COMMENTS OF
THE GULF RESTORATION NETWORK,
EARTHJUSTICE LEGAL DEFENSE FUND,
CARIBBEAN CONSERVATION CORPORATION,
DELTA LAND TRUST, AND M-W ASSOCIATES
ON
THE DRAFT GULF OF MEXICO HYPOXIA ASSESSMENT REPORTS
PREPARED BY
THE COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

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The Gulf of Mexico and its associated estuaries and wetlands are a unique national ecological, economic, cultural, and recreational treasure. Gulf estuaries are critical to the survival of 98% of the Gulf's marine fisheries. The Gulf is home to the nation's largest and most valuable fishery -- shrimp. The Gulf of Mexico produces approximately 40% of the United States' commercial fishing yield, and 28% of the total landings for the United States. The Gulf also provides diverse habitats that shelter and feed thousands of species of coastal and marine wildlife. In short, the Gulf is an enormously valuable natural resource.

However, excessive amounts of nitrogen entering the Gulf from the Mississippi River create a seasonal "Dead Zone" which poses a serious threat to this national treasure. The Dead Zone is an area of low-oxygen (hypoxic) water off the Louisiana coast that forms every summer and can stretch from the mouth of the Mississippi River all the way to Texas. The river brings nutrients contained in runoff from farms, industries, and sewage plants. This promotes algae blooms that die, decompose, and use up the water's oxygen, which, in turn, drives away mobile sealife like fish and shrimp, and kills immobile bottom dwellers.

In 1997, the President's Committee on the Environment and Natural Resources ("CENR"), through its Hypoxia Work Group, began a scientific assessment of the causes and consequences of Gulf hypoxia. The results of this assessment have been set forth in six topical draft "Gulf of Mexico Hypoxia Assessment" reports (hereinafter "Draft Reports").

The undersigned groups, concerned about the Dead Zone and efforts to address this significant environmental threat to the Gulf, submit the following comments on the Draft Reports.

A. General Comments

The CENR is to be commended for initiating such a comprehensive effort to analyze the existing data pertaining to the extent, characteristics, causes, and effects (both ecological and economic) of hypoxia in the Northern Gulf of Mexico. These peer-reviewed Draft Reports make important findings regarding the relationship between nitrogen and the Dead Zone, sources of nitrogen entering the Mississippi River Basin, and potential strategies for reducing the levels of nitrogen reaching the Gulf. The Draft Reports also identify critical research needs.

The CENR's integrated assessment is an important first step. However, it is imperative that the Administration ensure that, once the Reports are finalized, state and federal agencies embrace the conclusions and recommendations of the Reports, and incorporate them into an action agenda to address the root causes of nitrogen pollution in the Mississippi River Basin. Moreover, it is critical that the research needs identified in the Draft Reports ultimately be incorporated into appropriate agency budget priorities and that full funding for all necessary research be appropriated by Congress. We look forward to working with the CENR and the Mississippi River/Gulf of Mexico Nutrient Reduction Task Force to ensure that the assessment is so utilized.

Recently, a report entitled "The Role of the Mississippi River in Gulf of Mexico Hypoxia," Environmental Institute Report 70 (May 1999) (hereinafter "Fertilizer Institute Report") was completed for the Fertilizer Institute. We have heard assertions that the Fertilizer Institute Report undermines certain findings of the CENR Draft Reports. However, a careful review of the Fertilizer Institute Report reveals that there is no significant conflict between the conclusions reached in that Report and those reached in the CENR Draft Reports. In fact, these Reports agree on most issues. Common conclusions include findings that:

1) there is a relation between phytoplankton production in the Gulf and nutrients exported from the Mississippi River;

2) agriculture is the single most significant contributor of nitrogen to the Mississippi River;

3) anthropogenic changes in the Mississippi River basin watershed, including significant loss of wetland habitats, increased levying of the Mississippi River, and increases in precipitation have influenced nutrient flux in the watershed; and,

4) although mean annual nitrogen flux has tripled in the last 30 years, little change in the annual nitrogen flux has occurred since the late 1970's or early 1980s.

(The Reports disagree about whether nitrogen flux stabilized in 1979 or the early 1980s.)

In short, rather than undermining the CENR Draft Reports, the Fertilizer Institute Report confirms the need for a comprehensive strategy to address excessive nitrogen loadings to the river, similar to the strategy reflected in the recommendations of the CENR Draft Report 5. Those recommendations call for reforms in agricultural practices such as: changes in manure management; restoration of riparian and wetland areas; changes in the U.S. Army Corps of Engineers' approach to flood control; careful design and operation of lower Mississippi River water

diversion projects; and reduction of point sources -- including strict requirements for tertiary treatment for all new Publicly Owned Treatment Works ("POTWs"). These recommendations address all of the anthropogenic changes in the Mississippi Basin posited by the Fertilizer Institute Report as possible contributors to the Dead Zone. Accordingly, in order to address inaccurate assertions that have been made about the Fertilizer Institute Report conflicting with the CENR Reports, the Fertilizer Report should be fully reviewed and analyzed prior to finalization of the CENR Reports.

B. Specific Comments Regarding Individual Draft Reports

Draft Report 1: Characterization of Hypoxia

Draft Report 1 thoroughly analyzes the interaction between nitrogen entering the Gulf of Mexico via the Mississippi River and its relationship to the size and extent of the Dead Zone in the Gulf of Mexico. The findings of Draft Report 1 are clearly consistent with the finding in other watersheds that anthropogenic sources of nutrients have a pervasive ecological effect on shallow coastal and estuarine areas. *See, e.g.*, J.M. Burkholder et al., Rupture of a Large Swine Waste Holding Lagoon in North Carolina, U.S.A.: Impacts on a Coastal River and Estuary, J. Envtl. Quality (1997); Justi et al., Trends in Oxygen Content 1911-1984 and Occurrence of Benthic Mortality in the Northern Adriatic Sea, 24 Estuar. Coastal Shelf Sci. 435 (1987).

Draft Report 1 is also consistent with the findings contained in a report recently released by the Council for Agricultural Science and Technology: John A. Downing et al., Hypoxia in the Gulf of Mexico: Land and Sea Interactions (June 28, 1999) (attached hereto as Appendix 1 and incorporated herein by reference (hereinafter "CAST Report")). The authors of the CAST Report concluded that flood and drought observations support a strong connection between river nutrients and hypoxia and that "N is the river-borne nutrient most relevant to phytoplankton production in the broad marine region contributing to hypoxia". CAST Report, Ch. 2.

Draft Report 2: Ecological and Economic Consequences of Hypoxia

We are very concerned that the Executive Summary of Draft Report 2 makes an apparent unequivocal finding that "[t]he economic assessment based on fisheries data . . . failed to detect effects attributable to hypoxia." Draft Report at 8. Such a finding is contrary to the body of the Draft Report, which notes that in the absence of an existing body of analysis, the Report engaged only in what should be viewed as an exploratory or preliminary analysis of existing data to identify possible hypoxic effects. Almost every discussion of data and analysis within the Draft Report is prefaced with observations regarding the many assumptions that were made, the limited number of data sets available, and the fact that proxies utilized were "rough." The authors obviously thought this limitation in data was important in terms of the ecological assessment, because they qualify the ecological findings with the statement that "[g]iven the limitations of the ecological assessment. . . ." Draft Report at 8. (We find it peculiar that no similar qualifying clause is associated with findings regarding the alleged absence of any economic impact, since more is actually known about the ecological effects of hypoxia than is known about the economic effects at this point in time.) Accordingly, it is critical that this Draft

Report be clearly and unequivocally revised to reflect the fact that the necessary research has not yet been done regarding ecological and economic impacts of the Dead Zone; any implication that there are, in fact, no such impacts is entirely inappropriate and could drastically skew major policy decisions.

This Draft Report is far too circumscribed in its subject matter. The Report looks only at ecological and economic impacts of hypoxia on the Gulf, and entirely fails to address any of the ecological or economic consequences of nitrogen pollution in lakes, rivers, and streams throughout the Mississippi River Basin as it moves down the Basin. Nitrogen pollution has numerous economic costs to society. For example, data from the Environmental Protection Agency indicate that agriculture-related nutrients account for much of the degradation of water quality in rivers throughout the Basin, and significant impairment of lake acreage. U.S. Environmental Protection Agency, National Water Quality Inventory (1994). Nitrate/nitrogen levels in drinking water sources also significantly increase treatment costs incurred by drinking water treatment facilities. All of the economic impacts or costs of nitrogen pollution in the Mississippi River Basin must be fully considered.

With regard to the analysis of impacts to the Gulf, both the Executive Summary and the Conclusions sections of Draft Report 2 entirely fail to acknowledge the possible impact of hypoxia on biodiversity. For example, the Report acknowledges that energy pulses associated with hypoxia favor short-lived opportunistic species over larger, longer lived species that aerate sediments and help prevent the buildup of organic matter. Yet, the Conclusions section of the Report does not address this impact. The Conclusions section focuses on "fisheries and fish populations" while ignoring the significant impacts to benthic communities that serve as prey for economically important species, as pointed out in the body of the Report. Congress and the National Marine Fisheries Service both recognize the importance of fisheries habitat and prey species to sustainable fisheries. *See,* 16 U.S.C. § 1801-1883. Accordingly, the Conclusions section of the Report must be revised to discuss impacts to prey species and how such impacts affect economically important species.

Because the Report limits its analysis of the impacts to fisheries and fish populations to four economically important species (brown shrimp, white shrimp, red snapper, and menhaden), the Executive Summary and Conclusions of the Draft Report should clearly note this limitation. But more importantly, the authors should consider inclusion of other potentially affected species, such as red drum or other Sciaenids. Red drum, determined to be overfished by the National Marine Fisheries Service, is an economically important species which could be affected by hypoxia. Red drum generally feed off benthic organisms that are subjected to hypoxic conditions. Additionally, juvenile and subadult red drum spend time in coastal wetlands before moving offshore as adults to spawn. Therefore, the diet and movement patterns of adult and larval red drum may be affected by the annual occurrence of hypoxia in the Gulf.

Moreover, we find it peculiar that the Draft Report failed to detect effects on fisheries attributable to the Dead Zone, in light of the CAST Report which did make such a finding: "[b]ecause hypoxia blocks and eliminates access of migrating juvenile shrimp to offshore feeding grounds, lost production is probably significant over as much as 50% of the coastal shelf of Louisiana." CAST Report, Ch. 3 at 17. The CAST Report also found that the fact that overall

yield has shown no "striking trend" since the late 1970s "cannot be interpreted to mean that the impact of hypoxia has been minimal." Id. To the contrary, the CAST Report concludes that:

> Although declines in overall fisheries yields have not been dramatic over the period of increased hypoxia . . ., CPUE (catch per unit effort) data from the brown shrimp and white shrimp fisheries in the Gulf are consistent with the hypothesis of increased environmental impact. Decadal average CPUEs have declined continuously since the 1960's, with the most rapid rate of decline between the 1980s and 1990s. . . . A similar but less steep decline has been observed in the white shrimp fishery. . . . CPUEs in these fisheries have declined by more than 25% since the 1960s . . . . Although declines in the shrimp industry may be linked to changes other than hypoxia, there is no current evidence of recruitment failure; thus, the trend is consistent with the hypothesis of environmental impact.

CAST Report, Ch. 3 at 18. The authors of Draft Report 2 should carefully consider these findings before finalizing their Report.

Draft Report 2 fails to adequately discuss the potential economic impact of disruptions in shrimp migrations. Although the Report does look at the ecological impact of such migration disruptions and the economic impact of the possible movement of shrimpers offshore, no consideration is given to the economic impact of east/west movement of shrimpers. It is undeniable that such an east/west movement could have equally negative economic impacts. Recent data indicate that years of strong inshore shrimp production in Louisiana have coincided with increased landings in Texas; historically, that has not been the case. (Personal communication with Dr. James Nance, National Marine Fisheries Service). It can be inferred from this recent change that hypoxic conditions have led to a more east/west shrimp migration pattern rather than an historical migration to the offshore waters south of Louisiana. Absent other factors, this change in migration pattern undoubtedly causes Louisiana shrimpers to travel greater distances in the Gulf. Increases in distance traveled concomitantly increase the costs of doing business (i.e., gasoline, ice, etc.), and decrease profits. *See* CAST Report, Ch. 3 at 18 (noting that increased levels of effort required to catch shrimp due to the effects of hypoxia on shrimp migration patterns decrease net revenue to the fisheries, impacting social welfare).

We have concerns regarding the methodology employed in attempting to analyze the economic effects of hypoxia. It is difficult to analyze the aggregate fisheries impact of degraded water quality by examining landings or dockside values. *See* CAST Report, Ch 3 at 18. There are also dangers in using CPUE to estimate stock size. Consistent landings or CPUE can be clouded by governmental management systems, increased technology, improved shrimp location data, or the grouping of shrimp due to hypoxia. For example, if technology improves catch per unit effort, the model employed in the Report's analysis would assume higher stock size. Yet, this assumption would clearly be erroneous. Additionally, a finding that fishery landings are constant is not an absolute indication that the fishery is healthy. For instance, with current increases in technology it could be assumed that fisheries landings would be increasing. The fact

that they are not may be an indication that shrimp populations are declining, or it could just as easily be the result of management measures.

Furthermore, the grouping of statistical areas as part of the economic analysis is problematic. Such areas were grouped into three zones: Eastern Louisiana, Louisiana, and Texas. The Eastern Louisiana and Texas zones were used as a "kind of control" to distinguish between effects due to hypoxia and effects due to climate or other factors. There are obvious dangers in the use of these zones as controls. Significant differences in habitat, climate, and geologic processes are found within each of these regions. These difference alone may skew the analysis of economic impacts caused by the dead zone.

The authors of the Report concede that evidence from other hypoxic zones indicates that, in the face of worsening hypoxic conditions, at some point fisheries will decline, perhaps precipitously. Shrimp are an annual crop, significantly, and changes in the stock size of such annual species can occur in as little as one season. A dramatic reduction in stock size, were it to occur, would inflict potentially devastating impacts on what is economically the most important fishery in the Gulf of Mexico. Yet, the Draft Report includes no discussion of the impact such a potential collapse would have on the fishery, the fishermen, or the coastal communities dependent upon the fishery. A simple review of existing economic data regarding the economic value of the Gulf's shrimp fishery would reveal the magnitude of the economic impact of such a collapse. Such an analysis must be included in the final version of the Report if the potential economic ramifications of the Dead Zone are to be fully understood.

Finally, the Report notes that SEAMAP data has not been analyzed. SEAMAP is one of the most extensive fishery databases in the Gulf. It would behoove the authors of Draft Report 2 to conduct a full analysis of this substantial database prior to issuance of their final report. It is quite possible that the SEAMAP data could provide answers to many questions regarding the ecological and economic impacts of hypoxia that remain unanswered by the Draft Report.

Draft Report 3: Flux and Sources of Nutrients in the Mississippi-Atchafalaya River Basin

We believe that Draft Report 3 contains a thorough analysis of historical streamflow and water quality data. The Report includes an analysis of all pertinent data and establishes conclusively that the states above the confluence of the Mississippi and Ohio Rivers are the major contributors of nitrogen to the Mississippi River Basin and the Gulf. The findings of Draft Report 3 conform with the findings of the CAST Report. In fact, the percentages assigned within the two reports to the various sources of nitrogen are entirely consistent. The CAST Report notes that agriculture has been implicated in 60% of the assessments of river water quality degradation in the United States. In analyzing the size of major nitrogen releases, the CAST Report also indicates that 55% of the nitrogen used or released to the basin is attributable to agricultural fertilizers, 26% is from fixation by leguminous crops, 2% is from human sewage and industry, 3% is from nonagricultural fertilizer use, and 15% is from anthropogenic nitrogen deposition through precipitation. The authors of the CAST Report thus conclude, much like the authors of the CENR Draft Report, that "[a]lthough many sources of N contribute to the problem, the sheer

magnitude of N used in agriculture makes it likely that the majority of increased N transported by the Mississippi River is of agricultural origin." CAST Report, Ch. 4 at 19.

Draft Report 4: **Effects of Reducing Nutrient Loads to Surface Waters Within the Mississippi River Basin and Gulf of Mexico**

and

Draft Report 5: **Reducing Nutrient Loads, Especially Nitrate-Nitrogen, to Surface Water, Groundwater, and the Gulf of Mexico**

In general, the findings and recommendations of Draft Reports 4 and 5 are accurate and reflect both in-depth analysis and creative thinking. These Draft Reports address all possible factors linked to increased nitrogen levels to the Gulf, including increases in nitrogen use, the rate of flow of water to the Gulf, leveeing, damming, and channeling of the Mississippi River, and the loss of wetlands in southern Louisiana. The recommendations within that Report also seek to address significant contributors of nitrogen through a combination of wetland restoration and establishment of riparian buffers as zones for denitrification and sequestration of nutrients. The advantages of such an approach extends beyond the issue of nitrogen pollution, providing the additional benefits of flood control, increased wildlife habitat, detoxification, erosion control, and reduced sedimentation of water bodies -- objectives consistent with other state and national policy initiatives.

We concur strongly with the authors' emphasis on the need for strategic placement of wetlands and riparian areas in the watersheds. To successfully address the Dead Zone, those areas that export high rates of nitrate-nitrogen must be targeted. Random placement of wetland and riparian areas, while worthwhile for other reasons, will not achieve the desired result of significant reduction in nitrogen inputs to the Basin.

The recommended changes in farm practices -- the integration of more perennial crops, the reduction of subsurface drainage, better timing of manure and fertilizer applications, and nutrient accounting -- are also laudable. Most of these recommendations, while requiring some adjustments on the farmers' part, will likely work toward the farmers' long-term economic interests through more efficient use of nutrients, reduction of off-farm input costs, and reduced pollution hazards for well and pond water.

The Report rightly points out the importance of coupling comprehensive monitoring with nitrogen mitigation programs in order to discern whether and how well such programs work. However, historically such monitoring has often not occurred. Accordingly, it is essential that the need for monitoring be highlighted as a critical issue, and not merely presumed.

We concur with Draft Report 5's conclusion that subsurface drainage ("tiling") is a significant contributor to and primary source of high nitrate loads in the Corn Belt states. In those states, there are about 50 million acres of intensively drained farmland. Most is drained through the use of subsurface tile. In fact, there has been a significant increase in tile drainage in recent years and it is likely that this trend will continue. In these areas, elevated levels of nitrate-nitrogen concentrations in drainage water will be lost in tile-drained soil regardless of fertilizer

management practices. This trend would appear to explain why, despite purported decreases in the use of fertilizers on corn, no significant decrease in nitrogen inputs to the Mississippi River has been observed: the increase in the acreage of tile-drained fields has potentially offset any reduction in fertilizer use. Yet, despite the clear role that "tiling" plays in the levels of nitrogen entering the river, Draft Report 5 offers very little discussion of management of these drainage systems. Moreover, research recommendations listed in the Draft Report fail to identify the need for additional research on efforts to encourage adoption of management of tile drainage. Given the importance of this issue, recommendations for such management must be accorded more emphasis in the Final Report.

We applaud the Draft Report's clear acknowledgment of the role of manure as a significant source of nitrogen loading in the watershed, and as a source of nutrient pollution. However, we are distressed by the failure of the Draft Report to acknowledge large, concentrated animal feeding operations ("CAFOs") as a growing concern. CAFOs contribute to nutrient pollution in several ways: emissions of ammonia, excessive and concentrated disposal of manure, lagoon leakage, and all-too-frequent total waste lagoon failures. In fact, the enormous volume of water accumulated at these factory farms is so great that the possibility of sustainable nutrient cycling back to cropland is virtually impossible. During his oral presentation regarding Draft Report 6, Dr. Otto Doering asserted that the threat of nutrient pollution from livestock agriculture is more significant than calculations of manure output suggest. He further indicated that this is due to the concentrated industrial manner in which animals are now raised and their wastes disposed. Dr. Doering's conclusions find support in recent publications. *See, e.g.*, Carey, et al. The Role of the Mississippi River in Gulf of Mexico Hypoxia, 70 Envtl. Institute Rep. at 27 (May, 1999); Clean Water Network and Natural Resource Defense Council, America's Animal Factories: How States Fail to Prevent Pollution from Livestock Waste (December, 1998).

Alternatives to concentrated animal feeding certainly do exist. Most entail the redistribution of livestock back onto the farms where the feed is being produced and the manure can be economically and ecologically used as a fertilizer. This re-opens the option for sustainable nutrient cycling. Many alternatives are also associated with the increased grazing and feeding of perennial forage crops which has been acknowledged in the Draft Report as a useful means for reducing nitrate pollution. Yet, no recommended action beyond better management of manure spreading is discussed within the Report. Clearly, additional attention must be given this issue.

Draft Report 5 also fails to acknowledge the use of cover crops as a means to reduce nitrate pollution. The use of non-leguminous grasses as "catch crops" has long been a strategy for sequestering soluble nutrients and recycling them for subsequent crops. Considerable research has already been done on this technique, much of it using cereal rye and ryegrass -- species adaptable throughout most of the Mississippi River Basin. Techniques for interseeding and overseeding these grasses have also been developed, and there would be few barriers to implementation. In truth, cover cropping should, by now, be well integrated into Best Management Practices for row crop production. Unfortunately, that change has been too slow in coming.

Finally, Draft Report 5 ignores the results of studies that demonstrate the positive impact that whole farming systems -- such as organic farming -- can have on nitrogen pollution. Organic

farming is an approach to agricultural production that replaces pesticides, soluble fertilizers, and monoculture with biodiversity, cultural practices, and inputs that are more environmentally friendly. Recently published results of a 15-year study reveal that nitrate leaching was 50% less under organic production systems than under the typical conventional system. Drinkwater, L.E. et al. Legume-Based Cropping Systems Have Reduced Carbon and Nitrogen Losses, 396 (19) Nature 262 (1998). Another recent publication reports the large increases in nitrate leaching were found when several Illinois farm fields were converted from diverse organic rotations and management to conventional corn and soybean production. W.A. Goldstein, et al., Impact of Agricultural Management on Nitrate Concentrations in Drainage Waters, 13 (3) American J. of Alternative Agriculture 105 (1998).

Draft Report 6: Evaluation of Economic Costs and Benefits of Methods for Reducing Nutrient Loads to the Gulf of Mexico

We are deeply concerned about the findings in Draft Report 6. As a threshold matter, and as previously discussed regarding our critique of Draft Report 2, existing studies do indicate that there is both an economic and an ecological impact to the Gulf's resources as a result of the Dead Zone, but the CENR Draft Reports fail to adequately assess such impacts. The evaluation attempted by Draft Report 6 regarding economic costs and benefits of methods for reducing nutrient loads cannot be completed until an in-depth analysis of those impacts has been prepared.

Additionally, an analysis of the "benefits" of reducing loads in the Mississippi River Basin cannot be circumscribed only to those "benefits to the Gulf of Mexico." Nutrients are responsible for significant pollution problems throughout the Mississippi River Basin and its tributaries. *See*, U.S. Environmental Protection Agency, National Water Quality Inventory (1994). Reduction of nitrogen will have benefits for these watersheds as well as the Gulf. For example, national studies have found that the social benefits of decreasing agricultural nonpoint nutrient flux exceed private costs by a substantial margin. CAST Report, Ch. 6 at 29 citing T. Prato, Summary of MSEA Socioeconomic Research, Center for Agriculture, Resource and Environmental Systems, Univ. of Missouri (1995) (unpublished). Accordingly, the economic and social benefits of nitrogen reduction for local communities throughout the Mississippi River Basin and its tributaries must be included within the analysis of economic benefits of nitrogen reduction contained within the Final Report.

Moreover, as previously discussed, the recommendations in Draft Report 5 would have additional benefits beyond the reduction of nitrogen pollution. For example, restoration of wetland and riparian areas have clear implications for improvement of overall water quality, increased wildlife habitat, and flood damage reduction. These in turn create additional ecological and economic benefits. Accordingly, in the final Report a full analysis must be given all such benefits throughout the Mississippi River Basin.

Respectfully submitted,

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