need to target reduction practices to the regions contributing the most N. We tried to do this in the previous IA but were prevented from putting that recommendation in the report. I would bring this point even more strongly to the fore and make sure that it is one of the top priority recommendations from this panel.

P11, lns 20-21: Be specific. How large were the "several hypoxic events" prior to widespread fertilizer use? Give the reader context against which to compare current conditions.

P18, lns 35-38: If the spatial distribution of dated sediment cores "is not sufficient to determine the increases in the spatial extent of hypoxia over time", then how can you justify a statement that hypoxia has increased?

P23, lns 34-35: Why has the flow increased from the Atchafalaya River basin?

P37, Key Findings Box: Back to the statement that P has become limiting because N has increased. Someone needs to rethink what this really means. Just because you want to target P does not mean that is the most cost effective way to do things. P loading will be harder to reduce, will take longer to reduce due to hysteresis, and its reduction will not have an effect as long as there is too much N in the system.

P50, lns 9-14: This further confirms the fact that reducing N inputs from the MARB should be the highest priority. If DIP released from sediments is an order of magnitude higher than external inputs from rivers, we must wait years (Decades? Centuries?) for the stored source of sediment P to be deleted. This argues that N reduction is the most likely and short-term means to reduce hypoxia.

P51, lns 38-45: We argued about the fisheries effect while developing the last IA. I asked then, "Has anyone examined the overall cumulative fisheries harvest from the Gulf and found that it has decreased?" I get that some locations are less productive than others, but you would expect that all this increase in primary productivity would drive an increase in fisheries somewhere. Have the populations simply moved? Has anyone done the study? If not, it should be recommended.

P52, lns 7-15: This section is making that case that a regime shift has occurred and that recovery will take decades (based on records in the Baltic and Chesapeake Bay). However, the model systems being held up do not experience hurricanes. The Gulf should see a more rapid redistribution of sediments and potentially a more rapid recovery to pre-hypoxic conditions.

P53, lns 41-44: This statement seems to contradict the "policy" of this document to reduce P, but is welcome.

P55. Key Findings Box: I do not agree with the conclusion that N reductions alone may not rapidly improve the (hypoxia) situation in the MARB. The Panel has presented no data that support this conclusion.

P63, lns 1-8: Note that the researchers had to exclude large urban areas in order to get a significant correlation with nitrate loading. This supports my proposal that non-point urban sources should be given more attention.

P66-81: This is an EXCELLENT section that highlights the critical need to target regions for funding and technical support so that we can get the most efficient reductions in N loading! This SAB Panel needs to make a clear statement that past political practices driving the distribution of funding for conservation practices and technical support must be eliminated in favor of a scientific adaptive management approach that can attain the most N reductions for the dollar!

P84, Key Findings Box: The first two lines of this box are GOLD! The Panel needs to highlight this statement in the Executive Summary! There's no point in convening a panel to make recommendations if nobody is going to listen!

P87, ln 16: The assumption that the soil organic N pool is at steady state is repeated several places in this document. However, there are no data presented that support this assertion….NONE. The Panel should make a clear statement somewhere that this assumption is at the center of load estimation and at the center of how we might respond to this crisis. More definitive data are needed to evaluate this assumption…which I would assert is invalid. I don't accept that any tilled soil is at steady state with respect to carbon…whether fertilized or not.

P90, lns 7-11: This is a pretty clear indication that: a) your estimates of N input are incorrect, OR b) there is a net mineralization of soil organic N.

P92, lns 10-24: While I agree with the conclusion that considerable N is coming from soil organic N in these tile drained soils, is it reasonable to try and maintain a "no net loss of soil organic N" policy in a tile drained area? I say not. Therefore, how does the Panel think this should translate into a management policy for this region?

P103, lns 37-44: This section highlights the higher contribution of DIP from watersheds in Illinois…again supporting the Panel's conclusion that targeting of reduction programs is imperative. In this case, I would agree with targeting P reductions in tile drained systems, because these reductions are feasible, and because DIP is a strong driver of hypoxia when N is high.

P105, Table 7: It is interesting to note that the least wetland restoration has been done in the regions contributing the most N loading to the Gulf….again supporting the targeting approach.

P123-124, lns 40-30: Just a big supportive "YES!" to this call for experimentation.

P126, lns39-42: Again…it seems as if everyone is getting on the dual reductions bandwagon with no supporting scientific data. An analysis should be presented breaking down the relative costs and feasibilities of reducing N versus P that includes a specific discussion for each potential region in the MARB.

P127, lns16-27: This highlights the need to focus on spring NO3 reductions and is the correct priority!

P129, lns 14-29: This section points out the relative value in obtaining P reductions from sewage plant upgrades. This and the focus on tile drained systems should be highlighted in the executive summary as the appropriate places to seek P reductions.

P140, Table 11: I find it odd that the policies considered did not include an examination of the effects of international agricultural trade policies such as NAFTA on the costs that

U.S. farmers would incur to reduce N and P loads in the MARB. I expect this will substantially affect the competitiveness of American producers.

P145-146, lns40-2: This was an important conclusion that was left out of the first IA due to political pressures. It should be lifted up and highlighted in this Panels report.

P150, lns 38-45: Just a note that current buffer cost share programs help only with installation. Because these practices must be long-lived to be effective, some longer-term consideration should be given. Otherwise, the producer has no incentive to leave it in place.

P162, bullet #2 in the Key Findings Box: This contradicts the statement made on P161, lns 11-13 that "…wetlands restored on formerly cultivated cropland for the purpose of nitrate removal would have little or no net effect on N2O emissions."

P187, lns 6-14: If there is tilled land then there is a mechanism for SOM mineralization!

P189, lns 6-26: The Panel presents no data to support the conclusion that, "changes in fertilizer rates within the range of those optimum for corn production are unlikely to lead to long-term SOC and SON declines". All reports discussed were inconclusive or contradictory among each other.

P198, lns 34-43: This one paragraph is the basis of the whole report's premise that urban non-point sources are not contributory to N and P loads from the MARB. Just because urban areas make up less than 1% of the land area does not mean that they do not contribute a much higher relative proportion of nutrient loads. If a similar assertion were made with respect to CAFOs, then we must also assume that animal agriculture does not contribute N and P to the Gulf. Just because we have measured this data for CAFOs, but not for urban areas does not make this statement valid.

P215, Table 18: Why does this table not include and assessment of winter cover cropping, minimum tillage, and all the other practices listed in Table 17?

P218, first full bullet: What do you mean, "…given current constraints in cropping systems…"? Why not make the proposal that cropping systems in the MARB should be altered? You have cited plenty of reports indicating that a change in cropping system would be an effective means of reducing N and P loading to the Gulf.