Comments submitted by Dr. Bob Howarth, Hypoxia Advisory Panel member, 6-4-07

Page 7, lines 6-9: As written, the sentence does not even mention animal agriculture, and it implies that fertilizer losses from agricultural fields is just a result of not targeting the fertilizer use appropriately, which is not true. Also, at the scale of the MRB, fertilizer use on lawns, etc., is trivial. Therefore, I suggest replacing "Nutrients enter ecosystems through off-target migration of fertilizer from agricultural fields, golf courses, and lawns; atmospheric deposition of nitrogen; erosion of soil containing nutrients; sewage treatment plant discharges; and other industrial discharges" with "Elevated levels of nutrients reach coastal watersheds as a result of many human activities in the watershed, particularly agriculture (including animal feeding operations) but also urban wastewater treatment, industrial discharges, atmospheric deposition of nitrogen from fossil-fuel combustion, and other non-point sources in urban and suburban environments."

Page 7, Lines 9-13: The sentence is a little simplistic, and goes somewhat into mechanisms, without getting them quite write. I therefore suggest replacing "Excessive nutrients promote nuisance blooms (excessive growth) of opportunistic bacteria, cyanobacteria, or algae. When the available nutrients in the water column have been sequestered in plant biomass, the nuisance blooms die, decompose, and deplete dissolved oxygen in the water column and at the sediment water interface" with "Excessive nutrients lead to eutrophication and excessive phytoplankton production, often causing a depletion in dissolved oxygen in the water column and at the sediment-water interface."

Page 7, Lines 14-15: The "normal" amount of oxygen in waters is a complicated function of temperature, physics, etc.; I suggest we not be too specific, therefore, and delete "(≤ 8 mg/L),"

Page 26, lines 17-18: Change "For nitrogen, its deposition is estimated to be 13% of the amount of nitrogen that flows down the river" to "Direct deposition onto the waters of the NGOM amount to 13% of the nitrogen that flows down the Mississippi in an average year (Howarth 1998)."

Page 31, lines 25-28: I agree with Judy Meyers that the language suggests taking no action until we know more about the carbon fluxes. We should delete: "These links between locations and periods of specific nutrient limitation (or stimulation) of production and the fate of this production relative to hypoxia must be clearly established and quantified in order to formulate long-term, effective nutrient management strategies for this region."

Page 41, lines 21-23: Most of the organic matter that reaches the sediments of the NGOM is respired – eventually – and so potentially contributed to the formation of hypoxia. So I don't think the key research need is on better characterizing the composition and reactivity or lability of the organic matter. Rather, what is needed in the way of further research (if anything) is better characterization of the net flux as marshes degrade. That flux is poorly known, which goes to the heart of the argument; I believe it

must be really small, but there is uncertainty in that. Hence, our report says the flux from disappearing marshes may contribute. The way to nail that down would be to better determine that flux. I suspect most of the carbon that comes out does get decomposed on a time scale that could potentially contribute to hypoxia (within years to decades).... if the flux were significant.

Page 50, lines 28-29: I agree with Judy Meyers that we should point out the N and P correlation, at least over the past few decades. Back further in term, the loads are not as well correlated. Don Scavia did indeed make this point. He also has some new work directly on this, which we may wish to try to cite (a manuscript in preparation).