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The Influence of Stakeholder Groups on the Decision Making Process Regarding the Dead Zone Associated with the Mississippi River Discharge

Lisa M. Fairchild
University of South Florida

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The Influence of Stakeholder Groups on the Decision Making Process Regarding
the Dead Zone Associated with the Mississippi River Discharge

by

Lisa M. Fairchild

A thesis submitted in partial fulfillment
of the requirements for the degree
Master of Science
Department of Environmental Science and Policy
College of Arts and Sciences
University of South Florida

Major Professor: Andrew Price-Smith, Ph.D.
John Daly, Ph.D.
Frank Muller-Karger, Ph.D.

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ABSTRACT

The *Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico* represents the first national attempt to address this environmental issue. Hypoxia is the condition of low concentrations of dissolved oxygen in a body of water. This condition leads to a so-called “dead zone” and potentially threatens industries dependent on the living marine resources of this area. The potential impact of any policy or plan designed to combat hypoxia in the Northern Gulf of Mexico could have significant impacts on stakeholder groups, specifically the fishing industry in the Gulf of Mexico, and the agriculture and fertilizer industries in the Midwest.

This thesis examines the influence of the relative economic power of the aforementioned industries on the development of effective policy to mitigate hypoxia. The relative economic power of the agriculture and fertilizer industries has significantly impacted the development and efficacy of this plan. The fishing industry, on the other hand, was not well represented in the development of the plan. The *Action Plan* reflects the interests of industries with significant lobbying power, while the interests of less mobilized groups are not equally represented. This disparity between the influence of industry on the development of policy designed to reduce, mitigate and control hypoxia

in the Northern Gulf of Mexico could severely restrict the efficacy of future attempts to address the problem. This includes the recommendations set forth by the United States Commission on Ocean Policy regarding non-point source pollution as it pertains to hypoxia, as well as any new plan that could result from the five year reassessment of the *Action Plan*, which is currently in progress.

CHAPTER 1: INTRODUCTION

Introduction

The hypoxic area in the Northern Gulf of Mexico, off the coast of Louisiana, has the potential to disrupt industries that are important to the well being of states proximate to the Gulf as well as states within the Mississippi River Basin. The condition of low oxygen leads to a so-called “dead zone” off the Mississippi/Atchafalaya Delta that ranges, on average, in area between 5000 to over 20000 square kilometers in a given year.¹ Although hypoxic conditions can occur naturally, hypoxia in the Northern Gulf of Mexico has been accentuated by anthropogenic activities in the Mississippi River Basin.² Hypoxia is caused by a combination of factors including stratification and eutrophication³, which will be elaborated on later in this chapter.

One of the major industries in the Gulf of Mexico region is the fishing industry. On the other hand, agricultural concerns are of great importance throughout the Mississippi River basin, the breadbasket of the U.S.A. The purpose of this is to examine the perception of the efficacy of the *Action Plan for Reducing, Mitigating and Controlling Hypoxia in the Northern Gulf of Mexico*. The hypothesis of this thesis is that the economic powers of the fishing, agriculture, and fertilizer industries compete at the

¹ Nancy N. Rabalais, R. Eugene Turner, and William J. Wiseman Jr., “Hypoxia in the Gulf of Mexico,” *Journal of Environmental Quality* 30 (2001): 320-329.

² Scott W. Nixon, “Coastal Marine Eutrophication: A Definition, Social Causes, and Future Concerns,” *Ophelia* 41 (1995): 199-219; Nancy N. Rabalais, R. Eugene Turner and Donald Scavia, “Beyond Science into Policy: Gulf of Mexico Hypoxia and the Mississippi River,” *BioScience* 52 (2002): 129-142.

³ Nancy N. Rabalais et al., 1999, *Characterization of Hypoxia: Topic 1 Report for Integrated Assessment on Hypoxia in the Gulf of Mexico*. NOAA Coastal Ocean Program Decision Analysis Series No. 15. NOAA Coastal Ocean Program, Silver Springs, MD. 167pp.

federal level and inhibit the development of an effective national strategy to mitigate the seasonal hypoxic area in the Northern Gulf of Mexico. Within this context, this thesis also evaluates the climate within which the government and stakeholders are to act, or not, on the recommendations set forth by the U.S. Commission on Ocean Policy to combat non-point source pollution as related to the formation of the dead zone.

Chapter 1 lays out the background of the problem and methods to be used in the examination of the influence of industry on the development of environmental measures to address hypoxia in the Northern Gulf of Mexico. Chapter 2 presents an analysis and discussion of data and results. Primary Sources, government documents, articles from major newspapers as well as data collected by questionnaires are included in chapter 2. Finally, chapter 3 presents conclusions and recommendations.

Economic Relevance

The waters off the coast of Louisiana are home to approximately 40% of US fisheries.⁴ Therefore, to a large extent, the US seafood industry is dependent on Gulf fisheries. Nearly 26% of all seafood landed in the country comes from the Louisiana fishing industry.⁵ One of the major fisheries located in the Northern Gulf of Mexico is the shrimp fishery. In 2002, the shrimp fisheries off the coasts of Louisiana and Texas supplied approximately 57% of the nation's total shrimp landings. The commercial shrimp fisheries in the waters off Louisiana, alone, accounted for approximately 34% of

⁴ Environmental Protection Agency, January 2001, "Action Plan to Reduce the Size of the "Dead Zone" in the Gulf of Mexico," <http://www.epa.gov/msbasin/factsheet.htm> (January 20, 2004).

⁵ Louisiana Department of Economic Development, "Louisiana Overview," (2004). <http://www.led.state.la.us/overview> (June 14, 2004).

the total annual US shrimp catch in 2002.⁶ Shrimp and shellfish are a source of significant revenue for the state of Louisiana, contributing approximately 70% of the total commercial fisheries value in 1996.⁷

In 2002, the value of landings from fisheries off the coast of Louisiana was determined to be \$305.5 million, second only to Alaska in the value of national landings for that year. In comparison, the value of landings from Alaska's fisheries was determined to be \$811.5 million in 2002. Texas, which also depends on the Gulf Coast fisheries, ranked fifth, behind Alaska, Louisiana, Maine and Massachusetts, in terms of the value of commercial landings in 2002. Landings from Texas generated \$167 million dollars in 2002.⁸ In 1996, retail sales of all Louisiana's commercial landings were \$2.1 billion, with shrimp and shellfish accounting for \$1.5 billion of that value.⁹

Additionally, in 1996, the Louisiana commercial fishing industry provided approximately 31,000 jobs, with 22,000 of those being located in the shrimp and shellfish industry.¹⁰ The local recreational fishing industry also contributes to the economy of the Gulf Coast. On a regional scale, the Gulf fishing industry, commercial and recreational, has an economic impact of approximately \$5 billion dollars and employs approximately 200,000 people.¹¹

⁶ David Van Voorhees and Elizabeth S. Pritchard, *Fisheries of the United States, 2002*, National Oceanic and Atmospheric Administration/ National Marine Fisheries Service, Silver Springs: National Marine Fisheries Service, 2003

⁷ Rob Southwick, March 1997, *The Economic Benefits of Fisheries, Wildlife and Boating Resources in the State of Louisiana*, prepared by Southwick Associates for the Louisiana Department of Wildlife and Fisheries.

⁸ Van Voorhees and Pritchard, 6.

⁹ Southwick, 17

¹⁰ Ibid.

¹¹ John McQuaid, "Way of Life Threatened Along with Gulf's Vast Bounty," *Times-Picayune* (New Orleans, LA), March 24 1996, 3rd edition, National A37. Available on-line from LexisNexis [cited April 3, 2004.]

Despite the significant importance of the Gulf fishing industry to key states such as Louisiana, Texas and Florida, the issue of hypoxia in the Northern Gulf of Mexico remains unresolved. There is currently a lack of empirical data on the economic impact of hypoxia on the fishing industry in the Gulf of Mexico. The dearth of data may be partially explained by the complication of isolating the impact of hypoxia on fisheries. Diaz and Solow indicated that other factors, such as overfishing, in addition to hypoxia may be responsible for changes in the fisheries of the Gulf of Mexico, making it difficult to quantify the impact of hypoxia in this area.¹²

A further complication is that while hypoxia in the Gulf of Mexico may negatively impact the fishing industry, efforts to combat hypoxia may impose economic hardship on the agricultural industry in the Midwest¹³, including crops and livestock, as well as the fertilizer industry in general. The Mississippi Basin accounts for nearly 55% of agricultural lands, supplies 1/3 of the farm related jobs (approx. 1 million) in the US and contributes \$98 billion to the National economy from agricultural products alone.¹⁴ Furthermore, the fertilizer industry relies on the Midwest farmer as a consumer of their product. Annually, on average, approximately 7 million metric tons of nitrogen fertilizer is applied to land in the Mississippi River Basin.¹⁵ In 2000, anhydrous ammonia, the most common type of nitrogen fertilizer, accounted for 30% of all fertilizer consumed.¹⁶ Using an average price of \$233.19 dollars per ton of anhydrous ammonia fertilizer from

¹² Robert J. Diaz and Andrew Solow, 1999, *Ecological and Economic Consequences of Hypoxia: Topic 2 Report for the Integrated Assessment on Hypoxia in the Gulf of Mexico*. NOAA Coastal Ocean Program Decision Analysis Series No.16, NOAA Coastal Ocean Program, Silver Springs, MD. 45pp.

¹³ David Malakoff, "Death by Suffocation in the Gulf of Mexico," *Science* 281 (1998): 190-192.

¹⁴ *Ibid.*, 191; John A. Downing et al., 1999, *Gulf of Mexico Hypoxia: Land and Sea Interactions*, Council for Agricultural Science and Technology, Task Force Report No. 134, CAST. Ames, Iowa.

¹⁵ Donald A. Goolsby and William A. Battaglin, December 2000, *Nitrogen in the Mississippi River Basin- Estimating Sources and Predicting Flux to the Gulf of Mexico*, USGS Fact Sheet 135-00. 6pp.

¹⁶ Deborah Kramer, "Nitrogen," *U.S. Geological Survey Mineral Yearbook* (2000): 55.1-55.12

1990-2000, the sale of 2.1 million tons in the Mississippi River Basin generated nearly half a billion dollars for the fertilizer industry in 2000.¹⁷

All three of the industries involved in this issue are important to their respective regions. The issue of hypoxia in the Northern Gulf of Mexico pits the interests of the Gulf fishing industry against those of the Midwest agriculture and fertilizer industries.

Theoretical Issues

Common pool resources (CPRs) present obstacles to management because the interests of a large number of stakeholders must be considered in the development of any management plan. There are three models that, according to Elinor Ostrom, are used to justify the government's control of CPRs. The models are listed and briefly explained below:

1. The Tragedy of the Commons: according to this theory individually rational choices lead collectively to irrational outcomes.
2. The Prisoner's dilemma game: is a non-zero sum game where the players have the option to defect or cooperate. This game theory highlights the value of cooperation.
3. Collective action: assumes that individuals in a group will cooperate in order to achieve a common goal.¹⁸

Ostrom argues that "free riders," a common factor between the three models mentioned above, make common pool resources susceptible to governmental authority. Free-riders

¹⁷ Calculated using data from United States Department of Agriculture, "Agricultural Prices, National Agricultural Statistics Survey," <http://www.tfi.org/statistics/pricespaidbyfarmers%20.pdf> (24 April 2004).

¹⁸ Elinor Ostrom, *Governing the Commons-The Evolution of Institutions of Collective Action* (Cambridge: Cambridge University Press, 1990).

are those individuals who benefit from the actions of a group without contributing to achieving that benefit. Free-riders occur frequently in the management of common pool resources because there is no way to ensure the cooperation of all participating parties, especially when one person cannot be excluded from the benefits of a resource, regardless of whether or not they contribute to efforts to manage the selected resource.¹⁹

The management of common pool resources is additionally complicated by the often voluntary nature of such efforts. Appeals to the conscience are often used as a tool to encourage support and cooperation for such efforts; however, as Hardin suggests, appeals to the conscience favor the free riders. Furthermore, Hardin concludes that the commons will be destroyed if left up to the voluntary actions of man.²⁰ Like Hardin, Mancur Olson also recognizes the problem with group theory. Olson points out that individuals will not voluntarily act in the best interests of the group without coercion or incentives.²¹ This lack of voluntary participation hinders the successful management of common pool resources; thereby, necessitating an alternative way to govern the commons.

According to Ostrom, a common pool resource refers to a resource, either natural or man made, that is available to anyone.²² The Mississippi River and the associated basin fit this definition. The Mississippi-Atchafalaya basin is the third largest basin in the world and drains approximately 40% of the United States.²³ Both the Midwest agricultural industry and the Gulf fishing industry depend on the resources of this area.

¹⁹ Ostrom, 6.

²⁰ Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (1968): 1243-1248.

²¹ Mancur Olson, *The Logic of Collective Action- Public Goods and the Theory of Groups* (Cambridge: Harvard University Press, 1971).

²² Ostrom, 30.

²³ Downing et al., 19; Goolsby and Battaglin, 2; Rabalais, Turner and Scavia, 129.

The wide and open availability of the resources (land for agriculture, fish and shellfish) makes them vulnerable to overexploitation and difficult to protect.²⁴ Not only are states adjacent to the basin affected by it, but states a thousand or more miles away from the headlands of the Mississippi River, such as Louisiana, are affected by natural and human processes upstream in the Mississippi River Basin.

Hypoxia

According to a recent summit of the United Nations Environmental Programme (UNEP) there are over 150 hypoxic areas around the world. The number of “dead zones” has nearly doubled over the last decade. The UNEP has identified these areas as a top emerging environmental concern because of their rapid increase in number and potential negative impacts on marine life.²⁵ Hypoxic areas exist in marine as well as fresh water ecosystems around the world. An area is considered hypoxic when there is not sufficient oxygen available to sustain marine life. The amount of oxygen at which marine life can no longer be sustained has been determined to be below 2 milligrams per liter.²⁶ Rabalais et al. identified two environmental conditions associated with the development of hypoxia: eutrophication and stratification.²⁷

²⁴ Ostrom, 30.

²⁵ Hans Greimel, “U.N. environment summit opens, targets oceans dead zones,” *Associated Press*, March 20, 2004 (article received via email April 18, 2004).

²⁶ John S. Pavela, Jeffrey L. Ross and Mark E. Chittenden, “Sharp Reductions in Abundance of Fishes and Benthic Macroinvertebrates in the Gulf of Mexico off Texas Associated with Hypoxia,” *Northeast Gulf Science* 6 (1983): 167-173; Maurice L. Renaud, “Hypoxia in Louisiana Coastal Waters during 1983: Implications for Fisheries,” *Fishery Bulletin* 84 (1986): 19-27.

²⁷ Rabalais et al., *Characterization of Hypoxia*, 34.

Causes of Hypoxia

Nutrients are vital for the productivity of marine ecosystems; however, over-enrichment can be deleterious. Howarth et al. identified nutrient over-enrichment as a major threat to coastal ecosystems.²⁸ One result of over-enrichment is eutrophication, which is defined by Scott W. Nixon as “an increase in the rate of supply of organic matter to an ecosystem.”²⁹ Eutrophication can occur naturally; however, it is often associated with nutrient loading resulting from anthropogenic activities or changes including flood control, channelization, landscape alterations, municipal sewage and fertilizer application.³⁰

The addition of nutrients does not always have a negative impact on the ecosystem. Increased primary productivity can be associated with higher fishery production; however, there is a pareto-optimal threshold for the amount of organic matter that can be utilized by marine ecosystems. Phytoplankton not utilized by the system settles on the bottom and is decomposed by bacteria, which reduces the levels of dissolved oxygen in the water.³¹

Much of the anthropogenic-induced eutrophication can be attributed to activities resulting from the increased nutritional demands of the growing population. In order to meet the demand of the growing population fertilizer use has increased in amount, as well as frequency of application. Nixon argues that runoff and the fraction of fertilizer lost

²⁸ Robert Howarth et al., “Nutrient Pollution of Coastal Rivers, Bays and Seas,” *Issues in Ecology* 7 (2000): 1-15.

²⁹ Nixon, 201.

³⁰ Rabalais, Turner, Scavia, “Beyond Science..,” 134; Nancy N. Rabalais, R. Eugene Turner and William J. Wiseman Jr., “Gulf of Mexico Hypoxia, A.K.A “The Dead Zone”,” *Annual Review of Ecology and Systematics* (2002): 235-263; Nixon, 208.

³¹ Robert J. Diaz, “Overview of Hypoxia around the World,” *Journal of Environmental Quality* 20 (2001): 275-280; Rabalais, Turner, Wiseman, “A.K.A. ‘The Dead Zone’,” 238.

increase as fertilizer use intensifies. The fertilizer not utilized by the crops is easily washed away and contributes to occurrences of eutrophication in coastal waters.³²

According to Rabalais, Turner, and Wiseman Jr., the potential negative impacts of the oversupply of nutrients on shallow coastal waters are generating increasing concern around the world.³³ Although eutrophication is now recognized as a major threat to coastal waters, it did not prompt serious scientific concern until the 1950's. Since then the threat of nutrient loading on marine ecosystems has garnered more attention. By the 1970's, it was argued that algal growth in marine ecosystems was limited by the availability of nitrogen. In 1990, coastal eutrophication was identified as "one of the major causes of immediate concern in the marine environment."³⁴

In addition to eutrophication, stratification of the water column is also required for the development of hypoxia. The salinity, temperature and density of the nutrient rich fresh water reaching the Gulf of Mexico from the Mississippi River Basin differs from the water of the Gulf. These differences inhibit mixing of the water column and isolate the oxygen rich water to the top of the column, while the bottom of the column remains oxygen poor.³⁵

Hypoxia in the Northern Gulf of Mexico

The largest hypoxic area in the world is located in the Baltic Basin. This area measures approximately 70,000 sq km. The second largest hypoxic area in the world is

³² Nixon, 208.

³³ Rabalais, Turner and Wiseman, "A.K.A 'The Dead Zone'," 237.

³⁴ Nixon, 203.

³⁵ Nancy N. Rabalais et al., "A brief summary of hypoxia on the northern Gulf of Mexico continental shelf: 1985-1988," in *Modern and Ancient Continental Shelf Anoxia*, Special Publication No. 58, Eds. RV Tyson and TH Pearson (London, Geological Society, 1991), 35-47; Rabalais, Turner and Wiseman, "A.K.A 'The Dead Zone'," 238; Rabalais, Turner and Scavia, 134.

located in the Northern Gulf of Mexico, which at its largest measures approximately 20,000 sq km.³⁶ In this region, hypoxia is defined as an area of low oxygen concentration (below 2 milligrams per liter) where shrimp and demersal fish are no longer caught by trawl nets,³⁷ earning the area the nickname the “dead zone.”³⁸ Motile species escape while less motile ones succumb to the lack of oxygen. Downing et al. found portunid crab (*Portunus* sp.) and spider crab (*Libinia* sp.) suffocated in this area.³⁹ Shrimp, on the other hand, are able to escape the hypoxic area but not without being affected. The effects of hypoxia on shrimp stocks are discussed later in this chapter.

The hypoxic area in the Gulf of Mexico has been a documented summer (June through August) occurrence for the past 25 years. Hypoxia is most severe during these summer months; however, it has been observed from late February to early October.⁴⁰ The seasonality of hypoxia roughly corresponds to the nitrate flux from the Mississippi River Basin. Goolsby and Battaglin noted that seasonally high nitrate fluxes from the Mississippi precede the development of the hypoxic zone.⁴¹ Figure 1 illustrates the average area of mid-summer hypoxic conditions. The colored areas illustrate the frequency of hypoxia in these areas from 1985-1997.

³⁶ Rabalais, Turner and Scavia, 130.

³⁷ Ibid.; Renaud, 19.

³⁸ Rabalais, Turner and Wiseman, “A.K.A. ‘The Dead Zone’,” 235.

³⁹ Downing et al., 4

⁴⁰ Rabalais et al., *Characterization of Hypoxia*, 42; Rabalais, Turner and Scavia, 131.

⁴¹ Goolsby and Battaglin, 3.

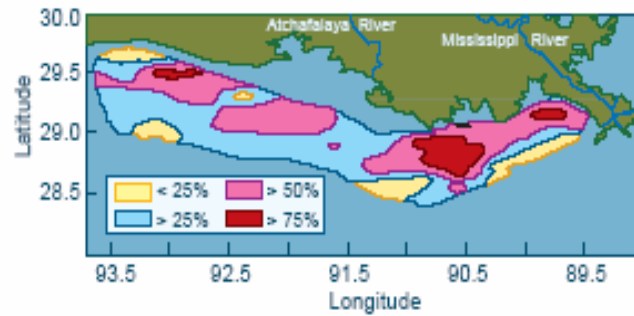


Figure 1. Map of Louisiana Coast Showing Areas Where Mid-summer Hypoxia Occurs Most Frequently (1985-1997)

[Source cited with permission: Council for Agricultural Science and Technology (CAST). 1999. *Gulf of Mexico Hypoxia: Land and Sea Interactions*. Task Force Report 134. CAST, Ames, Iowa.]

The hypoxic area is always located to the west of the outflow of the Mississippi River; however, the size and the shape vary with changes in winds, currents and tidal flows.⁴² The location of the hypoxic area relative to the coastline is also variable. The area can extend over a large distance and be found in shallower water near shore, or in deeper offshore waters, from 1 km from shore up to 125 km offshore respectively. Hypoxia commonly occurs in water ranging in depth from 5 to 30 m, but can occur as deep as 60 m. Additionally, the extent of hypoxia within the water column is also variable. Typically, between 20-50% of the water column is affected; however, it can range between 10-80%.⁴³

History of Documented Hypoxia

Hypoxia in the Gulf of Mexico is a persistent and well-documented phenomenon. Although anecdotal information from shrimp fishermen suggests the presence of hypoxic areas in the Gulf of Mexico during the 1950s and 1960s, it was not until the 1970's that

⁴² Downing et al., 8; Rabalais, Turner and Scavia, 131.

⁴³ Rabalais et al., *Characterization of Hypoxia*, 6; Rabalais, Turner and Wiseman, "A.K.A 'The Dead Zone'," 240; Rabalais Turner and Wiseman, "Hypoxia in the Gulf," 322.

hypoxia in the area was first empirically recorded. The first instance of documented hypoxia on the Louisiana continental shelf dates back to 1972, when data on oxygen concentration was collected during environmental assessments for oil and gas exploration. It was not until 1985 that data on the hypoxic area in the Northern Gulf was collected on a regular basis.⁴⁴

Agriculture and Hypoxia

The nutrients causing eutrophication and subsequently hypoxia come from a variety of sources. Major sources include animal waste, fertilizer and sewage. A majority of the nutrients that end up in the Gulf of Mexico originate from the Mississippi River Basin, which is home to one of the most productive farming regions in the world. Rabalais, Turner and Scavia note that nonpoint sources are responsible for approximately 90% of the nitrate inputs to the Mississippi River Basin. Of these nonpoint sources almost 75% of them are agricultural, including livestock and crop production.⁴⁵

Although not truly a point source of pollution, concentrated animal feeding operations (CAFOs) are considered a point source because of their highly concentrated nature.⁴⁶ The growth of large-scale livestock operations, over 1000 animal units, in recent years has led to a significant increase in the amount of manure being produced by livestock. An estimated 500 million tons of manure are produced by feedlots across the United States annually.⁴⁷ Manure is used as fertilizer because it is a significant source of

⁴⁴ Rabalais et al., "A brief summary," 35.

⁴⁵ Rabalais, Turner and Scavia, 135.

⁴⁶ Donald A. Goolsby, et al. *Flux and Sources of Nutrients in the Mississippi- Atchafalaya River Basin*. Topic 3 Hypoxia Assessment Report. Committee on Environment and Natural Resources, Hypoxia Working Group, NOAA, 1999. 130 pp.

⁴⁷ US Commission on Ocean Policy, "Addressing Coastal Water Pollution," *An Ocean Blueprint for the 21st Century*, Final Report, Washington, DC, 2004, pp. 204-225.

nitrogen and phosphorous; however, the absolute rate of manure production is exceeding the rate of consumption.⁴⁸

Livestock operations contribute nitrogen to the Mississippi River Basin through atmospheric deposition as well as runoff.⁴⁹ Excess wastes that are not utilized as manure can enter waterways through leakage from holding pens and runoff. In all, it is estimated that approximately 15% of the nitrogen flux to the Gulf of Mexico comes from livestock manure.⁵⁰ A more significant source of nitrogen in the Mississippi River Basin is crop production.

The high productivity of this region is linked to the use of commercial fertilizers. Annually, an average of 7 million metric tons of nitrogen fertilizer is applied to the land in the Mississippi River Basin. A significant amount of the fertilizer applied to this region is lost into the basin each year. On average, approximately 1.6 millions metric tons of nitrogen washes down the Mississippi into the Gulf each year.⁵¹ Downing et al. indicate that, over the last century, the input of nitrogen into the Mississippi has increased two to seven times,⁵² which roughly corresponds to the increasing use of fertilizers over the past century, particularly since the 1950s.⁵³

One region is primarily responsible for the nitrogen leaching into the Mississippi River. The Corn Belt, located north of the Ohio River, contributes over 60% of the

⁴⁸ Michael R. Burkart and David E. James, "Agricultural-Nitrogen Contributions to Hypoxia in the Gulf of Mexico," *Journal of Environmental Quality* 28 (1999): 850-859.

⁴⁹ US Commission on Ocean Policy, 211.

⁵⁰ Goolsby et al., xvi

⁵¹ Goolsby and Battaglin, 2-3.

⁵² Downing et al., 13.

⁵³ William J. Mitsch et. al, "Reducing Nitrogen Loading to the Gulf of Mexico from the Mississippi River Basin: Strategies to Counter a Persistent Ecological Problem," *BioScience* 51 (2001): 373-388.

Mississippi's nitrate load according to a US Geological Survey (USGS) study.⁵⁴

Burkhart and James' study supports the assertion that states dominated by crops such as corn and soybeans have the largest total nitrogen loss rates.⁵⁵ Besides the type of crop farmed, fertilization practices also influence the amount of nitrogen entering the Mississippi.

Some of the fertilization practices utilized in the Mississippi River Basin contribute to the increased loss of nitrogen. Depending on the crop being farmed, over-fertilization can be common. According to an article in the *St. Louis Post-Dispatch*, it is estimated that corn growers over-fertilize their crops by 20 percent.⁵⁶ Additionally, some farmers opt to fertilize their fields in the fall, although planting will not occur until spring. During a public comment session before the US Commission on Ocean Policy, Susan Heathcote, Iowa Environmental Council, noted that up to 50% of the nitrogen applied in the fall is lost before the crop is planted.⁵⁷ Additionally, evidence linking increased stream flow and precipitation to the size of the dead zone suggests that there is a relationship between the current agriculture practices and the formation of the hypoxic area in the Northern Gulf of Mexico.

In 1993, after significant flooding in the Mississippi River Basin, the "dead zone" dramatically increased in size, approximately 5,000 km larger than the previous year. Goolsby and Battaglin noted a peak in stream flow and nitrate flux in 1993.⁵⁸ The opposite effect has been seen in times of drought. During the summer of 2000, the

⁵⁴ Malakoff, 191.

⁵⁵ Burkart and James, 857.

⁵⁶ Peter Downs, "Reducing Nitrogen Use Could Reduce "Dead Zone" and Increase Farm Profits," *St. Louis Post-Dispatch*, June 30, 2000, B7. Available on-line from LexisNexis [cited March 14, 2004].

⁵⁷ Susan Heathcote, "Agricultural Nutrient Pollution and Hypoxia in the Gulf of Mexico," Comments before the U.S. Commission on Ocean Policy, Gulf of Mexico Regional Meeting, March 7-8, 2002.

⁵⁸ Goolsby and Battaglin, 2.

Mississippi River basin experienced drought conditions and the hypoxic area in the summer of 2000 was one of the smallest to date.⁵⁹ Additionally, in 1988, the hypoxic area was observed to have disappeared in the late summer. At this time, the river flow in the Mississippi was at its lowest level in 52 years.⁶⁰ Goolsby and Battaglin also reported a decrease in nitrate flux in 1988. Furthermore, they attributed changes in the nitrate flux, at least partially, to changes in stream flow and precipitation.⁶¹ Another study by Goolsby, Battaglin, Aulenbach and Hooper noted a direct relationship between nitrate concentration and stream-flow. They concluded that this relationship indicates a non-point source of nitrate, such as runoff from the agricultural industry.⁶²

Climate Change and Hypoxia

Climate change has the potential to further intensify hypoxia in the Gulf of Mexico by affecting stream flow and precipitation. Models run by Justic, Rabalais and Turner predicted that runoff in the Mississippi River will increase, due to increased precipitation as a result of climate change. The doubled CO₂ scenario of climate change predicts approximately a 20% increase in precipitation in the Mississippi River region. The consequences of climate change are predicted to cause the hypoxic area in the northern Gulf of Mexico to surpass its largest area to date.⁶³

⁵⁹ Rabalais, Turner, Scavia, 132.

⁶⁰ Rabalais et al., "A brief summary," 37, 41; Downing et al., 10; Rabalais, Turner, Wiseman, "Hypoxia in the Gulf," 323.

⁶¹ Goolsby and Battaglin, 2.

⁶² Donald A. Goolsby, William A. Battaglin, Brent T. Aulenbach and Richard P. Hooper, "Nitrogen Input to the Gulf of Mexico," *Journal of Environmental Quality*. 30 (2001): 329-336.

⁶³ Dubravko Justic, Nancy N. Rabalais, and R. Eugene Turner, "Effects of climate change on hypoxia in coastal waters: A doubled CO₂ Scenario for the northern Gulf of Mexico." *Limnol. Oceanogr.* 41 (1996): 992-1003.

Impacts of Hypoxia on Fisheries

According to the UNEP, dead zones pose as big of a threat to fish stocks as does overfishing.⁶⁴ Areas of low oxygen not only kill the less motile species, but force others either inshore or further offshore. The habitat of commercially valuable fish can also be impacted by hypoxia. An increase in the size of a hypoxic area could impact the productive habitat and affect spawning grounds as well as feeding grounds. These changes in habitat have been shown to force fish into less suitable areas.⁶⁵ Jubilees, which allow for easy overfishing, occur when large numbers of fish flee from the hypoxic areas towards the shore.⁶⁶

Hypoxia can impact fisheries in ways other than direct mortality. According to Breitburg hypoxia induced loss of habitat and mortality at early life stages are more likely than direct kills to impact fish populations.⁶⁷ Additionally, the development and reproductive success of fish may also be affected by hypoxia. Wu et al. report that hypoxia can act as an endocrine disruptor and potentially affects the reproductive capacity of fish stocks.⁶⁸ Evidence suggests that hypoxia has severely disrupted fisheries in the past.

Fisheries in the Black and Baltic Sea have been significantly degraded, and their composition changed, as a result of hypoxia.⁶⁹ The lobster fishery in the Kattegat, a branch of the Baltic Sea, is a striking example, as the Norwegian lobster fishing industry

⁶⁴ Greimel, 1.

⁶⁵ Downing et al., 16.

⁶⁶ Ibid., 5; Denise Breitburg, "Effects of Hypoxia, and the Balance between Hypoxia and Enrichment, on Coastal Fishes and Fisheries," *Estuaries* 25 (2002): 767-781.

⁶⁷ Ibid., 768.

⁶⁸ Rudolf S.S. Wu, Bing Sheng Zhou, David J. Randall, Norman Y.S. Woo and Paul K.S. Lam, "Aquatic Hypoxia is an Endocrine Disruptor and Impairs Fish Reproduction," *Environ. Sci. Technol.* 37 (2003): 1137-1141.

⁶⁹ Diaz, "Overview of Hypoxia," 279.

was completely eliminated by hypoxia. Additionally, hypoxia and anoxia have significantly decreased the number of commercially valuable species in the Black Sea. Forty years ago, the fisheries of the Black Sea had 26 commercially valuable species, and only six of those species exist today.⁷⁰

The more commercially valuable demersal fisheries of the Black Sea, which are bottom dwelling, have been replaced by less profitable pelagic fisheries, which are located higher up in the water column. Stocks of turbot, a highly valuable flatfish that is important to the fisheries in this area, collapsed during the 1970s. While the turbot fisheries were collapsing, anchovy fisheries rapidly increased.⁷¹ Benthic crustaceans and mussel populations in the Black Sea were also reduced as a result of hypoxia and anoxia.⁷²

Gulf of Mexico Fisheries

In contrast to the examples of the Kattegat and Black Sea, there is currently a dearth of concrete empirical evidence that hypoxia is negatively affecting the macro-level economies of the states that border the Gulf of Mexico.⁷³ However, there is a growing body of evidence that suggests that the abundance, distribution and migration of demersal fish and shrimp in the Northern Gulf of Mexico is severely impacted by hypoxia. Renaud discovered a positive relationship between the number of brown and white shrimp present

⁷⁰ Diaz, "Overview of Hypoxia," 279; Robert J. Diaz, 1998, "Hypoxia: A global perspective," In *Agricultural outlook forum '98*, 23, 184-86. WAOB-YCON-98. Washington, D.C.: U.S. Dept. of Agriculture; Robert J. Diaz, "Causes and Effects of Coastal Hypoxia Worldwide: Putting the Louisiana Shelf Events in Perspectives," *Proceedings of the First Gulf of Mexico Hypoxia Management Conference*, December 5-6, 1995, 102-105.

⁷¹ Rabalais, Turner and Wiseman, "A.K.A 'The Dead Zone'," 254.

⁷² Marine Resources Service. "Mediterranean and the Black Sea." *Review of the State of the World Fishery Resources: Marine Fisheries*. FAO Fisheries Circular N. 920 FIRM/C920, Fisheries Resource Division, Fisheries Department, FAO, Rome Italy, 1997.

⁷³ Diaz and Solow, 39.

and the concentration of dissolved oxygen in the bottom water off Louisiana.⁷⁴ A 1983 study by Pavela, Ross and Chittenden found an absence, or abnormally low amounts, of fish and shrimp in sampled areas in the Gulf of Mexico off Texas during times of hypoxia in June and July 1979.⁷⁵ In addition to negatively affecting actual catch size, hypoxia may also disrupt the migration and maturation of certain commercially valuable species, such as brown shrimp (*Farfantepenaeus aztecus*) and white shrimp (*Litopenaeus setiferus*), as demonstrated in a 2001 study by Zimmerman and Nance.⁷⁶

Brown shrimp fishing grounds are located in both near-shore and offshore environments. Zimmerman and Nance found that in times of hypoxia brown shrimp are prevented from reaching the offshore habitat in shrimp fisheries off Louisiana and Texas. Furthermore, they found that the shrimp catch is decreased where hypoxia is common.⁷⁷ Additionally, Diaz and Solow found that the size of shrimp caught from 1960-1996 has been decreasing, indicating that it is likely that juvenile shrimp are being caught.⁷⁸ Following the 1993 floods in the Mississippi and the associated growth of the hypoxic areas in the Gulf of Mexico, the brown shrimp catch dropped from record highs to below average.⁷⁹ Although the catch of brown shrimp remains above average, the catch per unit effort (CPUE) has been decreasing.

⁷⁴ Renaud, 21.

⁷⁵ Pavela, Ross and Chittenden, 169.

⁷⁶ Roger J. Zimmerman and James M. Nance, "Effects of Hypoxia on the Shrimp Fishery of Louisiana and Texas," in *Coastal and Estuarine Studies: Coastal Hypoxia 58*, Eds. NN Rabalais and RE Turner (Washington DC: American Geophysical Union, 2001), 293-310.

⁷⁷ Ibid., 296.

⁷⁸ Diaz and Solow, 31.

⁷⁹ Heather Dewar and Tom Horton, "Cycle of Growth and Devastation," (Part 2 of 5), *Baltimore Sun*, September 25, 2000. Available online from Baltimoresun.com [cited May 12, 2004]. Also see <http://galveston.ssp.nmfs.gov/news/2004Forecast/tables.html#table6> for data on brown shrimp.

The CPUE for brown shrimp has declined more significantly than that of white shrimp because brown shrimp are more dependent on offshore habitat, which is often blocked by hypoxia.⁸⁰ Since the 1960s, the CPUEs of these shrimp fisheries have decreased more than 25% with the most significant decrease occurring between the 1980s and 1990s.⁸¹

In addition to a decrease in CPUE, the US shrimping industry in the Gulf of Mexico has been further strained by the decreasing price of shrimp as a result of an influx in cheaper imported shrimp. A majority of shrimp consumed by the United States is imported from six countries: Thailand, Brazil, India, Ecuador, Vietnam and China.⁸² Recently, there have been several developments aimed at benefiting the shrimping industry in the Gulf of Mexico.

The 2002 Farm Bill, signed by President Bush, requires country of origin labeling for seafood, as well as other products; however, the mandatory labeling requirements have been pushed back until 2006.⁸³ Additionally, tariffs have been imposed on the importation of shrimp. Thailand, India, Ecuador and Brazil now face tariffs on the average of 10%.⁸⁴ Furthermore, in 2003, Congress provided \$35 million in “disaster relief,” or subsidies, in order maintain the shrimping industry.⁸⁵

⁸⁰ Zimmerman and Nance, 293.

⁸¹ Downing et al., 18.

⁸² Neil King Jr., Takeshi Takeuchi, and Elizabeth Price, “Shrimp Tariffs Imposed by US Despite Protests,” *The Wall Street Journal*, July 30, 2004, A9. Available on-line from ProQuest [cited October 22, 2004.]

⁸³ Jeffrey Sparshott, “Seafood set for origin labeling,” *The Washington Times*, September 30, 2004, C12. Available on-line from LexisNexis [cited 24 October 2004.]

⁸⁴ Brazil could face tariffs as high as 67%, Ecuador could face tariffs between 6-9.3%, India between 3.5-27.4%, and Thailand between 5.5-10.2%. King Jr., Takeuchi, and Price, A9.

⁸⁵ Scott Gold, “Shrimp Industry Finds Life in the Gulf Coast ‘Dead Zone’,” *Los Angeles Times*, August 24, 2003, A1. Available on-line from ProQuest [cited October 22, 2004.]

Despite the efforts of the measures discussed above, the shrimping industry is not likely to greatly benefit. It is predicted that the tariffs will not drastically impact the price of imported shrimp. Even if these measures were to significantly impact prices and decrease imports, the fisheries of the United States would not be able to keep up with the increased demand. Currently, US shrimpers can only provide for approximately 12% of US demand.⁸⁶ The effects of hypoxia on the development, migration and habitat of commercially valuable marine species could prove to be devastating to the fisheries in the Northern Gulf of Mexico over the long-term.

Conflict between Stakeholders

Despite the scientific evidence linking runoff from the agricultural industry in the Mississippi River Basin to the dead zone in the Northern Gulf of Mexico there is still notable disagreement on the causes. In 2000, Farm Bureau officials claimed that fertilizer usage in the Midwest does not contribute to hypoxia in the Gulf of Mexico.⁸⁷ Additionally, Midwestern farmers claim that other sources, such as municipal waste and sewage, are to blame for the dead zone since they claim that they have been reducing their fertilizer usage over the past 15 years.⁸⁸

The distance between the Midwestern Farming States and the hypoxic area in the Northern Gulf of Mexico further complicates this issue. Many farmers have difficulty

⁸⁶ King Jr., Takeuchi and Price, A9.

⁸⁷ Environmental Law and Policy Center, "Farm Bureau Muddies Debate on Mississippi River Pollution, August 9, 2000, <http://elpc.org/forest/deadzone.pr.htm> (February 5, 2004).

⁸⁸ C. David Kelly, "Hypoxia Paints a Murky Picture," *American Farm Bureau Association*, September 29, 1997, <http://www.fb.com/views/focus/fo97/fo0929.html> (April 22, 2004).

believing that their actions are affecting an ecosystem hundreds of miles away.⁸⁹

Furthermore, it is extremely difficult to weigh the costs of protecting the fisheries off the Gulf Coast against the costs to crop production by reducing fertilizer use. Conflicts between interest groups may result in the development of sub-optimal policy outcomes. The influence of interest groups on the development of policy aimed at combating the dead zone will be discussed in a later chapter of this thesis.

Impacts of Stakeholder Interests on Environmental Policy

The competing interests of stakeholder groups have the potential to negatively impact the efficacy of environmental policy. Interest groups can use their influence to promote an agenda; however, it is more common for such groups to use their influence to obstruct an agenda that differs from their own. As John Kingdon explains, “much of interest group activity in these processes [promoting new agenda items or advocating certain proposals] consists not of positive promotion, but rather of negative blocking.”⁹⁰ There are three phases during which interest groups can prevent the objectives of a policy from being realized: agenda setting, development and implementation.⁹¹ Additionally, Michael E. Kraft recognized that conflicts of interest among stakeholders can induce

⁸⁹ Bill Lambrecht, “Task Force Calls for Paying Farmers to Fix “Dead Zone” In Gulf of Mexico,” *St. Louis Post-Dispatch*, January 20, 2001, Five Star Lift Edition, 2. Available on-line from LexisNexis [cited April 25, 2004.]

⁹⁰ John W. Kingdon, *Agendas, Alternatives and Public Policies* (Boston: Little, Brown & Company, 1984), 52.

⁹¹ Zachary A. Smith, *The Environmental Policy Paradox* (New Jersey: Prentice Hall, 2000).

gridlock in Congress and prevent the development of effective policy, lead to the development of sub optimal policy, or hinder the implementation of developed policies.⁹²

An additional challenge in the development of environmental policy is that in order for the outcome of a policy to satisfy one group, the objectives of another group must be sacrificed. Many of the conflicts that arise during the development of environmental policy involve the economic interests of at least one of the interest groups. The economic interests of a region or industry often conflict with the objectives of the environmental policy, and present an obstacle to the development of strong environmental policy.⁹³

Methodology

The methodology of this thesis consists of an analysis of the interests and power of the fishing, agriculture and fertilizer industries and their influence on the formation and implementation of an effective national strategy to reduce hypoxia. These groups were selected because preliminary evidence indicated that they were the most important and relevant stakeholders involved in this issue. The relationship between the aforementioned industries and (a) Congress and (b) federal agencies is examined as part of this thesis.

⁹² Michael E. Kraft, "Environmental Policy in Congress: From Consensus to Gridlock," in *Environmental Policy: New Directions for the Twenty-First Century*. Norman J. Vig and Michael E. Kraft, Eds. (Washington DC: CQ Press, 2003), pp. 127-150.

⁹³ Judith A. Layzer, *The Environmental Case: Translating Values into Policy*. (Washington, DC: CQ Press, 2002).

Definition of Variables

The role of stakeholder groups, specifically industries, congressional oversight, and federal agencies in the decision making process are examined in this thesis. The relative economic power of the stakeholder groups is the independent variable. The stakeholder groups use their relative economic power, through lobbying, to apply pressure on members of congress and others in the decision-making position. The pressure exerted by the stakeholder groups in the form of lobbying influences the decision-making process, which is the intervening variable. The dependent variable is the effectiveness of federal statutes, legislation, and strategies such as the *Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico*.

Population and Sample

The population examined in this thesis is members of the political and academic arena that have the potential to influence policy and decision-making regarding hypoxia. This includes members of Congress, federal and state agencies, as well as academia. Members of academia are included in the sample because, according to Kingdon, they are an important group of non-governmental actors involved in the development of public policies, specifically for providing politicians ideas on how to deal with an issue on the agenda.⁹⁴ A sample (N=34) is assumed to be representative of the views of the population.

Members of the Mississippi River/ Gulf of Mexico Watershed Nutrient Task Force, which includes employees of the United States Department of Agriculture, United States Department of Commerce (National Oceanic and Atmospheric Administration),

⁹⁴ Kingdon, 57-59.

United States Department of Interior, and the United States Environmental Protection Agency, were asked to participate in this study. Additionally, other members of the aforementioned agencies, as well as other agencies, who were not identified by the *Action Plan* as members of the Task Force, but were thought to be knowledgeable about the issue, were also asked to participate. Furthermore, members of state agencies and tribes identified by the *Action Plan* as participants on the Task Force were also recruited to participate. A list of public offices recruited to participate is presented in Appendix A.

Additionally, relevant members of Congress, both in the House of Representatives and Senate, were recruited to participate. These included members of Congress from the states within the Mississippi River Basin and along the Gulf Coast. Members of Congress not representing these two regions were asked to participate if they sponsored or cosponsored legislation addressing hypoxia, actively participated in the development of legislation, or if their congressional testimony indicated that they had an interest in the issue. A list of the Congressional Offices recruited to participate is presented in Appendix B.

Finally, members of academia were recruited to participate from universities and institutes within as well as outside the Mississippi River Basin. Those contacted to participate from outside the basin were members of academia that are involved in research on hypoxia, or are previous members of the Task Force. The academics recruited to participate represent a variety of disciplines that were assumed to be familiar with hypoxia. These disciplines include agronomy, fisheries, water and soil science, environmental science, watershed management, oceanography, climate change, marine

affairs, animal science and agricultural economics. A list of the universities and institutes recruited to participate is presented in Appendix C.

Sources of Data

Although the phenomenon of hypoxia in the Gulf of Mexico was first reported in the 1970s, this analysis began with the year 1985, when scientific research on the hypoxic area in the Northern Gulf of Mexico began, and concluded with data available through December 31, 2003. There is one caveat to this. The collection of information pertaining to the US Commission on Ocean Policy (USCOP) concluded with data available through December 31, 2004, since the report was issued that year. Primary sources were collected using *LexisNexis*, the Library of Congress website, the USCOP website as well as other sources. Primary sources include congressional testimony, congressional records, comments on the *Action Plan, Integrated Assessment*, and USCOP report, testimony before the USCOP as well as articles from major national and regional newspapers.

The dates of primary sources collected vary depending on the database utilized. The two services included in *LexisNexis Congressional*: the Federal News Service and the Federal Document Clearing House, date back to 1988 and 1993 respectively. Additionally, Congressional Records available from the Thomas Library of Congress database date back to the 101st Congress (1989-1990). Additional primary data were collected through the use of a questionnaire (Appendix D).

Recruitment of Participants

Contact information for all potential participants was obtained by searching the relevant departments, agencies, congressional offices and universities using the World

Wide Web. Requests to participate were sent to potential participants in the political arena and academia via email or facsimile between November 27, 2004 and December 26, 2004. If a response indicating interest in participating was received, a follow-up contact was made to set up administration of the questionnaire. Additionally, during a trip to Washington, DC (December 8 - 11, 2004) the offices of members of Congress identified as potential participants were visited and recruited to participate.

Questionnaire Methodology

The questionnaire had three main objectives: to examine the perceptions of the efficacy of the *Action Plan for Reducing, Mitigating and Controlling Hypoxia in the Northern Gulf of Mexico*, the influence of industry on the efficacy of the plan, as well as to evaluate the climate within which the government and stakeholders are to act, or not, on the recommendations set forth by the US Commission on Ocean Policy to combat non-point source pollution as related to the formation of the dead zone. The first 11 statements of the questionnaire focus on the *Action Plan* and hypoxia, while the final two statements concentrate on the USCOP recommendations.

The questionnaire was developed using the methodology described by Babbie as a guideline.⁹⁵ The questionnaire utilized closed-ended statements where each participant was asked to rate the statement on a scale of one to ten by circling the appropriate number. The scale functioned as a thermometer to gauge the participants' perceptions of the issues being evaluated. Additionally, participants were given the opportunity to elaborate on the numerical ranking assigned. Furthermore, the statements were organized in a manner so the specificity of the statements intensified as the questionnaire

⁹⁵ Earl R. Babbie. *Survey Research Methods*, (Belmont: Wadsworth Publishing Company, 1990).

progressed. By doing so, the knowledge of the participants on this issue, and/or their willingness to comment on this issue, could then be evaluated based on the response rate.

Collection of Questionnaire Data

Questionnaires were distributed to potential participants via email or in person between November 29, 2004 and January 2, 2005. Questionnaire data were collected by email, in person administration of the questionnaire, and by distributing questionnaires to congressional offices in Washington, DC to be mailed back upon completion. When possible, appointments were scheduled to administer the questionnaire in person. The in person administration of the questionnaire was recorded and transcribed upon completion of the trip. Finally, email administration of the questionnaire was utilized when the participant was located outside the Washington, DC area or was unavailable to schedule an appointment. Data collection was completed on January 10, 2005.

Methods of Analysis

This study first examines the relationship between the area of hypoxia and the awareness and perceived importance of the issue. Data on the estimated size of bottom-water hypoxia in mid-summer from 1985-2003 were received from Dr. Nancy Rabalais of the Louisiana Universities Marine Consortium. The trend in the estimated area of the hypoxic area was compared to data on the annual incidence of mention of hypoxia and the dead zone in news and congressional sources in order to estimate the perceived awareness and importance of the issue of hypoxia. The study then examines the perceived efficacy of the *Action Plan* and the influence of the relative economic power of stakeholder groups on decision-making regarding hypoxia.

Estimated Perception of the Importance of Hypoxia

Data on the annual incidence of referrals to hypoxia or the dead zone in the Gulf of Mexico in congressional texts, major national and regional newspapers were collected and compared to the annual estimated area of hypoxia in order to ascertain if there was a significant relationship between the estimated size of the hypoxia area and the amount of attention the issue received. The major newspapers used in this analysis were determined by visiting the website of the Audit Bureau of Circulation⁹⁶, and these were *USA Today*, *the Wall Street Journal*, *the New York Times*, *the Los Angeles Times*, and *the Washington Post*. *USA Today* and *Wall Street Journal* are not available through *LexisNexis*, and therefore were not included in this study. The Southern and Midwestern Regions were included in this study because these two regions are most likely to be directly or indirectly impacted by hypoxia or proposed measures to mitigate hypoxia. Additionally, the annual incidence of the mention of hypoxia or dead zone was estimated in Congressional Testimony, given by outside sources in front of Congress, Congressional Records, documents presented by congress, transcripts of committee meetings, and bills using *LexisNexis Congressional*.

It was assumed that there is a lag between the occurrence of hypoxia and media or congressional attention to the issue. Therefore, in order to estimate the amount of attention generated by the size of the hypoxic zone in a given year, the estimated area was compared to the media or congressional attention for the following calendar year. Since primary congressional and media sources were only collected through December 31, 2003, the correlation only uses hypoxia data through 2002. The Pearson's correlation

⁹⁶ Audit Bureau of Circulation. Top 100 Newspapers According to Circulation. Dec 12, 2004, <http://www.accessabc.com/reader/top100.htm> (December 12, 2004).

coefficient (r) and significance (p -value, two-tailed) were calculated using SPSS statistical software in order to examine the magnitude and significance of the relationship.

Questionnaire Data

Data obtained from the questionnaire was used to supplement information gathered from other primary sources. The data obtained from the questionnaire was analyzed statistically; the mean, standard deviation and variance for each question were calculated. The distribution of scores per question was also examined and analyzed. The numerical data obtained from the questionnaire was supplemented by the elaborations provided by participants on their scores assigned to each statement.

CHAPTER 2: DISCUSSION

Action Plan

The first federal action to specifically focus on hypoxia in the Northern Gulf was introduced in 1997, 12 years after the mapping of the hypoxic area first began, when the Mississippi River/ Gulf of Mexico Watershed Task Force (the Task Force) was created. Four years later (2001), *The Action Plan for Reducing, Mitigating, and Controlling Hypoxia (The Action Plan)* was submitted to Congress in accordance with the Harmful Algal Bloom and Hypoxia Research Act (HABHRCA) of 1998. The Harmful Algal Bloom and Hypoxia Research Act of 1998 (P.L. 105-383) originated from HR 4235 sponsored by Rep. Christopher John (LA) and S 1480 co-sponsored by Senator Olympia Snowe (ME) and Senator John Breaux (LA) during the 105th Congress. This law required the establishment of an interagency Task Force, a national assessment on harmful algal blooms (completed in 2000), a national assessment on hypoxia (not complete), an assessment and a plan to address hypoxia in the Gulf of Mexico.⁹⁷

The Action Plan is the first national attempt to address the phenomenon of hypoxia in the Northern Gulf of Mexico. It is a collaborative effort between agencies, federal and state, and tribes along the Mississippi River Basin. The plan outlines a voluntary national approach to reduce the hypoxic area in the Gulf and consists of eleven

⁹⁷ Harmful Algal Bloom and Hypoxia Research and Control Act of 1998, 105th Congress, 2nd session, H.R.4235; Harmful Algal Bloom and Hypoxia Research and Control Act of 1997, 105th Congress, 1st session, S. 1480.

short term actions that were to be implemented beginning in the winter of 2000 and ending December 2005 (Appendix E). The objectives of the short term actions defined by the *Action Plan* are: the reduction of hypoxia, the improvement of water quality within the basin, and the improvement of economic conditions along the basin.⁹⁸ With regards to the area of hypoxia in the Northern Gulf of Mexico, the *Action Plan* aims to reduce the area of hypoxia to 5,000 square kilometers. Figure 3 illustrates the estimated area of hypoxia from 1985-2003, as well as the *Action Plan* goal.

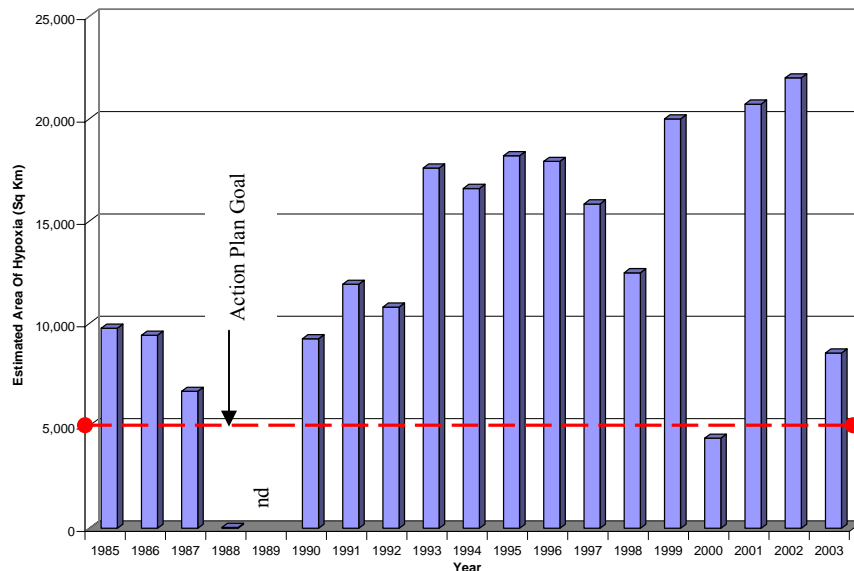


Figure 2. Estimated Area of Hypoxia (1985-2003) Depicting *Action Plan* Goal [Modified from Rabalais, Turner and Scavia (2002) with data provided by Nancy Rabalais, LUMCON]

Perceived Importance of Hypoxia

The issue of hypoxia has received attention across a variety of mediums including Congressional testimony, congressional records, bills as well as national and regional newspapers. An examination of the incidence of the mention of the keywords hypoxia or

⁹⁸ Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2001. *Action Plan for Reducing, Mitigating and Controlling Hypoxia in the Northern Gulf of Mexico*. Washington, DC.

dead zone and Gulf of Mexico in both newspapers and congressional documents illustrates the perceived importance of the issue.

Coverage of hypoxia in major national newspapers, from 1985-2003, is considerably lower than that of regional newspapers in the Southern and Midwestern Regions during the same time period (Table A-1). Additionally, there is significant variation among regional coverage of the issue during the same time period, as shown by Table 1.

Midwestern Regional News Sources	Southern Regional News Sources
63	233

Table 1. Total Incidence of Keywords Hypoxia or Dead Zone and Gulf of Mexico in Regional Newspapers 1985-2003

The difference in coverage between national newspapers and regional news sources indicates that the nation, as a whole, is not aware or concerned about hypoxia in the Gulf. Instead, it is only important to those areas, the Midwest and Southern regions, that stand to be impacted by hypoxia or any measure initiated to abate it. Furthermore, the heightened attention in Southern Regional newspapers indicate that states proximate to the issue are more likely to be directly threatened by the hypoxic zone and consequently perceive the issue as important. Finally, a positive significant (p -value = .030, $n = 17$, $df = 15$) correlation of .527 between the estimated area of hypoxia and the annual incidence of the keywords hypoxia or dead zone and Gulf of Mexico (1985-2002) indicates that the attention hypoxia receives in newspapers, especially in the Midwest and South, is relative to the size of the hypoxic area, and not a result of chance. The relationship between these variable is illustrated by Figure A-1.

On the other hand, the relationship between the annual estimated area of hypoxia and congressional attention (1985-2002) is not as great ($r = .206$), nor is it statistically significant ($p\text{-value} = .461$, $n = 15$, $df = 13$). Since the $p\text{-value}$ is greater than $.05$, it indicates that the relationship between congressional attention and the annual estimated area of hypoxia is due to chance. The relationship between these variables is illustrated in Figure A-2.

The perceived importance of hypoxia in Congress reflects the perception that the issue of hypoxia is not an important national issue. That said, hypoxia in the Northern Gulf has repeatedly appeared on the agenda of several members of Congress, including Senator Olympia Snow (ME), Senator John Breaux (LA) and Representative Ehlers (MI).⁹⁹ Additionally, testimony addressing hypoxia has been presented in front of committees from both the House and Senate. While some testimony focuses specifically on hypoxia in the Gulf of Mexico, in many instances the issue was only referred to in passing. A comparison of the total incidence of the mention of hypoxia in Congressional documents (Table A-2) to the total mention of hypoxia in newspapers (Table A-1) illustrates the high variability in the perceived importance or awareness of the issue. Overall, it appears that hypoxia is not ranked high on the national agenda.

⁹⁹ Senator Olympia Snowe (ME) and Senator John Breaux (LA) co-sponsored S. 1480, Harmful Algal Bloom and Hypoxia Research and Control act of 1998 and S.247, Harmful Algal Bloom and Hypoxia Research Amendments of 2003. Senator Snowe sponsored S. 3014, Harmful Algal Blooms and Hypoxia Research Act of 2004. Representative Vernon Ehlers (MI) sponsored H.R. 1856, Harmful Algal Bloom and Hypoxia Research Amendments Act of 2004.

Study Response Rate

The response rate of participants also reflects the divergence in the perception of the importance of the issue of hypoxia among various groups. Overall the response rate is 29%; however, it varies widely among the three groups recruited to participate. The response rates from public officials representing agencies, Members of Congress and academia are 35%, 5% and 49% respectively. The lack of response from Congress illustrates their overall lack of interest in or understanding of the issue of hypoxia. Additionally, it is important to note that the willingness of participants to respond may have been influenced by political orientation or affiliation.

Questionnaire Responses

The discussion of the data obtained from the questionnaire is presented in two sections, the first section examines statements one through eleven which focus on the issue of hypoxia and the *Action Plan*, while the second section examines the remaining statements which address the US Commission on Ocean Policy recommendations. A summary of the quantitative data obtained from the questionnaire is included in Table A-3 and a summary of statistical data discussed in this section is included in Table A-4. Finally, selected responses to the questionnaire not included in the following discussion are listed in Appendix G.

Hypoxia and the Action Plan

Statement One

Statement one asked participants to rate the knowledge among decision makers in Midwestern States that an area of hypoxia exists in the Northern Gulf of Mexico. A high response rate, 91%, indicates that most participants were comfortable responding to this statement. The mean score of 6.9 reflects the perception that a majority of decision makers in the Midwest possess knowledge of the hypoxic area in the Gulf. A relatively high score was expected since public officials from state agencies within the basin participate on the Task Force. Additionally, state agencies have submitted comments on the draft *Action Plan* as well as the *Integrated Assessment*.

The participation of state agencies in such processes signifies that decision makers from those agencies are aware of existence of the area of hypoxia in the Gulf of Mexico. However, according to one participant “knowledge of members of the Task Force was high, but many of the decision makers in the states not involved in the Task Force are not likely to have much awareness.” Additionally, the geographic distance between the Midwest and the Gulf, which is approximately 1000 miles, could hamper the awareness of hypoxia among Midwestern decision-makers.¹⁰⁰ The standard deviation (2.32), and distribution of scores (Figure 3) illustrate the high variation in the perception of this issue.

¹⁰⁰ Lambrecht, “Task Force Calls for Paying Farmers,” 2.

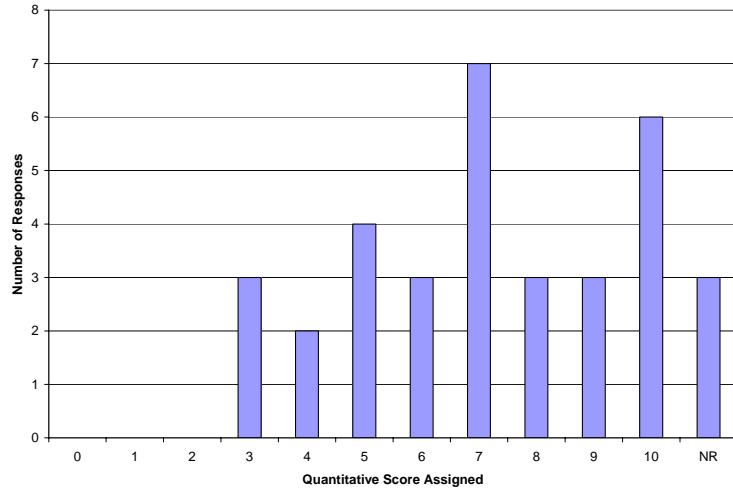


Figure 3. Statement One: Distribution of Scores

Statement Two

Statement two asked participants to rate the potential of hypoxia to disrupt the Gulf Coast’s fishing industry. A high response rate, 94%, indicates that most of the participants are comfortable responding to this statement. The perception of the potential for hypoxia to disrupt the fishing industry in the Gulf varies widely (Figure 4), as illustrated by the standard deviation of 2.54. This variation can be attributed to various factors.

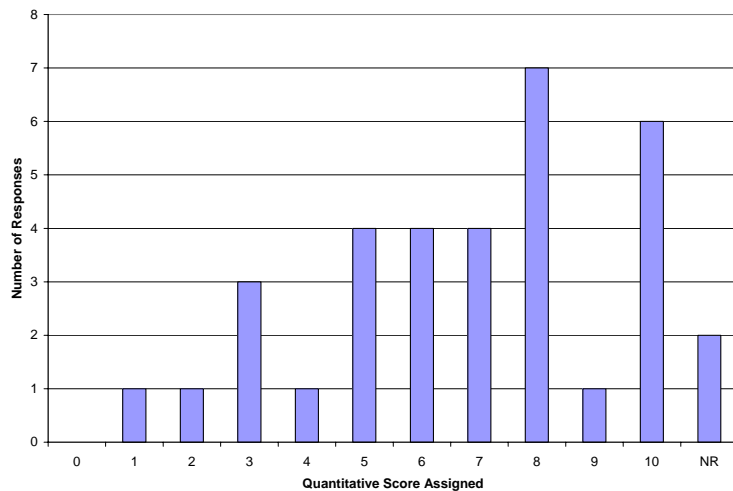


Figure 4. Statement Two: Distribution of Scores

First, there is a dearth of empirical data illustrating a relationship between hypoxia and its impact on fisheries. Another reason is the ability of more motile species to flee the area of hypoxia. Third is the perception that other environmental conditions present a more pressing threat to fisheries. Dr. Brian Leblanc, Associate Professor of Watershed Management at Louisiana State University, offered the following explanation, “hypoxia in the Gulf of Mexico is the most overrated threat to fisheries in the Gulf. Wetland deterioration is the most significant threat.” The three reasons presented above can explain some of the variation of scores for this statement that are below the mean (6.7).

Additionally, some participants submitted scores on the upper range of the scale. The following explanations illustrate reasons for an above average perception of the threat of hypoxia on Gulf’s fishing industry. Although, actual catch has not shown any decline, the catch per unit effort has decreased, making fishing a more expensive endeavor.¹⁰¹ As one participant explained “the zone has already disrupted the industry, changing fishing practices and types of fish caught. Secondly, some species are more vulnerable to hypoxia than others. Furthermore, according to Dr. Matlock, Director of the National Centers for Coastal Ocean Science at the National Oceanic and Atmospheric Administration, “the largest and most valuable commercial fishery in the GOM [Gulf of Mexico] is the penaeid shrimp fishery....Their benthic migration from estuaries to the adjacent Gulf as part of their annual life cycle makes them especially vulnerable...”

¹⁰¹ Zimmerman and Nance, 293.

The potential of hypoxia to disrupt the Gulf’s fishing industry is uncertain; however, evidence from past fisheries collapses in other parts of the world¹⁰² suggest that the possibility exists. While a hypoxia-induced collapse of Gulf fisheries is not imminent some species that are integral to the fishing industry in the area could be impacted and disrupt the Gulf fishing industry.

Statement Three

Statement three asked participants to evaluate the importance of addressing the issue of hypoxia in the Gulf of Mexico. A response rate of 94% indicates that participants felt comfortable in responding to this statement. Although, the mean of this statement (8) is relatively high, the standard deviation (2.4) indicates that there is a lack of consensus on this issue (Figure 5).

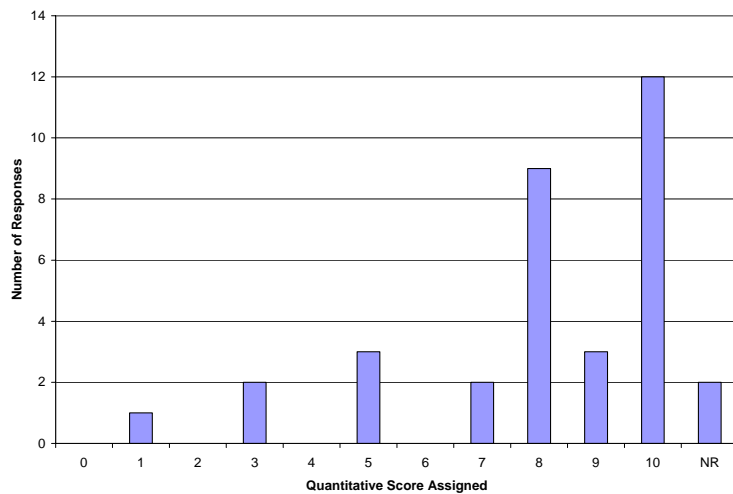


Figure 5. Statement Three: Distribution of Scores

The wide range in scores could be a result of respondents’ geographic proximity to the issue; however, some of the elaborations submitted by participants challenge this idea. Dr. Lee Burras, Associate Professor of Agronomy at Iowa State, explains that

¹⁰² For further information on fishery collapses resulting from hypoxia see Rabalais, Turner, Wiseman “A.K.A. ‘The Dead Zone’”; Marine Resources Services, and Diaz “Causes and Effects...”

addressing hypoxia is important for four reasons, “first, the ecological viability of the Gulf is at risk. Second, the economic viability of the Gulf fishing industry is at risk. Third, the economic viability of tourism is at risk. Fourth, hypoxia is an “early” warning that the watershed’s lands area at risk, eventually, excessive nutrient leaks overcome the environmental buffering of the upper watershed.” On the other hand, LeBlanc, from Louisiana, cites that “there is a growing body of evidence that the hypoxia conditions are not so abnormal.”

It was expected that participants from Louisiana would rate the importance of this issue highly since it is more visible to them and they are more likely to be impacted than other participants from other states. The responses for this statement indicate that there are factors in addition to geographical proximity to the hypoxic area that influence the perceived importance of addressing the hypoxic zone in the Northern Gulf of Mexico.

Statement Four

Statement four asked participants to rate their confidence in the accuracy of the science underlying the *Action Plan for Reducing, Mitigating and Controlling Hypoxia in the Northern Gulf of Mexico*. Statement four has a response rate of 82%, a lower response rate than the previous three statements. The observed decrease in response rate could be attributed to a hesitation to respond because of the new controversies associated with the science, or a lack of familiarity with the issue among some participants.

Although participants who responded to this statement generally consider the science behind the *Action Plan* as good for the time, the science has been challenged, not only by states, but also by federal agencies. The following discussion of states challenging the science behind the *Action Plan* is not based on data from the

questionnaire, but is included here because it is pertinent to the discussion. Rabalais, Turner and Scavia noted that the *Integrated Assessment*, the science behind the *Action Plan*, was criticized.¹⁰³ Additionally, Illinois' response to the draft action plan expressed concern about the scientific analyses that the recommendations in the *Action Plan* are based on.¹⁰⁴ Furthermore, a recent report issued by EPA region 4 highlights one such challenge.

The Region 4 report suggests that in addition to addressing nitrogen loading, the *Action Plan* should also address phosphorus loading as well.¹⁰⁵ Several respondents also questioned the science underlying the *Action Plan*. For example, Dr. Jorge Icabalceca, an economist at the Louisiana Department of Fish and Wildlife, responded “a sound plan has to be based on sound science. I do not doubt the scientific capabilities of the people involved in this plan. I question the data they are basing their recommendations on.”

Despite the challenges mentioned above, the mean score for this statement was 6.9. Although the science has been challenged and according to the response of Dr. Nancy Rabalais, Professor of Oceanography at the Louisiana Universities Marine Consortium, “this [science underlying the action plan] is coming under fire even more now than when drafted by the individuals in the Midwest and with industry,” a majority of the participants expressed their confidence in the science behind the plan. The above discussion, as well as the standard deviation of 2.8 for this statement reflects the wide range in the confidence of the science underlying the plan (Figure 6).

¹⁰³ Rabalais, Turner and Scavia, 138.

¹⁰⁴ Joe Hampton, Director IL Department of Agriculture, Thomas V. Skinner, Director IL EPA, and Brent Manning, Director IL Department of Natural Resources, “Illinois Response to the Draft Hypoxia Action Plan,” September 8, 2000, <http://www.sws.uiuc.edu/docs/hypoxia/ILrsp2dap.asp> (January 7, 2005).

¹⁰⁵ US Environmental Protection Agency, Region 4. *Evaluation of the Role of Nitrogen and Phosphorous in Causing or Contributing to Hypoxia in the Northern Gulf*, August 2004, Atlanta, GA. pp. 21.

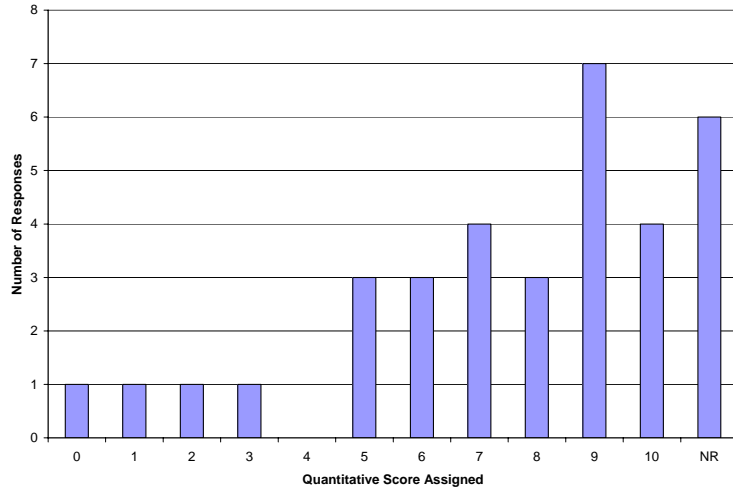


Figure 6. Statement Four: Distribution of Scores

Statement Five

Statement five asked participants to rate the involvement of stakeholders in the development of the objectives set forth by the *Action Plan*. The response rate for statement five was 71%; over one quarter of the sample lacked the familiarity with the issue necessary to respond. Some of the participants, though knowledgeable about hypoxia and aware of the *Action Plan*, responded that they were not familiar with the specifics of the *Action Plan* and declined to answer (NR indicates non-response).

The following information was not obtained from the questionnaire, but is pertinent to the discussion of stakeholder involvement. The *Action Plan* was prepared following the first seven public Task Force meetings which occurred between December 1997 and October 2000 in Virginia, Louisiana, Minnesota, Tennessee, Illinois, and Missouri.¹⁰⁶ Each meeting had an opportunity for public comments. Additionally, the second meeting, which occurred in Louisiana in 1998, included a stakeholder session

¹⁰⁶Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 31.

where the Task Force discussed issues with the stakeholders.¹⁰⁷ According to Rabalais, Turner and Scavia, stakeholders had an important role during the development of the *Action Plan* as well as the *Integrated Assessment*.¹⁰⁸

The diversity of the participants on the Task Force, the opportunities for public comment at meetings, as well as the opportunities to submit public comments on the draft and final *Action Plan* suggests that stakeholder participation was an integral part in the development of a strategy to reduce hypoxia. This assumption is challenged by the results from the questionnaire. A mean score of 6.4, and standard deviation of 2.7, indicates that the perception of the involvement of stakeholders is highly variable, as illustrated by Figure 7.

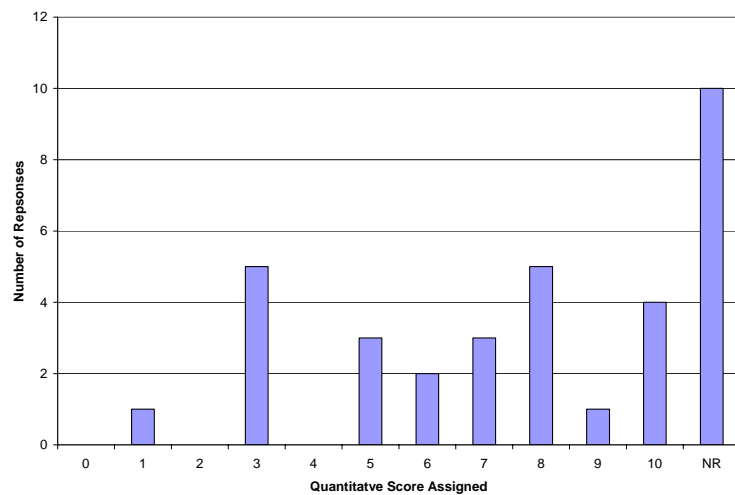


Figure 7. Statement Five: Distribution of Scores

The development of the *Action Plan* provided the opportunity for stakeholder involvement; however, some stakeholders felt left out. As one participant stated, “ultimately, the Task Force, which was all state and federal officials, had to make some

¹⁰⁷United States Environmental Protection Agency, “ Meeting Summary, Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, April 8-9, 1998, New Orleans, Louisiana,” January 21, 2004, <http://www.epa.gov/msbasin/2ndsummary.htm> (January 12, 2005).

¹⁰⁸ Rabalais, Turner, Scavia, 138.

tough choices for the actual objectives at a few final meetings, therefore some stakeholders may have felt excluded from that final decision making.” Additionally, with such a wide range of stakeholders, the “number of states and citizens and groups that would have been required made total involvement difficult and somewhat daunting,” as pointed out by William Franz, the Upper Mississippi River Basin Team Manager for Environmental Protection Agency Region 5. Finally, Dr. Andrew Slow, Director of the Marine Policy Center at Woods Holes Oceanographic Institute, concluded “involvement doesn’t necessarily imply a real hand in developing a plan.”

Statement Six

Statement six asked participants to rate the influence of industries, specifically agriculture and fertilizer, on the decision to remove the mention of a numerical goal for the reduction of N fertilizer [N discharge]. Over one-third of participants did not respond to statement five, resulting in a 62% response rate. This decrease in response rate indicates that an increasing number of participants lack the specific knowledge or willingness to respond.

According to an October 12, 2000 article in the *Times-Picayune* (Louisiana), Joe Hampton, Director of Illinois Agriculture Department, and Patty Judge, Secretary of Iowa’s Agriculture and Land Stewardship Department, opposed the inclusion of a numerical target for the reduction of nitrogen discharges during the seventh Task Force Meeting.¹⁰⁹ Additionally, the National Corn Growers Association (NCGA), in their comments on the Integrated Assessment, supported the removal of a numeric goal for the

¹⁰⁹ Leslie Williams, “Dead zone plan timid, Gulf States Say; Draft Skirts specific goals, critics note.” *Times-Picayune* (New Orleans, LA), October 12, 2000, National 2. Available on-line from LexisNexis [cited March 14, 2004.]

reduction of nitrogen.¹¹⁰ As demonstrated above, agricultural groups and agencies associated with such groups have supported the removal of the numeric target for the reduction of nitrogen.

The data obtained from questionnaire responses also supports the argument that the agriculture and fertilizer industries have had an influence on the removal of a numeric target from the *Action Plan*. The mean score of 7.5, and standard deviation of 2.1, demonstrates that most participants perceive the influence of the industries in this issue as moderate to high (Figure 8).

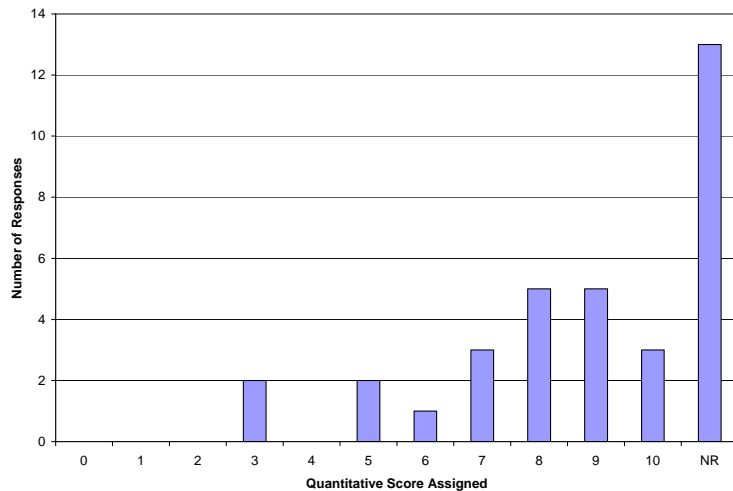


Figure 8. Statement Six: Distribution of Scores

According to one participant, “not only are there very close ties between these ag [agriculture] and fertilizer industries and certain federal agencies and state agencies, but the professional lobbyists from those industries were the most consistent and visible participants in the public discussions and comments. The perceived threat that this plan

¹¹⁰ Lynn O. Jensen, National Corn Growers Association. December 20, 1999, Comments on the Integrated Assessment of Hypoxia in the Northern Gulf of Mexico. Submitted to the Gulf of Mexico Hypoxia Working Group, NOAA, Silver Spring, MD.

could lead to regulation of those industries was the principal driver for their high participation.”

The preceding discussion demonstrates the influence of industry on the removal of the numeric goals from the *Action Plan*; however, the impact of the removal of the numeric goals for nitrogen from the *Action Plan* is uncertain. The removal of the numeric goal may encourage cooperation with the voluntary plan of nutrient reductions. As Rabalais explained in her response to this statement, “the *Action Plan* would have never been signed by Iowa and possibly other states if there had been a numerical goal for nitrogen reduction.” Several participants, agreed with the stance of some of the Midwest states as well as the agricultural industry, and mention in their responses that a numerical target is not appropriate.

Statement 7

Statement seven asked participants to rate the potential economic impacts that the agricultural industry in the Midwest may incur as a result of *the Action Plan*. Approximately 76% of participants responded, indicating that most of the participants possessed the knowledge or willingness to evaluate the statement. The *Integrated Assessment* identified various land management strategies that can be utilized to achieve the objectives of the *Action Plan*. These strategies include a reduction in nitrogen fertilizer use, as well as the restoration of wetlands among other options.¹¹¹

¹¹¹ CENR, 2000, Integrated Assessment of Hypoxia in the Northern Gulf of Mexico, National Science and Technology Council, Committee on Environment and Natural Resources, Washington, DC. This report provides a detailed discussion on land management strategies that could be utilized to improve water quality within the Mississippi River Basin.

Agricultural groups, such as the National Corn Grower’s Association, expressed concern over the economic impacts of the *Action Plan* on the agricultural industry¹¹²; however, the results from the questionnaire indicate that the potential economic impact of the *Action Plan* on the agricultural industry will not be as significant as some fear. The mean score of 4.3 and standard deviation of 2.4 indicates that the perception of the impact of the *Action Plan* on the economy of the agricultural industry in the Midwest is low to moderate. Despite the low mean score there were participants who rated this statement moderate to high reflecting the perception of many in the agriculture industry as illustrated by Figure 9.

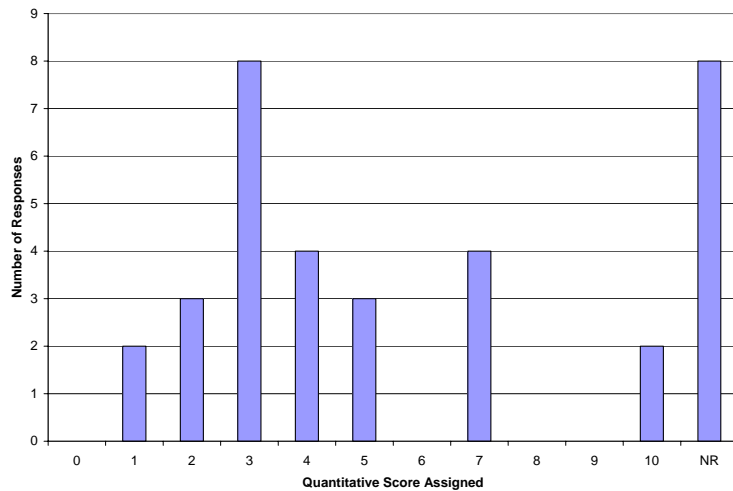


Figure 9. Statement Seven: Distribution of Scores

The variation in the perception of the impact can be attributed to the strategies utilized. As Dr. Philip Moore, a soil scientist from the United States Department of Agriculture, explains “this [impact] depends on whether it is voluntary or not and what is required. My understanding is that most of it is voluntary. Under those conditions where people are getting incentive payments the rating would be 1 or 2. If growers are forced by

¹¹² Jensen, 3

law to dramatically reduce fertilizer rates without regards to the impact on yields, than the rating would be high (8-9).” Additionally, as one participant points out, “based on the voluntary nature of *Action Plan* implementation and the fact that it relies on using existing management programs, many administered by the USDA, I believe adverse economic impacts will be minimized. Furthermore, because it relies on the use of existing management programs, it may be difficult to attribute adverse impacts exclusively to the *Action Plan*.” The risk to producers should be mitigated through existing subsidies, conservation programs, such as those in the 2002 Farm Bill, and other types of economic incentives, therefore, the Midwest Agricultural Industry should not incur any significant economic impacts as a result of the *Action Plan*.

Statement Eight

Statement eight asked participants to rate the impact of conflict between the objectives of the Gulf Fishing industry and the Midwest Agriculture/Fertilizer industries in the development and implementation of the *Action Plan*. Only 65% of participants responded to this statements. This high level of non-response (NR) indicates that approximately one-third of the participants was not familiar with this issue or was unwilling to respond.

Hypoxia in the Gulf of Mexico has the potential to impact the fisheries in the Gulf while any measure designed to reduce the hypoxia, such as the *Action Plan*, could impact the agricultural industry in the Midwest. The potential impacts of the *Action Plan* on these industries have the potential to create conflict and impact the development and implementation of the plan.¹¹³ While the potential for conflict exists, the mean score

¹¹³ Malakoff, 190.

(5.1) indicates that the participants perceive the impact on the conflict between the fishing and agricultural industries on the development and implementation of the *Action Plan* as moderate. Despite the moderate mean, the high standard deviation of 3.2 indicates that the mean most likely does not reflect the average perception of this issue, and the perception of this issue varies widely (Figure. 10).

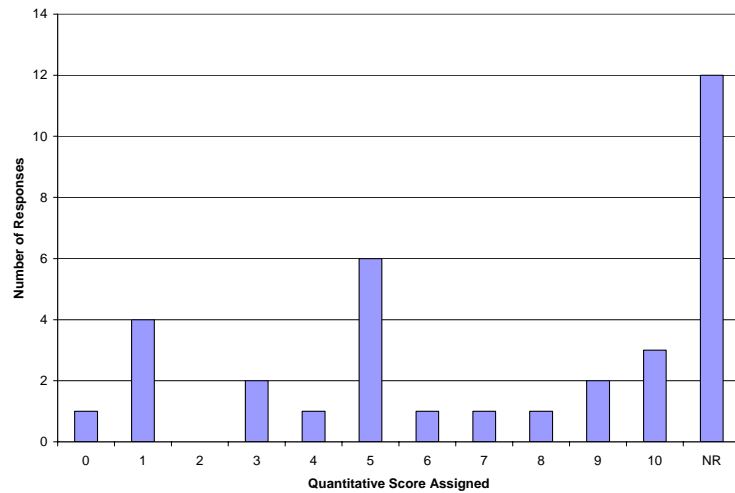


Figure 10. Statement Eight: Distribution of Scores

According to one participant, “this was not really significant conflict, as an “us v. them” sort of debate. So far, the fishing industry has not been significantly impacted so they are not extremely vocal in the debate. The big debate is between the agricultural industries and the water quality and ecosystem interests.” As illustrated by the above discussion, the conflict between the fishing and agriculture industry is not perceived as greatly impacting the development or implementation of the *Action Plan*. There is more conflict between the economic interests of industries and the environmental interests of environmental groups, than between the economic interests of the fishing and agricultural industries.

Statement Nine

Statement nine asked participants to rate the degree of variation among states in efforts to implement the *Action Plan*. Only 62% of participants responded to this statement. This high rate of non-response signifies that over one-third of the sample lacked the familiarity or was unwilling to respond. This issue is also difficult to assign value to for the reasons discussed in this section.

In January 2001, the nine states along the Mississippi River: Arkansas, Illinois, Iowa, Louisiana, Minnesota, Mississippi, Missouri, Tennessee and Wisconsin agreed to cut farm runoff; however, no specifics on how the states were planning to do so were available.¹¹⁴ According to the short term actions of the *Action Plan*, states were to establish sub-basin committees by summer of 2001; however, by this date only one such sub-basin committee had been formed, the Lower Mississippi Sub-Basin Committee. This committee was formed by representatives of Arkansas, Louisiana, Mississippi, Missouri and Tennessee. Since then, three other sub-basin committees, the Ohio, Upper Mississippi and Missouri, have been formed, but not in conjunction with the timeline proposed by the *Action Plan*.¹¹⁵ This is one example of the variation between states in their efforts to implement the *Action Plan*.

The questionnaire respondents also recognized a moderate-high degree of variation among states in their efforts to implement the *Action Plan*. This statement had

¹¹⁴ Bill Walsh, "EPA aims to halve dead zone in Gulf; Nine states agree to cut farm runoff." *Times-Picayune* (New Orleans, LA), January 19, 2001, National 6. Available on-line from *LexisNexis* [cited April 5, 2004.]

¹¹⁵ Ellen Athas, Testimony before the House subcommittee on Fisheries Conservation, Wildlife and Oceans on Algal Bloom and Hypoxia Research and Control, *Federal Document Clearing House Congressional Testimony* (26 February 2004), available on-line from *LexisNexis* [cited December 09, 2004].

an average score of 6.8, and a standard deviation of 3.2. This high standard deviation indicates a large variation in the perception of this issue, as illustrated by Figure 11.

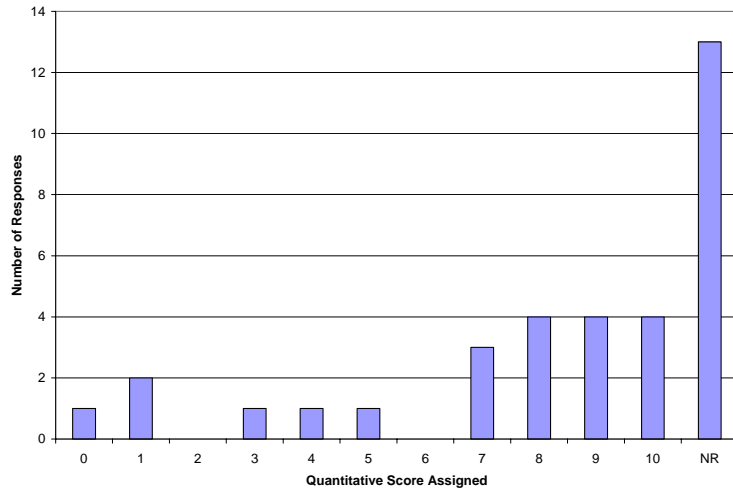


Figure 11. Statement Nine: Distribution of Scores

On a national level, not much has been done to implement the *Action Plan*. Those states where hypoxia is most visible, either directly or indirectly, appear to be leading the implementation of the *Action Plan*. According to Dr. Donald Scavia, former Chief Scientist of the National Oceanic and Atmospheric Administration’s National Ocean Service, “the Lower and Upper Mississippi States appear to have significant interest in implementation, and have begun some preliminary efforts. The “middle states” (Illinois, Iowa, etc.) appear to be lagging behind.” It is important to note, however, that although some states have been more active in their efforts to implement the plan, almost all are behind schedule.

There are a number of possible reasons for the variation in efforts to implement the plan. One participant responded that “there will be tremendous variation in implementation as budgets, interpretation of programs, and “honesty” of reporting varies

across the watershed.” There is a wide variation in the perception of the state efforts to implement the *Action Plan* as well as actual state efforts to implement the *Action Plan*.

Statement Ten

Statement ten asked participants to rate the degree to which the Bush Administration has assisted in the promotion and implementation of the *Action Plan*. Just over two-thirds of the sample (68%) responded to this question. This fairly high non-response rate indicates either a lack of familiarity with the issue being evaluated or a hesitation to respond because of political orientation or affiliation.

The impetus for the development of the *Action Plan* was the creation of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force in 1997 by President Clinton. With the departure of the Clinton Administration, the future of the *Action Plan* was uncertain. After the plan was released, in 2001, the Task Force was hopeful that efforts to improve water quality and decrease hypoxia would receive some additional federal funding; however, the Bush Administration told the EPA’s Gulf of Mexico Program office that they would not receive any additional funding to support the objectives of the plan.¹¹⁶

Data from the questionnaire (mean = 2.8, standard deviation = 1.7) indicates that respondents do not perceive the Bush Administration as very involved in the promotion and implementation of the *Action Plan*. Figure 12 illustrates the variation in the perception of the involvement of the Bush Administration in promoting and supporting the *Action Plan*.

¹¹⁶ Mark Schleifstein, “Dead zone panel must make do without extra aid; War, deficit trump nutrient cutting goal.” *Times-Picayune* (New Orleans, LA), August 7, 2003, Metro 4 [cited October 15, 2004.] .

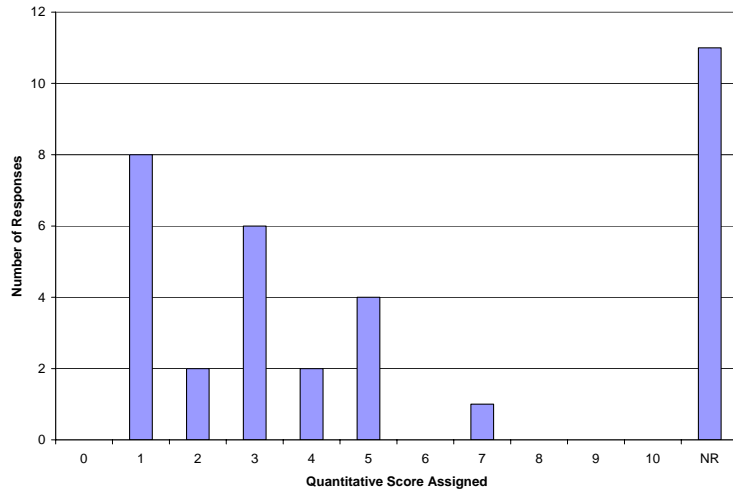


Figure 12. Statement Ten: Distribution of Scores

Several respondents indicated that the lack of financial support from the Bush Administration is hindering the implementation of the *Action Plan*. Additionally, the lack of support from the Bush Administration has allowed challenges to the science underlying the *Action Plan* and the *Action Plan* itself. According to Scavia, “while the Bush Administration has not killed the *Action Plan* or Task Force, its actions have been far from promoting it. The Task Force met only twice in the first 4 years of the Administration and there appears to be significant back-peddling in pushing for the programs and funding for implementation. It has allowed unreviewed and unpublished data from one EPA region to cast doubt on the thorough IA [*Integrated Assessment*] science and doesn’t appear to have a clear path forward.” In general, the degree to which the Bush Administration has promoted the implementation of the *Action Plan* has been low to moderate, at best.

Statement Eleven

Statement eleven asked participants to rate their perception of the effectiveness of the *Action Plan*. A response rate of 68% indicates that approximately one-third of the

participants did not respond to this question. The timeline of short term-actions within the *Action Plan* recommended nutrient reduction begin in 2003. Currently, there is a lack of data on water quality changes or changes in the area of hypoxia than can be attributed to the efficacy of the plan. However, participants based their perception on the efficacy of the plan on factors such as implementation, funding, support and cooperation.

As discussed earlier in statement nine, little has been done to implement the *Action Plan*, which essentially limits its efficacy. However, as Katie Flahive, an environmental scientist for the EPA, points out “if all 11 actions are completed in a timely manner, the science shows that a reduction in the size of the zone is possible.” The future effectiveness of the plan is dependent on its implementation, as several of the participants pointed out. Furthermore, the voluntary nature of the *Action Plan* compromises its effectiveness. For the plan to be effective, farmers in the Midwest must cooperate. This is complicated because farmers are skeptical that they are part of the problem leading to the hypoxia area.¹¹⁷ Without the cooperation of the Midwestern agricultural industry the effectiveness of the *Action Plan* will be uncertain.

The mean score of 3.5 and the standard deviation of 2.7 indicate that participants perceive the efficacy of the plan as low to moderate. While there is a high standard deviation, a majority of the scores are distributed towards the low end of the scale. However, as illustrated by Figure 13, there is a general lack of consensus on the perceived effectiveness of the *Action Plan*.

¹¹⁷ Walsh, 6.

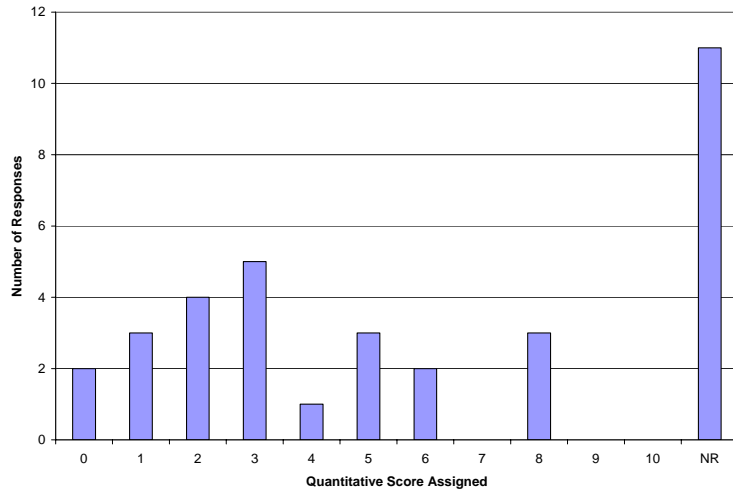


Figure 13. Statement Eleven: Distribution of Scores

Although the effectiveness of the *Action Plan* is questionable, the plan is important because it elevates the issue of hypoxia in the Gulf to the national level. As one participant concluded, “the *Action Plan* is going in the right direction.”

US Commission on Ocean Policy Recommendations

Statement 12

Statement twelve asked participants to rate their familiarity with the recommendations set forth by the US Commission on Ocean Policy (USCOP) regarding non-point source pollution and hypoxia. The US Commission on Ocean Policy released its final report *An Ocean Blueprint for the 21st Century* on September 21, 2004. The report contained over 200 recommendations; however, the recommendations of interest to this thesis were 14-3, and 14-7 through 14-10 in Chapter 14: Addressing Coastal Water Pollution.

There were 16 public meetings of the Commission on Ocean Policy between September 2001 and July 2004. Environmental groups, members of academia, public

officials from state and federal agencies as well as tribes and private citizens presented public comments at Commission Meetings as well as on the Commission’s Preliminary Report.¹¹⁸ The report also received media attention in newspapers, magazines and television. A high percentage (85%) of participants responded to this statement. The mean score for this statement (4.6) indicates a moderate familiarity with the recommendations among respondents. The standard deviation of 2.65 indicates that the familiarity with the recommendations were highly variable, as illustrated by Figure 14.

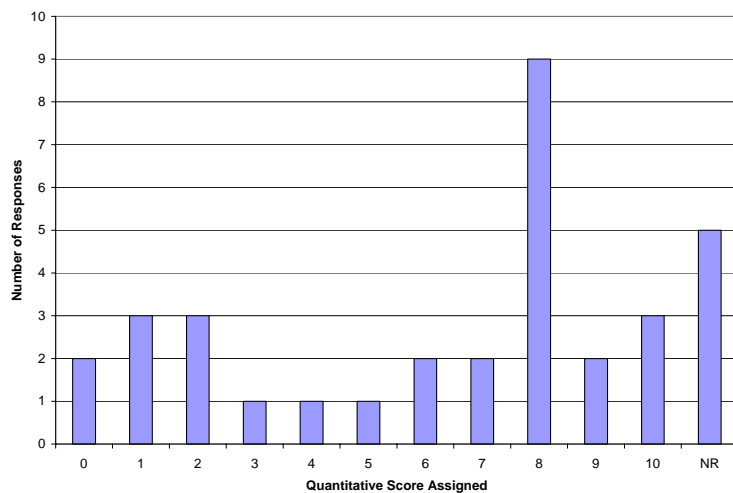


Figure 14. Statement Twelve: Distribution of Scores

The familiarity of the participants with the recommendations was attributed to their affiliation and involvement with the issue of hypoxia. While many members of academia were not familiar with the recommendations, some had participated in the development of the recommendations. Rabalais, for example responded, “I was involved in testimony to the Ocean Commission, and Admiral Watkins the Chair, was briefed by me and others on several occasions about this issue, both in the Gulf and other areas of

¹¹⁸ See www.oceancommission.gov for archived public comments presented to the US Commission on Ocean Policy.

the US. He and others on the Commission were very aware of this issue. I followed the whole process and was involved from inception to current pending legislation.”

The wide range of scores can be attributed to varying levels of exposure to the U.S. Commission on Ocean Policy’s report. Many members of the federal agencies, and some academics, were engaged in the development of those recommendations in some capacity. Other members of academia, state and federal agencies were less familiar with the report.

Statement Thirteen

Statement thirteen asked participants to rate the potential of the relevant recommendations (14-3, 14-7 through 14-10) in the US Commission on Ocean Policy (USCOP) report being implemented and enforced. Approximately three-quarters (74%) of the participants responded to this question. The response rate for this statement is lower than that of statement twelve, which asked participants to rate their familiarity with the recommendations. It is assumed that the decrease is the result of a non-response from participants who are not familiar with the recommendations.

The development of the USCOP report, like the development of the *Action Plan*, provided multiple opportunities for public comment. The agricultural industry, especially the Farm Bureaus, actively participated in the comment process, often challenging the recommendations set forth by the report. They objected to the recommendation 14-7 regarding the alignment of USDA conservation programs with efforts of other agencies to combat non-point source water pollution because conservation programs through the USDA are voluntary and incentive based, while EPA programs aimed at reducing non-

point source pollution are the opposite.¹¹⁹ Additionally, the Iowa Farm Bureau challenged EPA's regulatory authority regarding the Clean Water Act and Recommendation 14-3, which suggests that states impose stricter regulations on Concentrated Animal Feeding Operations (CAFOs) in order to achieve a desired water quality. Many states already regulate CAFOs.¹²⁰

In addition to the influence of industry, the current presidential administration must also be considered when evaluating the potential of the relevant recommendations in the US Commission report being implemented and enforced. The US Commission on Ocean Policy was created by the Bush Administration in accordance with the Oceans Act of 2000.¹²¹ Additionally, on December 17, 2004 President Bush signed an executive order establishing a new Committee on Ocean Policy.¹²² Furthermore, the recently released *U.S. Ocean Action Plan-the Bush Administration's Response to the U.S. Commission on Ocean Policy* highlights the importance of the USCOP report and lends support to many of its objectives, including those addressed at reducing non-point source pollution.¹²³

The *U.S. Ocean Action Plan* outlines various actions that have the potential to improve water quality and hypoxia in the Gulf of Mexico. One of the most salient

¹¹⁹ Bob Stallman, American Farm Bureau Federation, "Public Comment on the Preliminary Report, US Commission on Ocean Policy." June 4, 2004, www.oceancommission.gov/publiccomment.htm (January 12, 2005).

¹²⁰ Rick Robinson, Iowa Farm Bureau Federation, "Public Comment on Preliminary Report, US Commission on Ocean Policy," September 17, 2004, www.oceancommission.gov/publiccomment.htm (January 11, 2005).

¹²¹ "Information of the Oceans Act of 2000." January 2003. <http://www.oceancommission.gov/documents/oceanact.html#commission> (November 13, 2004).

¹²² "Chairman of the US Ocean Commission Commends on Initial Step towards National Ocean Policy," December 17, 2004, http://www.oceancommission.gov/newsnotices/dec17_04.html (January 5, 2005).

¹²³ Council on Environmental Quality, December 2004, *U.S. Ocean Action Plan-the Bush Administration's Response to the U.S. Commission on Ocean Policy*, <http://ocean.ceq.gov/actionplan.pdf> (February 19, 2005)

recommendations regarding hypoxia in the Gulf is the notion of using grants and incentive programs to improve water quality. The administration, in this report, proposes targeted watershed grants and the use of the USDA farm bill as possible ways to improve water quality.¹²⁴ The availability of economic incentives and assistance will be integral in gaining the support of industry and promoting the recommendation of the USCOP. While the administration appears to be supporting the recommendations of the US Ocean Commission, in general, it is uncertain whether this will be sufficient impetus for the implementation and enforcement of the recommendations. The interests of industry, specifically agriculture, have the ability to hinder such progress. The previous discussion is based on data obtained from comments to the USCOP and other primary sources.

The following discussion is based on data obtained from the questionnaire. The mean score of 4.6 for this statement on a scale of ten reflects the perception that there is a moderate potential of those recommendations included in chapter fourteen, that address non-point source pollution, of the USCOP report being implemented and enforced. The standard deviation of 2.65 indicates a highly variable perception of the climate surrounding the future of the recommendations (Figure 15).

¹²⁴ Council on Environmental Quality, 27.

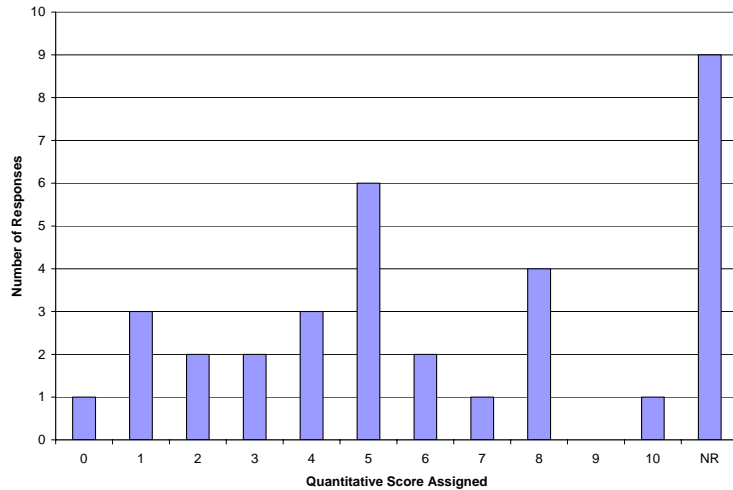


Figure 15. Statement Thirteen: Distribution of Scores

As one participant concluded, “unfortunately, the broad political impact of the Commission has not been great. So far the only major impact I am aware of is that NOAA’s budget has gotten a boost this year. Neither the Pew Report nor the Ocean Commissions Report did what might have been hoped.”

As discussed earlier in this section, the USCOP report and the *US Ocean Action Plan* both recommend the use of incentives and incentive based programs as a tool to reduce non-point source pollution. Columbus Brown, Special Assistant to the Regional Director, US Fish and Wildlife Service, identified the use of such programs as very important to the success of the recommendations. In his questionnaire response, Brown stated “it is very likely that the Commission Report will be implemented. Non-regulatory approaches are extremely important to real success.” It is important to note that the preceding discussion only pertains to the perceptions of respondents regarding the recommendations in chapter 14, specifically recommendations 14-3, and 14-7 through 14-10, and not to the entire report. Additionally, the report was just released in late 2004 and it has not yet been evaluated by the public. As Matlock points out in his response to

the questionnaire “at this point, it is unclear how likely it is that the most meaningful recommendations will be implemented. But, I’m optimistic that it is as likely as it is unlikely.”

CHAPTER 3: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This thesis served three objectives. Firstly, it examined the perceived efficacy of the *Action Plan*. Secondly, it tested the hypothesis that the relative economic power of the fishing, agricultural and fertilizer industries compete and inhibit the development of an effective national strategy to mitigate seasonal hypoxia in the Northern Gulf of Mexico. Finally, this thesis also evaluated the climate within which the government and stakeholders are to act, or not, on the recommendations set forth by the U.S. Commission on Ocean Policy to combat non-point source pollution as related to the formation of the dead zone.

Since the inception of legislation designed to combat hypoxia in 1998, the situation has not changed. Senator Olympia Snowe (ME) recognizes the persistence of the problem, and states that “harmful algal blooms and Hypoxia are just as much of a problem as they were in 1998, when we passed the original bill. It is clear the problems have not gone away.”¹²⁵ The *Action Plan* was created almost four years ago, and yet the problem of hypoxia continues to exist today. So far the effectiveness of the *Action Plan* has been mixed at best. While the plan has provided increased attention to the issue, the implementation of the short term goals as described by the plan is behind schedule. The

¹²⁵ Senator Olympia Snowe, United States Congress, Senate, Statements on Introduced Bills and Joint Resolutions, *S. 247 Harmful Algal Bloom and Hypoxia Research Amendments of 2003*. (108th Congress, 1st Session, 149 Cong Re S 1737, January 29, 2003). Available on-line from LexisNexis Congressional [cited September 23, 2004].

timeline mandated by Congress for the implementation of certain actions has not been satisfied. Furthermore, Congress has failed to implement and enforce the plan.¹²⁶ One requirement of the *Action Plan* is that it be reassessed by December 2005, and every five years following. This reassessment is currently in progress. The three long term goals: Coastal Goal, Within Basin Goal, and Quality of Life Goal will be evaluated as part of this process, and revisions will be made to the strategies if necessary.¹²⁷

The issue of hypoxia in the Gulf of Mexico can be considered a common-pool resource problem because of the wide range of stakeholders that utilize the Mississippi River Basin. The nature of the Mississippi River Basin complicates efforts designed to mitigate hypoxia in the Northern Gulf of Mexico because any such effort would require cooperation from the various stakeholder groups within the Basin. The effectiveness of the *Action Plan* is compromised by its voluntary manner.

The case of the *Action Plan* illustrates the notion that individuals sharing a common-pool resource will not voluntarily act in the best interest of the group without coercion or incentives. In this case, the threat of EPA regulation and the potential inclusion of a numerical target for nitrogen reductions in the *Action Plan* mobilized the agricultural industry to oppose such actions. Similarly, the Task Force concluded that the solution to hypoxia in the Gulf was to pay farmers.¹²⁸

In order to develop an effective strategy to combat hypoxia in the Northern Gulf the issue must gain more attention on the national level. Unfortunately, the development of a national strategy such as the *Action Plan* does not signify that the issue is perceived

¹²⁶ Athas, 6.

¹²⁷ Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 14.

¹²⁸ Lambrecht, "Task Force calls for paying farmers," 2.

as nationally important. Despite the value of the basin to a wide range of people, the issue only appears to be of significant importance on a regional level; to those who could be directly or indirectly impacted by hypoxia or efforts to mitigate it. It has yet to appear as a prominent issue on the national agenda.

The *Action Plan* allowed for a high level of stakeholder involvement; however, members of the Task Force were ultimately responsible for the recommendations made. Some of the stakeholder groups that participated in this process were more successful in the promotion of their interests. The agriculture lobby has been highly engaged in this endeavor for a number of reasons, particularly the perceived threat of EPA regulations and the perceived threat of the economic impacts of the plan. The lobbying efforts of the agriculture and fertilizer industries, as well as their ties with state and federal agencies allowed them to exert significant influence on the development of the *Action Plan*. As Kingdon explains “a group that mobilizes support, writes letters, sends delegations and stimulates allies to do the same can get governmental officials to pay attention to its issue. As one of my respondents described the way subjects rise through his departments to the secretary’s level due to group pressure, ‘Generally speaking, the louder they squak the higher is gets.’ Then when I asked him why other groups weren’t paid much attention, he replied, ‘they don’t come in very often; they just don’t come in.’”¹²⁹ Unlike other stakeholder groups, the agricultural industry has the capacity to mobilize and effectively promote their interests. Currently, there is no comparable group for the fishing industry.

¹²⁹ Kingdon, 52.

The central hypothesis of this thesis was that economic conflict between the aforementioned industries inhibited the development of an effective strategy to address hypoxia; however, the results obtained suggest otherwise. The lack of involvement of the fishing industry, and not conflict between the fishing and agriculture/fertilizer industries, has influenced the development of the *Action Plan*. Interests of the agriculture and fertilizer industries were represented; those of the fishing industry were not. However, the potential for hypoxia to impact the Gulf fishing industry, especially the shrimp fisheries, could renew the interests of the fishing industry and lead to conflicts of interest between the fishing and agriculture industries in the future.

The lobbying efforts of the Midwest agricultural industry were successful in having the numerical goal for nitrogen reduction removed from the initial pages of the *Action Plan* and replaced with a voluntary recommendation for an overall decrease in nitrogen loss. Farmers feared that the numerical target would lead to new regulations on non-point source pollution; however, the hypoxia Task Force does not have the authority to create any new regulations or mandate compliance. The voluntary compliance of the *Action Plan* further reflects the influence of the Midwestern industries on the development of policy.¹³⁰ Other groups, such as the fishing industry that do not have the economic power to mobilize groups to attend Task Force meetings were less influential in the development of the *Action Plan*.

The combination of the influence of the agriculture and fertilizer industries of the Midwest and factors such as the lack of basin wide cooperation, high variation between states in implementation efforts, and lack of funding have potentially limited the efficacy

¹³⁰ Bill Lambrecht, "Farm Conservation Money Stirs Hope for Shrinking "Dead Zone" in Gulf," *St. Louis Post-Dispatch*, December 11, 2002, A4. Available on-line from LexisNexis [cited April 4, 2004.]

of the *Action Plan*. Cooperation between states, the agriculture, fertilizer industries and other stakeholders, including the fishing industry and environmental groups is essential to the effectiveness of the *Action Plan* and the USCOP recommendations. It is especially important to have the cooperation of the states north of the Ohio River since over 56% of the nitrate load originates in this area.¹³¹ The impact of the voluntary measures proposed by the *Action Plan* is uncertain and largely dependent on the cooperation among the states and industries in the basin.

The potential impact of any policy or plan designed to combat hypoxia in the Northern Gulf of Mexico could have significant impacts on stakeholder groups. However, there are two factors that should mitigate the economic impacts of the *Action Plan* on the Midwest agriculture industry. First, is the voluntary nature of the *Action Plan*. Second, is the funding available through existing programs such as those in the 2002 Farm bill that provide incentives and assistance for many of the land management alterations suggested by the *Action Plan*.

The 2002 Farm Bill authorized the spending of \$17 billion over the next ten years to improve water quality and other objectives.¹³² It is important to note that the Farm Bill does not stipulate that money provided must be used to address hypoxia. The Conservation Securities Program (CSP), which was not included in the 1996 Farm Bill, is specifically of interest in the discussion of hypoxia. The CSP offers economic incentives as well as technical assistance to farmers who practice good stewardship on agricultural land.¹³³ Other programs under the 2002 Farm Bill that could benefit the effort to combat

¹³¹ Rabalais, Turner and Scavia, 140.

¹³² Lambrecht, "Farm Conservation Money," A4.

¹³³ US Commission on Ocean Policy, 214.

hypoxia include the Environmental Quality Incentives Program (EQIP), the Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP).¹³⁴

Although Farm Bill money is not targeted at hypoxia, many of the activities supported by the bill may combat hypoxia by improving water quality. Two such activities, as identified by Mitsch et al. were the alteration of agricultural practices and the creation of riparian buffers as two possible ways to decrease the nitrogen flux into the Gulf of Mexico. Furthermore, they noted that a combination of measures, rather than the implementation of a single policy, will be more effective at reducing hypoxia.¹³⁵ Overall, the conservation programs offered through the USDA, government subsidies, and the more efficient use of fertilizer should prevent any substantial impacts and may economically benefit the agricultural industry for cooperating with the objectives of the *Action Plan*.

The successful implementation and enforcement of the recommendations set forth by the US Commission on Ocean Policy regarding non-point source pollution as it pertains to hypoxia in the Gulf of Mexico faces many of the same obstacles that the *Action Plan* has faced and continues to face. Unlike many other policy options designed to address non-point source pollution the final report from the USCOP, *An Ocean Blueprint for the 21st Century*, recommends increased federal involvement in addition to the use of incentives.¹³⁶ The agriculture industry supports the use of incentives, but objects to the proposed increased federal involvement on the grounds that it may result in additional regulations on the industries. As with the *Action Plan*, the lobbying of the

¹³⁴ USDA, 2003. "Conservation," *Farm Bill 2002*. http://www.usda.gov/farmbill/conservation_fb.html (October 12, 2004).

¹³⁵ Mitsch et al., 382.

¹³⁶ US Commission on Ocean Policy, 218.

agricultural industries, in addition to the relationship between the agricultural and fertilizer industries and state and federal agencies, as well as the involvement of the current administration could impact the future of the USCOP recommendations.

Although the *Action Plan* focuses on voluntary measures, the importance of effective regulation in controlling hypoxia has been demonstrated in previous examinations of hypoxia. Diaz explains that the only ecosystems where oxygen conditions have improved are those that have been subject to intensive regulations.¹³⁷ If the *Action Plan* is to succeed in achieving its goals of a reduction in the area of hypoxia, an improvement of water quality within the basin, and an improvement of the economic conditions within the basin the federal agencies and decision-makers must not only take into account those groups that actively promote their interests, but must also consider the interests of those groups that are not well represented. Additionally, the cooperation of the states and industries within the basin is integral to the success of the plan. Without this the only chance may be increased state and/or federal regulation. If stakeholders can significantly influence the development of objectives of the *Action Plan*, as demonstrated by this study, future attempts to combat non-source pollution and hypoxia could face similar obstacles.

Recommendations

The following recommendations focus on some of the more significant obstacles to the success of the *Action Plan* and the USCOP report. These include lack of awareness, under-represented stakeholders, and agricultural subsidies.

¹³⁷ Diaz , “Overview of hypoxia,” 278.

An increased awareness of hypoxia in the Gulf of Mexico could lead to increased pressure on Members of Congress as well as federal and state agencies to implement the recommendations of both the *Action Plan* and the USCOP report. Increased coordination of programs designed to combat hypoxia in various areas throughout the United States, such as the Gulf, Chesapeake Bay, and Long Island Sound, could increase visibility of this issue on the national level.

The increased involvement of various stakeholder groups would also be useful to the development of effective strategies to combat hypoxia. It has been demonstrated that certain groups were not as active as others in the development of the *Action Plan*. Two possible reasons for this are a lack of awareness or the lack of financial means to attend meetings. Increased coordination of stakeholder groups, such as the fishing industry, could help address the lack of awareness, as well as the lack of capacity to attend meetings, by provided an increased pool of resources. This would increase the range of participation in the development process, which is currently dominated by a few industries.

The following recommendation is pertinent to both the *Action Plan* and the USCOP report. The success of both of these endeavors is dependent on available funding. Currently, no funding sources are aimed at land management strategies that are specifically directed to hypoxia. Instead of the federal government subsidizing agriculture, the money should be put into a fund to be distributed to members of the agricultural community who engage in the good land stewardship on a day-day basis, not just those who make a significant change in land management behavior. Subsidies discourage crop rotation because only certain crop such as corn and soybeans are

subsidized. Both of these crops are associated with high losses of nitrogen.¹³⁸ The failure to develop policy that effectively addresses this issue may lead to the development of perverse subsidies and a continuance of ecosystem damage in the form of hypoxia.

¹³⁸ Burkart and James, 857.

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Appendices

Appendix A: Public Officials (Federal and State) Recruited to Participate
(In alphabetical order)

Arkansas, Soil and Water Conservation Commission

Council on Environmental Quality

Department of the Interior

Department of Justice

Illinois, State Water Survey

Iowa, Department of Agriculture and Land Stewardship

Louisiana, Department of Fish and Wildlife

Minerals Management Service

Mississippi, Department of Environmental Quality

Missouri, Department of Natural Resources

Tennessee, Department of Agriculture

U.S Department of Commerce-National Oceans and Atmospheric Administration

U.S. Army Corp of Engineers-Mississippi Valley Division

U.S. Department of Agriculture

U.S. Environmental Protection Agency

U.S. Fish & Wildlife Service

U.S. Geological Survey

White House Office of Science and Technology Policy

Wisconsin, Department of Natural Resources

Appendix B: Offices of Congress Recruited to Participate
(In Alphabetical Order)

Senator Lamar Alexander, Tennessee
Representative Judy Biggert, Illinois
Representative Jo Bonner, Alabama
Senator John Breaux, Louisiana
Representative Sherrod Brown, Ohio
Senator Chris Bond, Missouri
Senator Thad Cochran, Mississippi
Senator John Cornyn, Texas
Representative Jim Davis, Florida
Senator Mark Dayton, Iowa
Representative William Delahunt, Massachusetts
Senator Mike Dewine, Ohio
Senator Richard Durbin, Illinois
Representative Vernon Ehlers, Michigan
Senator Russ Feingold, Wisconsin
Senator Peter Fitzgerald, Illinois
Representative Mark Foley, Florida
Senator Bill Frist, Tennessee
Senator Chuck Grassley, Iowa
Senator Norm Grassley, Minnesota
Senator Tom Harkin, Iowa
Representative Katherine Harris, Florida
Senator Fritz Hollings, South Carolina
Senator Kay Hutchinson, Texas
Representative Christopher John, Louisiana
Representative Stephanie Tubbs Jones, Ohio
Representative Marcy Kaptur, Ohio
Representative Ron Kind, Wisconsin

Appendix B (Continued)

Representative John Kline, Minnesota
Senator Herb Kohl, Wisconsin
Senator Mary Landrieu, Louisiana
Representative Tom Latham, Iowa
Representative Jim Leach, Iowa
Senator Carl Levin, Michigan
Representative Sander Levin, Michigan
Senator Blanche Lincoln, Arkansas
Representative William Lipinski, Illinois
Senator Trent Lott, Mississippi
Representative George Miller, California
Representative Chad Pickering, Mississippi
Senator Mark Pryor, Arkansas
Representative E. Clay Shaw, Florida
Senator Olympia Snowe, Maine
Senator Debbie Stabenow, Michigan
Senator James Talent, Missouri
Representative Billy Tauzin, Louisiana
Representative Gene Taylor, Mississippi
Representative Fred Upton, Michigan
Senator George Voinovich, Ohio
Representative Robert Wexler, Florida

Appendix C: Universities and Institutes Recruited to Participate
(In alphabetical order)

Auburn University
Cornell University
Florida Institute of Oceanography
Iowa State University
Louisiana State University
Louisiana Universities Marine Consortium
Princeton University
Purdue University
Ohio State University
Texas A&M
University of Arkansas
University of Illinois Urbana-Champaign
University of Maryland-Center for Environmental Science
University of Miami
University of Michigan
University of Minnesota
University of Missouri-Columbia
University of South Florida- St. Petersburg
University of Southern Mississippi
University of Tennessee
University of Wisconsin

Virginia Institute of Marine Science
Woods Hole Oceanographic Institute

Appendix D: Copy of Questionnaire

Questionnaire

One a scale of 1 to 10 (1 being the least, 5 being moderate and 10 being the greatest) please rate the following. After rating the statement by circling the desired number, please use the space below to briefly explain your rating.

1. The knowledge among decision makers in Midwestern States that an area of hypoxia exists in the Northern Gulf of Mexico.
1 2 3 4 5 6 7 8 9 10

2. The potential of hypoxia to disrupt the Gulf Coast's Fishing Industry.
1 2 3 4 5 6 7 8 9 10

3. The importance of addressing the issue of hypoxia in the Gulf.
1 2 3 4 5 6 7 8 9 10

4. Your confidence in the accuracy of the science underlying the *Action Plan for Reducing, Mitigating and Controlling Hypoxia in the Northern Gulf of Mexico* (hereafter referred to as the *Action Plan*).
1 2 3 4 5 6 7 8 9 10

5. The involvement of stakeholders in the development of the objectives set forth by the Federal *Action Plan*.
1 2 3 4 5 6 7 8 9 10

6. The effectiveness of the *Action Plan*.
1 2 3 4 5 6 7 8 9 10

Appendix D (Continued)

7. The influence of industries, specifically agriculture and fertilizer, on the decision to remove the mention of a numerical goal for the reduction in N fertilizer use from the *Action Plan*.

1 2 3 4 5 6 7 8 9 10

8. The potential economic impacts that the agriculture industry in the Midwest may incur as a result of the *Action Plan*.

1 2 3 4 5 6 7 8 9 10

9. The impact of the conflict between the objectives of the Gulf Fishing Industry and the Midwest Agriculture/Fertilizer Industries in the development and implementation of the *Action Plan*.

1 2 3 4 5 6 7 8 9 10

10. The degree of variation among states in efforts to implement the *Action Plan*.

1 2 3 4 5 6 7 8 9 10

11. The degree to which the Bush Administration has assisted in the promotion and implementation of the *Action Plan*.

1 2 3 4 5 6 7 8 9 10

12. Your familiarity with the recommendations set forth by the US Commission on Ocean Policy regarding non-point source pollution and hypoxia.

1 2 3 4 5 6 7 8 9 10

13. The potential of the relevant recommendations in the US Commission report being implemented and enforced.

1 2 3 4 5 6 7 8 9 10

Appendix E: Short-term Actions as Outlined by *Action Plan*

1. By December 2000- the Task Force submit proposal for additional funds.
2. By summer 2001- sub-basin committees will be established.
3. By fall 2001- develop a strategy to coordinate and promote additional research programs to reduce scientific uncertainties.
4. By spring 2002- expand the long-term monitoring program.
5. By spring 2002- expand the existing monitoring efforts within the basin.
6. By fall 2002- develop nutrient reduction strategies.
7. By December 2002- nutrient reduction actions will be studied by the U.S. Army Corp of Engineers, if funding is obtained from Congress.
8. By January 2003, or on a time frame established by sub-basin committees, significant point source dischargers within the MARB will be identified. Measures will be taken to reduce the dischargers in accordance with action #6.
9. By spring 2003, or on a time frame established by sub-basin committees, increase assistance to landowners for voluntary conservation efforts.
10. By spring 2003, or on a time frame established by sub-basin committees, increase assistance to agricultural producers for the implementation of best-management practices (BMPs) which are effective in addressing nitrate flux.
11. By December 2005, and every 5 years thereafter, the Task Force will reassess the reduction of nutrients and the response of the hypoxic area. The Task Force will then re-evaluate current strategies and make revisions if necessary.

Appendix F: Data

Year	Number of Results in Major News Sources	Number of Results in Regional News	Total Annual Incidence
1985	0	0	0
1986	0	0	0
1987	1	0	1
1988	0	0	0
1989	0	0	0
1990	0	0	0
1991	0	0	0
1992	0	0	0
1993	0	2	2
1994	0	4	4
1995	0	12	12
1996	1	11	12
1997	1	14	15
1998	4	30	34
1999	1	35	36
2000	2	60	62
2001	2	23	25
2002	5	24	29
2003	2	27	29
Total	19	242	261

Table A-1. Annual Incidence of Keywords in Major National Newspapers and Southern and Midwestern Regional Sources (1985-2003)

Appendix F (Continued)

Year	Number of Results Congressional Records	Number of Results in Congressional Testimony	Total Annual Incidence in Congressional Documents
1988	4	0	4
1989	4	0	4
1990	2	0	2
1991	4	0	4
1992	2	0	2
1993	3	2	5
1994	0	0	0
1995	0	0	0
1996	0	0	0
1997	3	7	10
1998	5	25	30
1999	2	22	24
2000	6	13	19
2001	5	13	18
2002	1	7	8
2003	4	9	13
Total	45	98	143

Table A-2. Annual Incidence of Keywords in Congressional Sources
(1988-2003)

Appendix F (Continued)

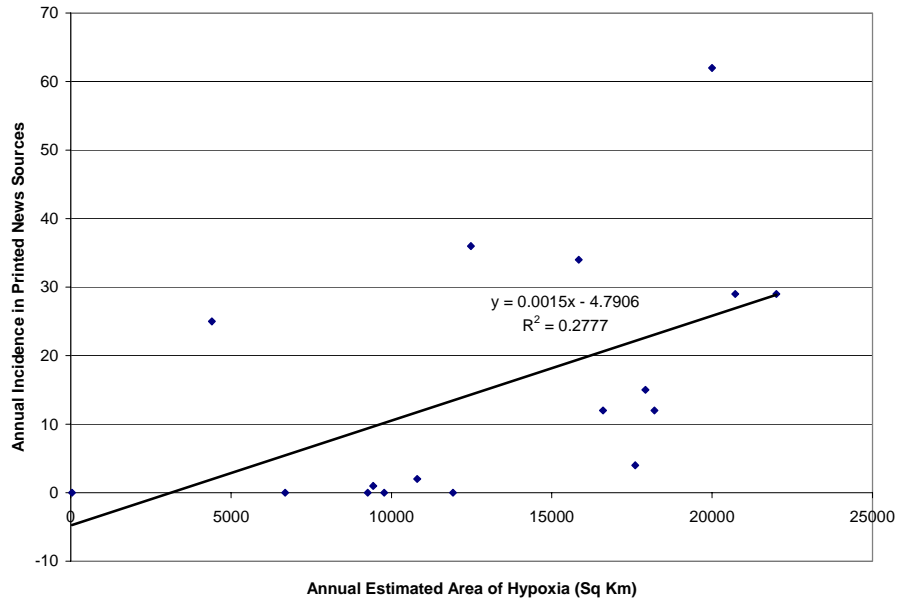


Figure A-1. The Relationship between the Annual Estimated Area of Hypoxia (1985-2002) and the Annual Incidence of Keywords in Newspapers the Following Year

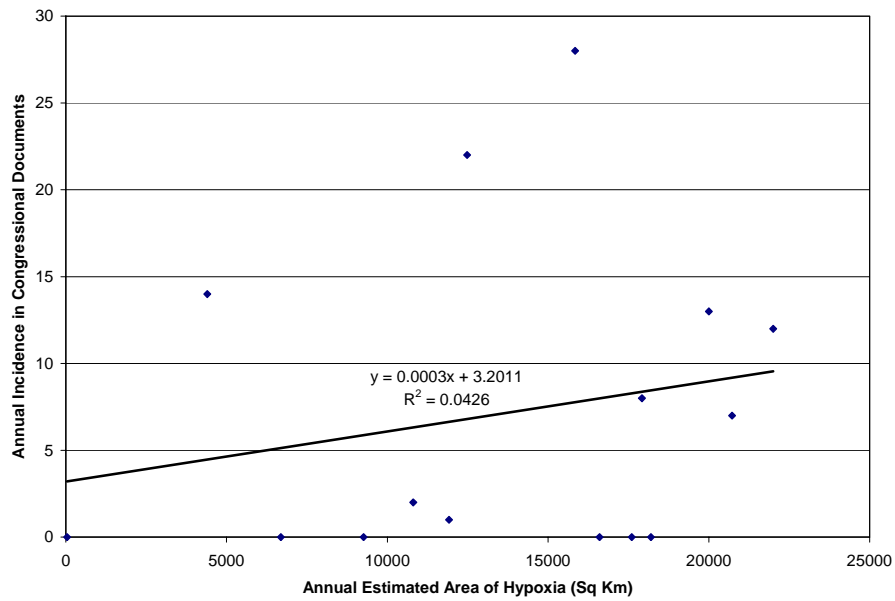


Figure A-2. The Relationship between the Annual Estimated Area of Hypoxia (1987-2002) and the Annual Incidence of Keywords in Congressional Documents the Following Year

Appendix F (Continued)

Participant	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
1	6	7	9	8	8	7	4	3	9	5	4	6	4
2	8	6	8	7	6	7	4	4	8	4	8	2	2
3	10	8	10	9	10	10	3	5	NR	4	5	9	5
4	10	3	10	6	5	5	1	1	7	1	1	1	1
5	10	5	3	8	10	8	5	5	1	5	6	2	5
6	7	6	7	7	NR	NR	4	NR	NR	2	2	6	3
7	7	1	1	2	1	NR	NR	NR	1	NR	NR	NR	0
8	9	8	8	9	7	8	7	7	9	5	5	10	7
9	NR	5	10	7	3	3	10	1	NR	1	1	1	NR
10	6	8	8	5	3	NR	5	5	9	2	3	7	1
11	10	2	5	0	3	NR	NR	NR	NR	NR	0	10	10
12	NR	NR	7	NR	NR	NR	NR	NR	NR	NR	NR	8	5
13	3	10	8	NR	NR	NR	NR	NR	NR	NR	NR	7	1
14	10	7	10	10	10	10	3	1	10	3	3	8	6
15	7	10	10	10	7	NR	6.5	NR	7	3	NR	8	NR
16	8	6	8	9	10	8	7	5	9	3	3	8	5
17	9	8	10	5	7	6	1	1	7	5	8	5	8
18	5	3	5	1	3	10	7	9	10	1	3	1	NR
19	NR	5	8	7	3	9	4	NR	NR	1	1	0	NR
20	7	9	8	NR	NR	NR	NR	NR	NR	NR	NR	0	NR
21	4	10	10	NR	NR	NR	3	NR	NR	NR	NR	NR	NR
22	5	4	3	6	8	3	3	0	0	NR	0	NR	NR
23	5	NR	NR	3	8	9	3	8	10	1	2	8	2
24	2.5	10	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
25	5	10	10	10	5	NR	5	10	10	1	5	2	5
26	9	8	9	6	5	9	2	9	5	1	2	4	3
27	3.5	7	10	NR	NR	8	3	10	NR	3	NR	8	8
28	3	6	5	5	NR	NR	NR	NR	NR	NR	NR	NR	NR
29	10	7	8	9	8	8	3	6	8	3	6	8	6
30	8	3	8	9	6	7	3	3	3	1	2	3	3
31	7	5	10	9	NR	NR	2	NR	8	NR	NR	10	8
32	7	8	10	10	9	5	10	5	8	7	8	9	8
33	6	10	9	8	8	9	2	5	4	3	3	8	4
34	7	8	NR	9	NR	9	NR	10	NR	NR	NR	8	5

Table A-3. Summary of Questionnaire Data
(NR indicates Non-Response)

Appendix F (Continued)

N=34	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Number of responses	31	32	32	28	24	21	26	22	21	23	23	29	25
Mean score	6.90	6.66	7.97	6.93	6.38	7.52	4.25	5.14	6.81	2.82	3.52	5.76	4.6
Range	7.5	9	9	10	9	7	9	9	10	6	8	10	10
Standard deviation (Sx)	2.32	2.54	2.4	2.77	2.68	2.09	2.4	3.23	3.2	1.74	2.47	3.33	2.65
Variance (Sx) ²	5.38	6.45	5.76	7.67	7.18	4.37	5.76	10.4	10.2	3.03	6.1	11.1	7.02

Table A-4. Statistical Summary of Questionnaire Data

Appendix G: Summary of Selected Questionnaire Responses

Statement 1.

- “Most decision makers are aware, but it isn’t a top priority.”
- “As I speak with decision makers and read the reports and newspapers, everyone (legislators (sic), congress members, leaders, farms, NGO’s) all recognize hypoxia exists. They don’t agree on its importance, extent or causes, necessarily, but they accept that its there.”
- “Between federal legislation, media coverage, and interagency action group-awareness is high.”
- “They are aware and some put a lot of effort into trying to debunk the idea that their states are causing the problem.”
- “Public at large in mid-western states know little about hypoxia, not high on the radar of decision makers, nor does it impact their communities. Similar situation in North LA.”
- “I think most decision makers see it as a more local problem, and do not have the “downstream” thinking that would make them more concerned about the Gulf.”
- “A significant fraction of the population, including decision makers, don’t pay attention as long as it doesn’t affect their daily lives.”

Statement 2.

- “It already has, but perhaps not catastrophically. For example, shrimpers have to travel farther to fish...”
- “Given the open nature of this continental shelf and the ability for recruitment, the likelihood that this part of the Gulf would suffer the serious fishery problems of the Baltic and Black Sea are less likely. ‘Disruption’ comes in the form of altered fishing techniques and locations, inability to fish, added expenses to fish.”
- “I believe there is a significant, unquantified risk to the shrimp industry.”
- “Hypoxia makes it very difficult to predict what types of fishing systems and what limits should be imposed by governments in order to insure the sustainability of a productive Gulf Coast Fishing Industry.”
- “The only thing that has been documented in the size of the hypoxic zone. It is not clear what the consequences can be in the short and long term.”
- “It appears that if you have hypoxia in a certain area, animals are smart enough to move out of it. There probably would or might be something to do with oysters living in a certain area, that don’t really have time or don’t tend to move around a whole lot.”
- “Given the fact that nutrient loads in the Mississippi/Athchafalaya have decreased and there is a plan to reduce loads further, I do not envisage future worsening of hypoxia or disruption of the industry, if nutrient loads from the M/A are the cause of the problem.”
- “More important threat is the destruction of the coastal estuaries that are breeding grounds.”

Appendix G (Continued)

Statement 3.

- “The Clean Water Act commits the country to restore the chemical, physical, and biological integrity of our nation’s waters. The Gulf Hypoxic Zone is one of the most visible and worsening water quality blights in the country.”
- “I don’t think that impacts or effects of the dead zone in the Gulf as a whole are well communicated if known, other than that it exists and has existed for some time. Many folks see the dead-zone research as just that-more research without practical application or reason.”
- “At this point in time, it’s a 1, because we don’t know if or where any damages are occurring; neither do we know what would need to be done physically to eliminate the problem, nor, what the costs might be.”
- “based on my (admittedly limited) understanding, I would say that hypoxia is more a symptom than it is a root issue, so while it’s an important problem to solve, the solutions don’t necessarily lie in addressing hypoxia per se. non-point source pollution, agricultural runoff, etc, are the problems to address.”
- “This, like global climate change, might be viewed as an insurance situation. We do not expect our house to burn down, but we have fire insurance. If for no other reason, some basic prevention should be undertaken to mitigate the risk of future environmental disruption that might stem from the existing hypoxia.”
- “From a Minnesota perspective this has 2 components: 1) a fundamental environmental ethics issue-we don’t have the right to damage other people’s environments, and 2) because this appears to be a serious issue there could be serious repercussions on Minnesota agriculture if this is not addressed.”
- “Hard to say without knowing how damaging it is or how much it would cost to control.”

Statement 4

- “The science that went into the development of the Action Plan was good and used the best information available. As we learn more and our understanding is increased we need to be able to be flexible and adjust to our improved understanding.”
- “...the science doesn’t include anything to do with the damages nor costs or remediation, it all has to do with aerial extent.”
- “It was the best that the limited number of scientists could have put together in the limited time available. There were several impediments to a higher quality assessment. The scientific inquiry behind the plan was limited by the committee structure. The time to complete the plan was limited. The general agricultural research community, which will ultimately be asked to discover solutions to non-point source nutrient loads, was not openly invited to participate in enquiry.”

Appendix G (Continued)

- “The CENR assessment is flawed and inaccurate and does not provide a sound scientific basis for effective action. A key question to ask is how the nation could have been so ill served...They used a concocted nutrient ration which has no scientific basis...based on this flawed science, they concluded that it would be appropriate to reduce nitrogen load by about 30%.”
- “I am very confident in the science base. The IA was based on six technical reports that had gone through extensive peer review and public comment phase, as well as a myriad of published information. The IA was also subjected to public comment, and most of the information was reviewed and discussed in scientific meetings and the Task Force public meetings. It would be difficult to find a body of science more thoroughly reviewed.”

Statement 5.

- “Hypoxia Task Force has meetings at least once a month which has a major public involvement component. The Action Plan itself was coordinated with the public, both in terms of getting opinions up front and on review of the final draft. The Action Plan reassessment effort which is now underway has major public involvement aspects including public workshops and review of the final draft.”
- “If you are looking at agriculture, the people that talk to me in agriculture feel like it has just been a paper exercise by the EPA as far as they’re concerned and its been a ton of money spent with very few people in terms of determining aerial extent.”
- “It all depends on who the ‘stakeholders’ really are. I’m sure the agency types are involved, at least on the surface. Folks working in point source facilities may be involved (farmers are not).”
- “My understanding is that the objectives were developed by CENR, especially USEPA.”
- “Efforts were made, but I do not believe that all stakeholders were adequately represented. Given the very large area of MS River Basin and the large geographic distances between public meetings it was not always possible to have continuity or representation, except from some of the better funded groups.”
- “It seems to me that most of the ‘stakeholders’ that developed the action plan were from state and federal agencies. In later stages, I would hope that others would be involved-landowners, developers, fishing industry, universities, etc.”
- “Good faith bureaucratic efforts were made to get stakeholders involved; however, stakeholders, represents such a plethora of individuals, views and needs that I am confident that unexpected stakeholders will emerge as the Action Plan goes forth. There needs to be a mechanism to allow these folks to be part of the program, whereas, the history of “Action Plans” is generally one where the early participants receive the benefits and these benefits continue to accrue at the expense of stakeholders who come to the program later.”

Appendix G (Continued)

- “It seems relatively adequate, though too much power was given to the fertilizer industry.”
- “My gut feeling is that there were large numbers of unmobilized stakeholders not included making it more likely that mobilized stakeholders participated.”

Statement 6.

- “This was probably more due to the efforts of the agriculture community than anything else. This is the result of misinformation and the inability to engage all parties in the process. There are some groups that believe that they were not heard during the process and that they were ignored. This has resulted in a lack of trust and until that trust is restored a solution will be difficult to achieve.”
- “It is unlikely that an Action Plan would have been completed without the concessions made to those industries.”
- “If this happened there was justification in the abbreviated examination of all nutrient sources related to agriculture... Unfortunately, the recommendations for reduction of fertilizer was presented without qualification. Consequently, producers knew they would be negatively affected if they maintained the crop and livestock systems that USDA currently supports. Producers need to know that commodity support policies will allow them to change systems. Consequently, the industries concerned about N-fertilizer reduction goal were representing a large number of producers.”
- “I have no doubt this lobbying group played a major role, however, given the range of options it was probably not appropriate to set a numeric target.”
- “I am confident agriculture and the fertilizer industry sought to remove numerical goals for N change. But I am equally confident that regulatory agencies (‘government’) collectively are not opposed to that either. Both groups expose themselves to risk by agreeing to details.... In other words, game theory tells us “best science” numerical goals are not best from a human system risk assessment approach.”
- “The decision was promoted by one or two of the mid-western states and was significantly driven by the interests of those industries.”

Statement 7

- “The economic impacts appear small given that agricultural lands are generally ‘overfertilized’.”
- The industry is nervous about the new science which is also implicating P and that might have economic impacts, particularly as the reassessment progresses.”
- “I think this plan is gigantic and the devastation (or benefits) it can cause is huge.”

Appendix G (Continued)

- “The economy of the small farm is more likely to be affected than the large agribusiness. The farm economy is driven more by world markets, subsidies, economic structure than how much fertilizer costs or it used.”
- “Reductions in N use may have some short term impacts on forcing some of the less efficient farmers and producers out of business. In the long term I think it may stimulate industry to improve its nitrogen use efficiency (through better timing and placement technologies) which we know is possible. In the long term with increasing oil and nitrogen prices, improvements in nitrogen use efficiency may even have positive economic impacts.”
- “The least economically important soils will be the ones taken out of production/put into wetlands, etc. the net impact is the economies of Iowa, Illinois and the rest of the upper Midwest will be hurt minimally-and even possibly helped.”
- “The Action Plan implementation is based on incentives and voluntary action. US agriculture is already heavily subsidized by the government and shifting those subsidies to conservation and away from production would surely compensate for any loss in income. There are also innovative state and private insurance programs being developed that should reduce the risks to producers.”

Statement 8.

- “This [conflict] is not a major problems just a misunderstood condition.”
- “Part of the basin work has involved bring them together to understand each others viewpoints and needs.”
- “The impact was probably small because the shrimp industry has not yet been substantially impacted by the hypoxic area (ie. landings have not declined significantly). The Gulf shrimp industry suffers many other more direct stresses at the moment.”
- “I don’t see that there is a conflict between the fishing and agriculture/fertilizer industries. The fishers are not organized and crying out for justice. The citizenry of the watershed from Minnesota to Louisiana are the ones that are concerned about local and Gulf water quality. The state and federal water resource managers are also leaders in the desire to have fewer-nutrient related problems.”
- “Basic economic theory tells us that conflict resulted in a better plan that has the maximum chances of success in an anthropomorphic watershed such as the Mississippi River. I will concede that on the surface this conflict resulted in lots of unhappy people who want to point their fingers at one another. That’s not the same as saying that conflict negatively impacted the Action Plan.”
- “The fertilizer industry in particular made a concerted effort to question the validity of the science linking N fertilizers to N export by the MR...Some of their nutrient budget work is extremely flawed, but helped their lobbying effort.”

Appendix G (Continued)

- “The conflict was more specifically between the American Farm Bureau/Fertilizer Industry and Environmental Groups representing both the Gulf and Basin interests. Local producers (even local farm bureau agents) and fishers seem to have been caught in a bigger economic game among the larger organizations.”
- “There was no meaningful conflict in the sense that the value of the crops in the Midwest swamps the value of the fishing industry.”

Statement 9.

- “To date few specific actions have been implemented and therefore monitoring results are limited and almost non-existent.”
- “I believe all the states are behind the Action Plan efforts, and hence, there is little variation.”
- “Some states are in denial, some recognize that nutrient loads in their streams are too large and they need to reduce them to satisfy state interests. I don’t see signs that any states are implementing changes that will put them at competitive disadvantage with their neighbors.”
- “States like Louisiana which have more to lose will embrace it. States that are unaffected will only do as much as federal dollars for that specific purpose will allow.”
- “There is significant variability in visibility of this issue among the 30 or so states in the basin.”
- “States haven’t uniformly accepted the results of the Action Plan, so there will be a lot of variation, which can stall action and progress.”
- “There will be tremendous variation in implementation as budgets, interpretation of programs, and “honesty” of reporting vary across the watershed.”
- “At this point there is such modest implementation that the variations can not be very large.”
- “The data to support an answer to this question are not readily available.”

Statement 10.

- “There has been no coordinated budget for actions to address to hypoxia problem. So far, there has been much talk and not much action...”
- “Several years were lost without any action, particularly on the side of the federal budget initiative. In the past year, with the revival of the Task Force (primarily in response to a controversial science paper from EPA’s Region 4 Staff) this administration is providing helpful assistance to the effort.”
- “The Task Force Members have supported dialogue and have met a number of times during this administration; the Task Force is interested in showing results, and reducing the size of the zone by implementing a number of actions supported by the Bush Administration, such as trading.”

Appendix G (Continued)

- “Leadership by federal agencies is responsible for much of the Task Force’s progress toward the goals of the action plan.”
- “The lack of financial support is a major hindrance to progress, not only for the *Action Plan*, but also for filling in gaps and science needs.”
- “The Bush Administration has not done enough to reevaluate the CENR science assessments.”
- “They neglected the issue when the Bush Administration came into office, but did not overtly squelch it. Now they seem to be paying a little more attention, but not to the extent that they will meet the goals of the *Action Plan*, or even come close to meeting those goals.”
- “The Bush Administration re-activated the Task Force after 1 year in office. This was doing well under the leadership of Adm. Whitman, but has suffered in the wake of her resignation and new leadership and constant turnover in higher administrative posts of EPA. Also the NOAA leadership sees this as an important issue, but there has been significant turnover further down in the offices there as well, and replacements do not see this as important as those involved in the development of the Assessment and Action Plan. The process requires a continual re-education of state and federal leaders. In addition, budget battles and loss of discretionary funds under the Bush Administration has put the whole *Action Plan* in jeopardy in the funding of science, monitoring and implementation of nutrient management strategies.”
- “The Bush Administration has a very mixed record on such environmental issues. While they have not totally withdrawn from them, as many in the environmental community first feared, it is not nearly as supportive as the previous administration.”

Statement 11.

- “Because of the lack of action for nearly 3 years, the plan has had little effect”
- “Recent modeling indicates that the targets in the Plan may be insufficient to reduce the hypoxia area. Further, the implementation of the Plan relies primarily upon voluntary efforts, and it is unclear how effective those will be in the future.”
- “It is not a topic of conversation or policy in Iowa until some national media rediscovers the Plan and then there is limited discussion.”
- “It is too soon to tell. Data are lacking first on how management action are being targeted based on the Action Plan and the supporting scientific data, and second on the reductions in nutrient loads and hypoxia that result from those actions. Furthermore, as a result of natural processes, response to management actions may not be seen in environmental data for a decade.”
- “Effectiveness can only be as good as implementation...so the jury is still out.”

Appendix G (Continued)

- “Nobody knows for sure how the reductions in fertilizer would affect the size of the hypoxia zone. Nobody has done an ex-ante benefit-cost analysis of the situation and nobody has done an ex-ante biological, environmental and ecosystem analysis.”
- “The present Action Plan is based on flawed science.”
- “Voluntary, incentive based actions will work only to a point.”
- “As it stands today, not much attention is being paid to it. If it had some regulatory teeth it would be more effective.”
- “Relying on an entirely voluntary action with little government support, the Action Plan is doomed to fail... we should at least recognize the effort to attempt to make an Action Plan. Perhaps the first step can pave the way for a policy with some potential.”
- “The Action Plan is a solid document, but it was not an implementation Plan. The Task Force was supposed to develop sub-basin strategy teams to draft specific implementation plans, and that has been very slow to develop. Until there is a significant pressure and a Framework from the Task Force to development of these teams and plans, little progress will take place. An important motivator for implementation of the incentive-based, voluntary plan was the potential threat of EPA regulation. That incentive appears to be gone.”
- “The action plan by itself cannot be effective. It provides some good guidelines for action, but a willingness to act is required.”

Statement 12.

- “I have read the recommendations and assisted in EPA response.”
- “I have been involved in the process of providing material to CEQ to assist in the development of the President’s response to the Commission’s report.”
- “I was on the Task Force for USDA. Anything I saw in there is general enough that at this point in time, and non-specific enough, that I don’t think you can comment on the specifics because I don’t think there were a heck of a lot of specifics in there.”
- “Although I’m familiar with many of these recommendations, I am not sure of the feasibility of costs of many.”
- “Most of the recommendations, though, are of the “develop a policy” and “set goals” variety, rather than concrete suggestions.”
- “I know some of the committee members, have read portions of the report, and appreciate the citation of the causes and consequences of the “dead zone” in this report.”
- “They rely heavily on the Pew Ocean Commission Report, and I helped draft those recommendations.”
- “I was a member of the Science Advisory Panel to the Committee.”

Appendix G (Continued)

Statement 13.

- “Unless Congress takes action and enacts the recommendations of the Ocean Commission’s Report the “Action Plan” will be the blue print that will be followed.”
- “Because the difficulty of increasing the requirement on non-point sources, the potential for much change is low.”
- “Under current law, if you are talking about hypoxia I think nearly 0. And the reason for that is because you are talking about something that is whatever is probably coming from non-point and you don’t have a provision in the CWA that allows for regulation of non-point sources...”
- “These recommendations are so extremely broad and extensive, and will require both significant new resources and a coordination of terrestrial and coastal water quality goals and the strategies to achieve them.”
- “There is potential, but until States and other stakeholders buy into the overall goals and implementation plans, there will be wide differences in implementation and enforcement. Funding could certainly help.”
- “The potential is large, if the science is corrected. I don’t know what the probability of success is.”
- “There is a strong push to develop legislation to take care of the more obvious, single agency issues. Where multiple agencies need to work together to implement recommendations, the ability will be determined by whatever structure is eventually developed for a federal-level ocean committee, cabinet level, post, etc...”
- “The recommendations are so reasonable...I think there is a good chance they will be carried out.”
- “As a philosopher and historian with a long-term view I would say “10.” As a scientist seeking improvement now I would say “5.” As a stakeholder with mixed environmental and economic goals, I would say 8. So my average answer is “8.”
- “Unfortunately, the broad political impact on the Commission has not been great. So far the only major impact I am aware of is that NOAA’s budget has gotten a boost this year. Neither the Pew Report nor the Ocean Commissions Report did what might have been hoped.”
- “There are several laws, regulations, programs and plans on the books dealing with non-point source pollutions. If this was an easy problem, it would already have been addressed and solved. The Commission report will help bring more attention to the issue, but that alone will not solve the problem.”
- “I do not see the political will to do much at this point. A critical issue is the willingness to commit to high quality long term monitoring of water quality so we have a better record on which to make future recommendations on which to base future actions.”