6-8-07

Dr. Stallworth,

As the DFO for the SAB Panel working on hypoxia in the Gulf of Mexico, I am sending you my comments on the Summary of Findings and Recommendations section of the draft report. I hope you can send them to the SAB hypoxia panel prior to your meeting in New Orleans next week.

I found the draft report to be inclusive of all aspects of the Gulf hypoxia story, well written, and a very positive step to resolving the problems. As with any document of this scope, there are points that I could pick on, but overall a nice job.

If you need further clarification or comments, please let me know.

Bob
Robert J. Diaz
Virginia Institute of Marine Science

Summary of Findings and Recommendations – Comments from Robert Diaz, Virginia Institute of Marine Sciences

This section is a good summary of the dissolved oxygen issues for the Gulf of Mexico. The broad set of recommendations put forth covers all aspects of the problem and pose good long-term solutions. If the key recommendations are implemented, I am certain that hypoxia in the Gulf of Mexico will be significantly reduced both spatially and temporally.

Overall, I would urge the HAP to consider the following points:

- Prioritization of the recommendations to focus managers and policy makers on what needs to be done first.
- Clearly articulate the level of effort that will be required to understand and solve the Gulf's hypoxia problems.
- View the Gulf of Mexico as a whole ecosystem. This is particularly important for understanding effects of physical processes on development of hypoxia, and for assessing effects of hypoxia on living resources at community and population levels.
- Assess how data from programs funded by private, state, and federal agencies can be applied to the problem of hypoxia in the Gulf of Mexico.

An example of the last point is the Department of the Interior's Mineral Management Service (MMS) that has funded, and continues to fund, regional and Gulf wide studies of currents that would be directly applicable to understanding physical processes on the shelf where hypoxia develops.

Specific comments:

Page 184, line 16. Reference to Figure 3 is wrong, Figure 6 is a closer match.

Page 184, line 41. I find it hard to imagine how fluid mud layers could extend over large areas to the west of the Mississippi delta. While fluid muds could suppress vertical mixing, what evidence is there that these types of layers occur over large areas west of the delta? In addition, Gulf hypoxia extends further off the bottom than 2 m, which would not support the contention that fluid mud layers are an important factor.

Page 185, lines 21-37. The scenario described for the Gulf of Mexico is the exact scenario that could be used to describe every other coastal system around the globe that experiences hypoxia. The point should be made in this paragraph that the Gulf of Mexico is not unique in this respect and is just one of dozens of systems that have followed the same path of declining dissolved oxygen from eutrophication driven by excess nutrient additions.

Page 185, line 44. While I would agree that the fate of terrestrial derived organic matter is not well characterized and if it were respired would contribute to lower dissolved oxygen, it is organic matter from in-situ primary production that fuels hypoxia in coastal systems around the world. Other organic sources take on more importance in rivers, estuaries, and bays.

Page 186, line 39. n should be in.

Page 187, line 4-9. Statements about the correlation between river flow and hypoxia seems a bit misleading. Current models, which predict and hind cast annual hypoxic area/severity, incorporate both flow and loading. To separate the two variables is not appropriate. What in the DiMarco citations lead you to make the statements regarding break down of the correlation? While I can follow that severity of hypoxia can increase dramatically from one year to the next, it is a combination of at least flow and nutrients that must be considered, not one or the other.
Also the Conley et al 2007 citation is missing.

Page 187, line 31-33. It could be a good idea to consider the contribution of P, but do not lose track of the fact that for marine systems it is N that really controls of primary production.

Page 189, line 2-34. Better models are needed for understanding both the spatial and temporal dynamics of hypoxia, but without finer resolution dissolved oxygen data it will not be possible to construct more complex process-based models. The immediate need for such models makes monitoring of dissolved oxygen a critical recommendation. This should be pointed out. Also, without higher resolution of dissolved oxygen levels in space and time we are stuck with current modeling approaches.

Page 195, line 7. I agree that negative effects of hypoxia on Gulf of Mexico ecosystems would be reversible if hypoxia could be vastly reduced or eliminated. My guess is that recovery rate for coastal systems would be a function of how quickly dissolved oxygen improved. In areas where hypoxia has been greatly reduced, even for a year or two, coastal ecosystems responded quickly. Examples of this can be seen in the Baltic with aperiodic bottom water renewals and in the Black Sea in the early 1990s after the collapse of the Soviet Union and subsequent reduction in nutrient loading. I would also agree that for enclosed systems recovery time could be decades.

Page 197, line 31. One of best examples, in the last 15 years, of ecosystem wide water quality and benthic habitat improvement following sewage treatment upgrades and reduction in P and N loading is Boston Harbor. You should add it to your list.