

**Integrated Final Report to Congress and
Legislative Environmental Impact Statement**

for the

**Mississippi River – Gulf Outlet
Deep-Draft De-authorization Study**

**Volume 2
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by
U. S. Army Corps of Engineers
New Orleans District

November 2007



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APPENDIX A

**Letter from Kathleen Blanco
Governor, State of Louisiana**



KATHLEEN BABINEAUX BLANCO
GOVERNOR

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June 2, 2006

Major General Don T. Riley
Director of Civil Works
United States Army Corps of Engineers
441 G Street, NW
Washington, DC 20314

Dear General Riley:

I am encouraged by the historic partnership formed between the U.S. Army Corps of Engineers and the State of Louisiana to develop a comprehensive master plan for the protection and restoration of our fragile coast, as mandated by the Congress and our state Legislature. I am pleased that the Corps and the State have responded quickly and are committed to making these two plans become one vision for coastal Louisiana.

Last November, our Legislature created the Coastal Protection and Restoration Authority (CPRA) of Louisiana to develop, implement and enforce a comprehensive coastal protection master plan that for the first time in our state's history will truly integrate coastal restoration and hurricane protection. By law, this single state entity will be your partner, representing the State in the long journey to establishing a safe and sustainable coast.

Our integrated team, comprised of Corps leadership and the CPRA, has been hard at work on the comprehensive coastal protection and restoration plan, with the interim report due to Congress on June 30. I understand that this report will recommend that certain projects be advanced to bring immediate solutions for our most vulnerable coastal areas and that the final report on comprehensive protection will be made in December 2007. As we work together as partners on this critical planning effort, I believe it is essential that we communicate clearly and openly on each and every aspect of this plan.

Therefore, I write to unequivocally express the policy of this State regarding the future of the Mississippi River Gulf Outlet (MRGO). Our people have spoken, our Legislature has made its will clear, and my Advisory Commission on Coastal Protection, Restoration and Conservation has recommended the immediate closure of this channel.

Over the years, MRGO has compromised the safety of countless communities and contributed to the loss of vital coastal marsh areas. The closure of the MRGO must ensure that communities are safe and our ecosystems are protected from further saltwater intrusion and coastal land loss.

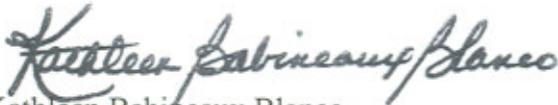
General Riley
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Specifically, our work must include a more precise plan for closure, restoration of the extensive wetlands lost as a direct result of the MRGO, and the integration of this closure into the comprehensive hurricane protection plan. We must also consider the navigation needs that will be affected by closing the MRGO to deep draft navigation, including expediting the construction of the new IHNC Lock and relocation of businesses currently depending on the MRGO.

As this report is formulated, I will be communicating this policy on MRGO through the CPRA directly to our Congressional Delegation. I urge you to join me in advocating with one voice on this issue, as well as on other critical near term aspects of our plan.

I understand, as do the people of Louisiana, that there will be many tough decisions in the coming months and years. Implementing these policy choices and determining their long term sustainability will not be easy. However, I am confident that working together, with a strong commitment to public input and thoughtful direction from our legislative leaders, we will set Louisiana on the right path for a safe and prosperous future.

Sincerely,



Kathleen Babineaux Blanco
Governor

APPENDIX B

Economics

Appendix B Economics

This appendix presents the Mississippi River Gulf Outlet (MRGO) economic and financial de-authorization costs and outlines the methodology used for the cost calculations. The economic appendix consists of four components. The first component of the analysis is a description of the study area. This component contains descriptive information about the project area, the base condition, and the *without* and *with* project futures. Discussion of this component is presented to help facilitate understanding of the more detailed applications contained in this appendix. The second involves identifying the considerations for the businesses located along the MRGO. This was accomplished through surveying potentially affected companies and determining what, if any, impacts they anticipate. The third component of this analysis involves identifying the vessels that use the MRGO for navigational purposes. This component relied on analysis of the Waterborne Commerce Statistics Center (WCSC) data to determine vessel traffic. The final component discusses the economic impact of flood damage reduction that can be attributed to the MRGO.

Costs and impacts to deep-draft and shallow-draft navigation are presented and, to the greatest extent possible, the costs are classified as National Economic Development (NED) criteria, financial, or other. Where applicable, costs are presented in average annual equivalent terms using a 50-year period of analysis, and the U.S. Army Corps of Engineers (USACE) vessel operating costs contained in the Economic Guidance Memorandums (EGM 05-01, Deep-Draft Cost and EGM 05-06, Shallow-Draft) were utilized.

I. Project Area, Vessel Traffic and Commodity Movements

The analysis of transportation costs and industry impacts approaches the study by comparing the transportation costs for the base condition with discontinuance of maintenance of the MRGO federal deep-draft navigation project. In addition, the transportation costs and benefits for alternate shallow-draft channel depths were evaluated. Alternative transportation mode and business reestablishment costs are discussed as well.

Project Area

As presented in the main report, the MRGO is approximately 76 miles long. It begins 9.4 miles into the Gulf of Mexico, southeast of New Orleans, where it is authorized to a depth of 38 feet and a bottom width of 600 feet. This reach is designated as mile -9.4 to mile 0. The authorized dimensions for the remaining 66 miles of the MRGO are a 36-foot depth and a of 500-foot bottom width. From mile 0 to mile 23, it extends through shallow bays of Breton Sound. From mile 23 to mile 60, the MRGO extends further to the north and west through coastal wetlands. At mile 60 the MRGO connects with the Gulf Intracoastal Waterway (GIWW) and the two run contiguously westward for 6 miles to the Inner Harbor Navigation Canal (IHNC) in New Orleans. From the westernmost

point of the MRGO, the IHNC extends north to Lake Pontchartrain and south to the IHNC Lock, which connects it with the Mississippi River. The lock between the IHNC and the Mississippi River was built in the 1920s and is relatively narrow and shallow. It measures 74.5 feet in width, 640 feet in length, and 31.5 feet in depth.

The IHNC Lock presents an obstacle for most of the deep-draft ships using the Mississippi River and the IHNC. The alternate route from the Gulf of Mexico to the IHNC is the MRGO. The IHNC Lock dimensions are significantly smaller than the dimensions of the Panama Canal. This is referenced because the Panama Canal and “panamax vessels,” with their associated width restriction of 106 feet and depth limit of 36.9 feet, represent a major benchmark in the shipping industry. The “panamax vessel” design is a significant factor in the design of cargo ships, with many ships being built to exactly the maximum allowable size. “Panamax vessels” or anything larger cannot transit past mile 60 of the MRGO due to the IHNC Lock restriction.

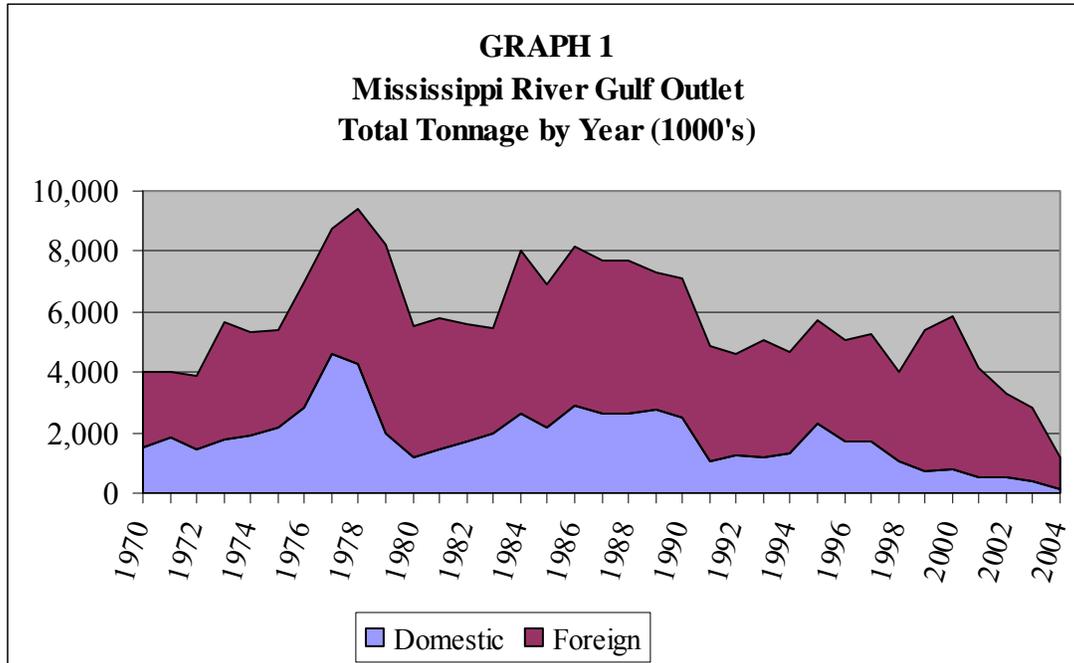
Vessel Traffic and Commodity Movements

Traffic records from the WCSC show utilization of the MRGO steadily increasing until reaching a peak in terms of tonnage carried in 1978 and in terms vessel trips in 1982. Table 1 and Graph 1 display the MRGO total domestic and foreign tonnage for the period 1997 - 2004. The table contains data from 4-year increments from 1970 - 1994 and continuous records from 1995 - 2004. The graph displays the complete 34-year time line. Foreign-flag deep-draft vessel movements consist of self-propelled, ocean-going vessels. Maximum loaded vessel drafts were approximately 36 feet with vessels taking advantage of advanced maintenance and tides. For the period from 1995 - 2004, approximately 20 percent of vessels traveled with loaded drafts over 30 feet. Domestic cargo on the MRGO consists of shallow-draft barge traffic and coastwise ocean-going vessels. The maximum loaded drafts for the tow vessels are 12 feet or less, and domestic coastwise vessels have maximum drafts in excess of 30 feet.

TABLE 1
Mississippi River-Gulf Outlet, Total Tonnage by Year (1000's of short tons)

Year	Total Tonnage	Foreign	Domestic
1970	4,013	2,522	1,491
1974	5,308	3,386	1,922
1978	9,411	5,136	4,275
1982	5,572	3,878	1,694
1986	8,145	5,254	2,891
1990	7,084	4,611	2,473
1994	4,690	3,347	1,343
1995	5,701	3,416	2,285
1996	5,042	3,314	1,728
1997	5,253	3,552	1,701
1998	4,007	2,974	1,033
1999	5,369	4,619	750
2000	5,850	5,065	785
2001	4,173	3,634	539
2002	3,290	2,786	504
2003	2,847	2,442	406
2004	1,206	1,045	161

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center.



Comparison of tonnage volumes for the most recent period of record (2002 - 2004) with the previous comparable period (1992 - 1994) shows current volumes down by nearly 60 percent, with drops in both domestic and foreign freight volumes. While total tonnage

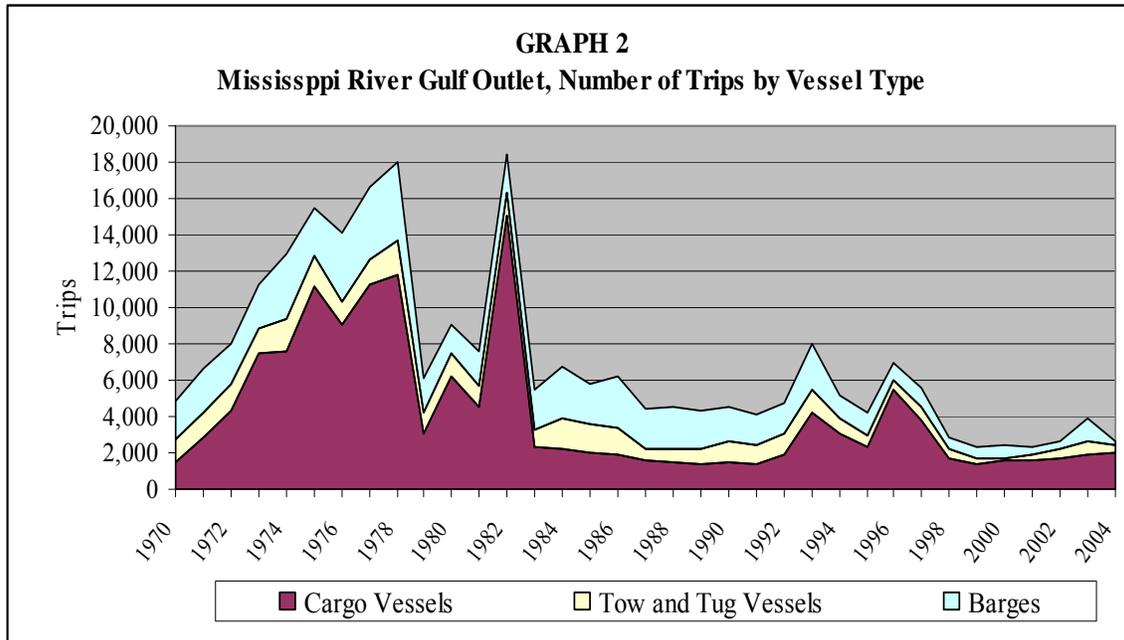
declined, the percentage of foreign freight maintained a larger share of total tonnage than domestic freight. The percentage of foreign freight represents 86 percent of 1999 - 2004 total tonnage. In spite of distributional changes, the overall trendline illustrates a downturn for all traffic, with 2004 volumes representing an historical low before declining further in 2005 after Hurricane Katrina. While the pre-Katrina declines were driven by a variety of factors, the MRGO authorized depth of 36 feet, which is recognizably shallow in comparison to other U.S. Gulf Coast deep-draft channels, and the current dimensions of the IHNC Lock are contributors to the post-Katrina decline. The IHNC Lock dimensions are 640 feet by 75 feet by 31.5 feet. The limitations of the MRGO, in terms of its 36-foot depth and the IHNC, likely impeded commercial navigation growth during periods of significant increases in the sizes of large vessels serving U.S. ports. The lack of funds for operational and maintenance (O&M) dredging during the 1990s, and the need to direct funds for emergency dredging during the pre-Katrina years, is also likely to have contributed to declining trends. As previously noted, no dredging has occurred since Hurricane Katrina on the MRGO.

Annual vessel trip totals are displayed in Table 2 and Graph 2. Table 2 shows that cargo vessels have predominated as the primary vessel type. The number of trips decreased since peaking in 1982 to a greater extent than has the tonnage, presumably representing a move toward larger ships and bigger loads. National trends, as evidenced at other

TABLE 2
Mississippi River Gulf Outlet
Number of Trips by Vessel Type (1970-2004)

Year	Total Trips	Passenger & Cargo Vessels (Dry and Liquid Cargo)	Tow or Tugboat	Barge (Dry and Liquid Cargo)
1970	4,809	1,476	1,220	2,113
1974	12,941	7,551	1,837	3,553
1978	17,956	11,828	1,841	4,287
1982	18,419	15,084	1,190	2,145
1986	6,212	1,941	1,460	2,811
1990	4,479	1,486	1,110	1,883
1994	5,130	3,006	903	1,221
1995	4,263	2,300	628	1,335
1996	6,934	5,433	519	982
1997	5,591	3,797	696	1,098
1998	2,827	1,700	462	665
1999	2,368	1,420	296	652
2000	2,386	1,541	188	657
2001	2,341	1,550	377	414
2002	2,590	1,693	488	409
2003	3,897	1,902	692	1,303
2004	2,584	1,972	448	164

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center.



major U.S. ports, towards larger, more fully loaded vessels also contribute to the downward trend in vessel trips. Declines in the annual the MRGO vessel trip counts are also, of course, directly associated with the declining tonnage volumes as shown in Table 1. Since its authorization, the size and draft of vessels using the MRGO tended to increase to meet the competitive demand for more efficient movements of bulk commodities. Table 3 presents the number of vessel trips by general draft group. The

TABLE 3
Mississippi River Gulf Outlet
Trips by Vessel Draft (1970 - 2004)

Year	Total	Trips by Vessels		Trips by Vessels	
		Less than or equal to 18 ft		Greater than 18 ft	
1970	4,809	4,355	91%	454	9%
1980	8,959	7,806	87%	1,153	13%
1990	4,310	3,384	79%	926	21%
1995	3,009	2,132	71%	877	29%
1996	2,563	1,634	64%	929	36%
1997	5,591	4,468	80%	1,123	20%
1998	2,827	1,922	68%	905	32%
1999	2,368	1,327	56%	1,041	44%
2000	2,386	1,193	50%	1,193	50%
2001	2,341	1,447	62%	894	38%
2002	2,590	1,964	76%	626	24%
2003	3,897	3,400	87%	497	13%
2004	2,584	2,278	88%	306	12%

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center.

WCSC defines shallow-draft trips as trips having loaded drafts of less than or equal to 18 feet, while deep-draft trips are defined as trips having loaded drafts over 18 feet. Note: For this report, the USACE is using the definition of deep-draft vessels contained in ER-1105-2-100. This defines deep-draft as vessels requiring greater than 14 feet.

Graph 3 displays a comparison of total tonnage by draft class and helps illustrate the transition to more fully loaded vessels that occurred and would most likely continue in the absence of a shoaled channel and the IHNC Lock restriction. As mentioned, cargo vessels are the predominant vessel type. The type of cargo vessel found most often on the MRGO is one that carries dry cargo, with very few tanker vessels. Table 4 presents distribution of 2000 - 2004 freight tonnage by approximate vessel dead-weight tonnage (DWT) range, type, and beam width.

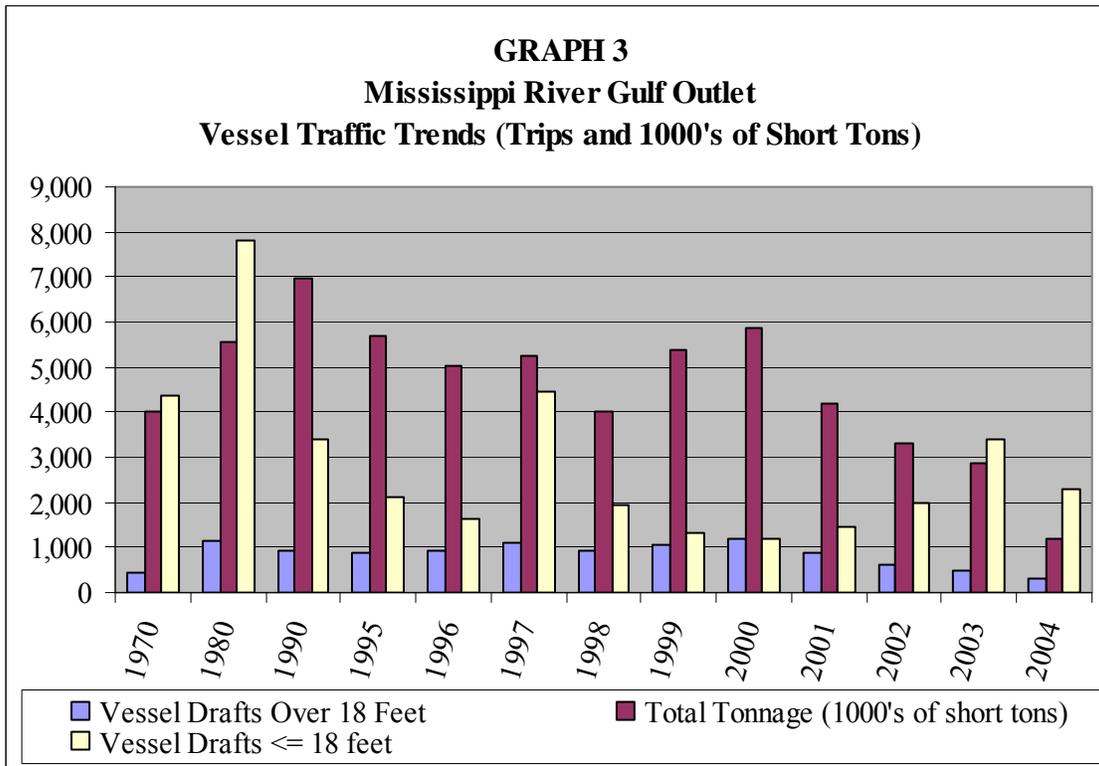
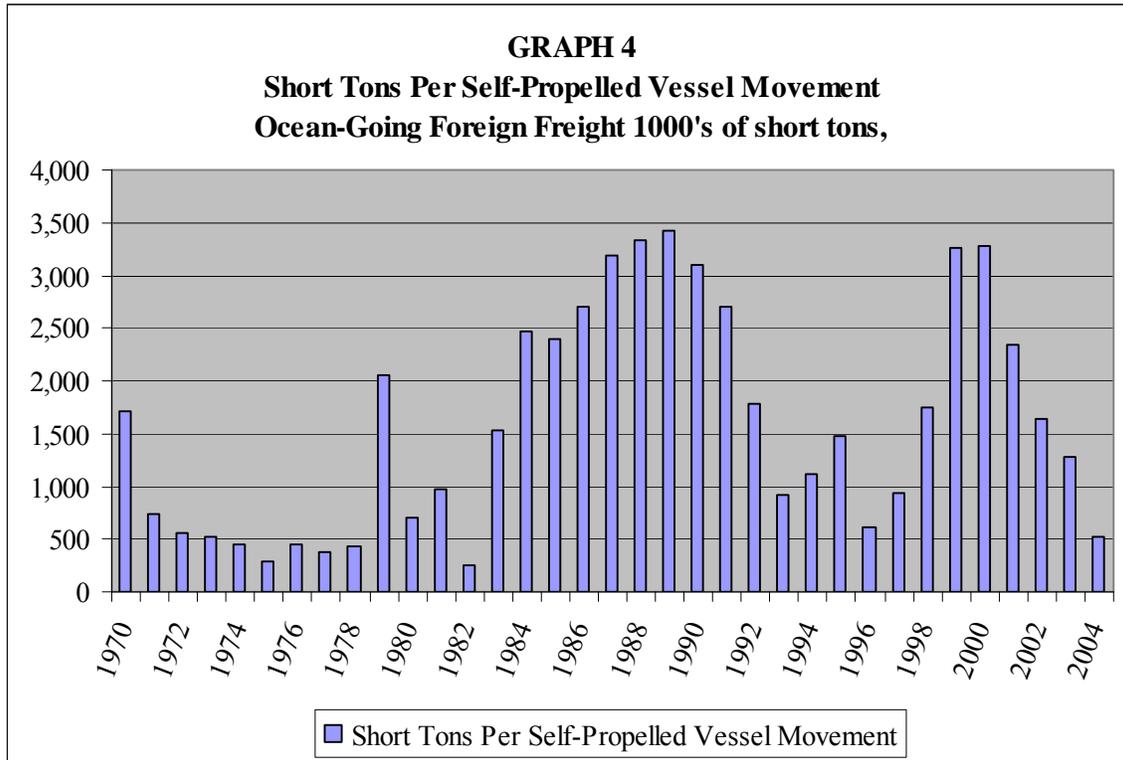


TABLE 4
MRGO Approximate Percentage of Foreign Freight by General DWT Range
Calendar Years 2000, 2002 and 2004

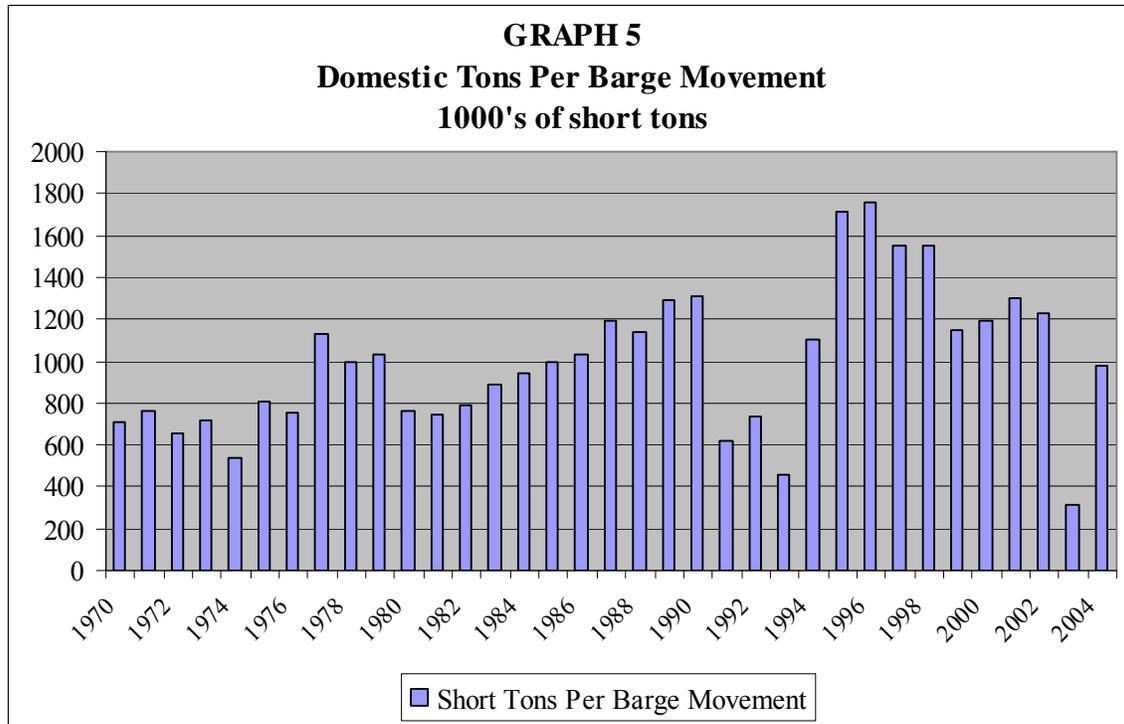
DWT Range Estimate	% of Short tons	Beam (ft)	Predominant Vessel Type
<10,000	16%	40-75	Refrigerate red Cargo Vessel
10,000-19,999	14%	76-106	General Cargo, Containership
20,000-39,999	29%	89-106	Containership, General Cargo
40,000-59,999	19%	105-106	Containership, Chemical Carrier
60,000-75,000	22%	106	Bulk Carrier
Total	100%		

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center.

Examination of the 1970 - 1994 historical trendline for ocean-going freight indicates a general upward movement in volume of cargo per vessel trip. The 1970 - 2004 trendline of the average number of short tons for foreign freight cargo per self-propelled vessel trip is displayed in Graph 4. A general upward trend, with recognizable annual fluctuations, was evident until 1988.



In addition to ocean-going freighters, a large number of tugs and towboats use the MRGO. Towboats push barges and the general increases in barge trips relative to tow trips suggest transition towards larger volumes per barge. Per tow-barge movement with tank, barges the size of 298 feet by 54 feet are the most frequent users of the channel. The largest tows are generally 4-barge tow consisting of three 298-foot by 54-foot barges, and one 150-foot by 54-foot barge pushed by towboats ranging from 1,800 to 3,000 horsepower. As with foreign freight, a general upward trend, with recognizable annual fluctuations, was evident until 2000.



Tables 5 and 6 present detailed information about the type of commodities shipped through the MRGO. In 2004 the three commodity groups with the greatest number of tons transported on the MRGO are “Manufactured Equipment, Machinery and Products,” “Food and Farm Products,” and “Primary Manufactured Goods.” For the three groups, foreign commerce represented more than 80 percent of the total commerce.

For the purpose of the analysis, it is important to distinguish between two sections of the MRGO. The first one is the east - west oriented section that runs between the intersection with the GIWW at mile 60 of the MRGO and the IHNC, hereafter referred to as the GIWW Reach. The second section runs southeast - northwest from mile 60 into the Gulf of Mexico, hereafter referred to as the Inland Reach. The Sound Reach extends from the Gulf of Mexico across Breton Sound and the Bar Channel. Based upon Congressional direction, this de-authorization study of the MRGO would affect the Inland and Sound Reaches and the Bar Channel; therefore, only the trips that go through that portion of the channel are relevant to this analysis.

TABLE 5
Mississippi River-Gulf Outlet, Commodities by year (in thousand of short tons)

Industry Group	1997	1998	1999	2000	2001	2002	2003	2004
	ton D F							
Coal	7 0% 100%	48 6% 94%	5 60% 40%	9 22% 78%	3 67% 33%	0 - -	0 - -	0 - -
Crude Petroleum	13 100% 0%	10 90% 10%	316 2% 98%	54 15% 85%	8 100% 0%	47 100% 0%	63 100% 0%	4 100% 0%
Petroleum Products (1)	184 58% 42%	166 82% 18%	243 28% 72%	182 27% 73%	180 64% 36%	215 47% 53%	73 59% 41%	44 80% 20%
Crude Materials (except fuels) (2)	1755 25% 75%	1260 22% 78%	1022 27% 73%	1659 19% 81%	918 14% 86%	928 5% 95%	657 2% 98%	166 7% 93%
Food and Farm Products (3)	866 30% 70%	658 13% 87%	1766 2% 98%	1458 2% 98%	632 0% 100%	465 0% 100%	405 2% 98%	292 0% 100%
Primary Manufactured Goods (4)	1091 45% 55%	695 29% 71%	832 19% 81%	1051 12% 88%	810 3% 97%	788 0% 100%	337 1% 99%	251 14% 86%
Chemicals (5)	798 16% 84%	651 7% 93%	695 5% 95%	738 0% 100%	938 1% 99%	567 0% 100%	590 0% 100%	109 18% 82%
Manufactured Equipment, Machinery and Products (6)	531 49% 51%	506 53% 47%	475 36% 64%	659 39% 61%	644 39% 61%	686 44% 56%	674 40% 60%	323 17% 83%
All Others	8 0% 100%	14 0% 100%	15 0% 100%	40 0% 100%	40 0% 100%	51 0% 100%	48 0% 100%	17 0% 100%
TOTAL	5253 32% 68%	4007 26% 74%	5369 14% 86%	5850 13% 87%	4173 13% 87%	3290 15% 85%	2847 14% 86%	1206 13% 87%

D: domestic participation.

F: foreign participation.

- (1) "Petroleum products" includes gasoline, distillate fuel oil, residual fuel oil, lube & greases, naphtha & solvents, and liquid natural gas, among others.
- (2) "Crude Materials (except fuels)" includes forest products (wood and chips), pulp and waste paper, soil, sand, gravel, rock, stone, iron ore and scrap, non-ferrous ores and scrap, sulphur, clay, salt, and slag, among others.
- (3) "Food and Farm Products" includes fish, grain, oilseeds, vegetable products, and processed grain and animal feed, among others.
- (4) "Primary Manufactured Goods" includes paper products, lime, cement, glass, primary iron and steel products, primary non-ferrous products, primary wood products, among others.
- (5) "Chemicals" includes fertilizers and other chemical and related products.
- (6) "Manufactured Equipment, Machinery and Products" includes textile products, machinery, electrical machinery, vehicles and parts, ships and boats, manufactured wood products, and rubber and plastic products, among others.

Source: Waterborne Commerce Statistics Center.

TABLE 6
Mississippi River-Gulf Outlet, “Dropping off / Picking up” Traffic, Commodities by year (in thousand of short tons)

Industry Group	1997	1998	1999	2000	2001	2002	2003	2004
	ton D F	ton D F	ton D F	ton D F	ton D F	ton D F	ton D F	ton D F
Coal	0 - -	3 100% 0%	4 100% 0%	8 25% 75%	2 100% 0%	0 - -	0 - -	0 - -
Crude Petroleum	0 - -	0 - -	222 0% 100%	46 0% 100%	0 - -	0 - -	0 - -	0 - -
Petroleum Products (1)	40 100% 0%	67 97% 3%	50 90% 10%	105 43% 57%	96 100% 0%	68 100% 0%	35 100% 0%	35 100% 0%
Crude Materials (except fuels) (2)	664 62% 38%	804 32% 68%	370 71% 29%	466 68% 32%	209 61% 39%	46 100% 0%	3 100% 0%	12 100% 0%
Food and Farm Products (3)	0 - -	66 3% 97%	554 0% 100%	800 3% 97%	2 100% 0%	0 - -	108 2% 98%	0 - -
Primary Manufactured Goods (4)	281 62% 38%	150 59% 41%	332 40% 60%	244 41% 59%	10 100% 0%	0 - -	1 100% 0%	3 100% 0%
Chemicals (5)	92 75% 25%	112 19% 81%	35 60% 40%	47 0% 100%	8 100% 0%	0 - -	2 100% 0%	0 - -
Manufactured Equipment, Machinery and Products (6)	2 100% 0%	1 100% 0%	1 100% 0%	2 0% 100%	0 - -	2 100% 0%	1 0% 100%	1 100% 0%
All Others	0 - -	0 - -	0 - -	2 0% 100%	0 - -	0 - -	0 - -	0 - -
TOTAL	1079 65% 35%	1203 37% 63%	1568 30% 70%	1720 28% 72%	327 75% 25%	116 100% 0%	150 29% 71%	51 100% 0%

D: domestic participation.

F: foreign participation.

- (1) “Petroleum products” includes gasoline, distillate fuel oil, residual fuel oil, lube & greases, naphtha & solvents, and liquid natural gas, among others.
- (2) “Crude Materials (except fuels)” includes forest products (wood and chips), pulp and waste paper, soil, sand, gravel, rock, stone, iron ore and scrap, non-ferrous ores and scrap, sulphur, clay, salt, and slag, among others.
- (3) “Food and Farm Products” includes fish, grain, oilseeds, vegetable products, processed grain and animal feed, among others.
- (4) “Primary Manufactured Goods” includes paper products, lime, cement, glass, primary iron and steel products, primary non-ferrous products, primary wood products, among others.
- (5) “Chemicals” includes fertilizers and other chemical and related products.
- (6) “Manufactured Equipment, Machinery and Products” includes textile products, machinery, electrical machinery, vehicles and parts, ships and boats, manufactured wood products, rubber and plastic products, among others.

Source: Waterborne Commerce Statistics Center.

Table 7 depicts the actual number of trips by reach of the MRGO. On average, and for the years for which information was available, trips within the Inland Reach represented 89 percent of total trips on the GIWW and Inland Reaches, totalizing an average of 2,254 trips per year.

TABLE 7
Mississippi River-Gulf Outlet, Number of Trips by Reach

Year	GIWW and Inland Reaches	MRGO below mile 60 (Inland Reach)	Percentage
2000	2,386	2,088	88%
2002	2,590	2,357	91%
2004	2,584	2,318	90%
Total	7,560	6,763	
Annual Average	2,520	2,254	89%

Source: Waterborne Commerce Statistics Center

A traffic forecast was not prepared for this analysis. While the reasons for not preparing a forecast primarily relate to practicality, they also relate to the physical impediment of the IHNC Lock limited dimensions. As previously noted, “panamax vessels” cannot transit the IHNC Lock restriction. Additionally the limitations of the MRGO, in terms of its 36-foot depth, likely impeded commercial navigation growth during periods of significant increases in the sizes of large vessels serving U.S. ports. The reasons for not preparing a forecast also relate to an existing condition where some businesses have already chosen to move away from the MRGO. The USACE has been asked to identify the reestablishment costs for business that are still located on the MRGO and are dependent upon deep-draft navigation. For purposes of the USACE’s economic analysis procedures, the reestablishment costs for businesses that have already moved are “sunk costs.” Several of the businesses located along the MRGO are involved in the rebuilding of New Orleans and are forecasting increasing business. At the base condition depth, the businesses located along the IHNC/MRGO would not experience any transportation inefficiencies and would not likely choose to relocate. While certain businesses have left their facilities along the MRGO since Hurricane Katrina, it is possible that comparable businesses may establish operations at those locations.

The MRGO traffic has experienced an overall decline, particularly since calendar year 2000. The most recent 3-year average was used as the base condition for the cost calculations.

II. Business Considerations

This section presents discussion of the business considerations of the MRGO de-authorization. The first step in determining the business impacts was to identify the companies that had the potential to be affected if the MRGO were not maintained at a depth of 36 feet. This step was accomplished through analysis of the WCSC data to identify where vessels had docked along the MRGO and a review of past USACE reports and studies. A search of published articles on the MRGO was performed to find additional companies which may be affected. Aerial photographs

were reviewed to determine facilities with operations along the MRGO. After an initial list of companies was developed, that list was shown to selected stakeholders for input. Using stakeholder feedback a list of affected companies was finalized. The final list included not only the large companies with operations along the MRGO, but smaller companies in surrounding areas. The nature of the businesses contacted ranged from towing companies, to cement and construction aggregate yards, to scrap facilities.

The potentially affected companies were contacted by telephone for preliminary screening interviews to determine which companies could be potentially impacted by the de-authorization. In preparation for those interviews, a copy of the survey was sent out to the companies with a letter of introduction. Table 8 lists the companies consulted.

Interviews were conducted with companies both inside and outside of the study area. The interviews outside the study area focused on the towing and other companies that used the MRGO and the potential impacts of de-authorization on that aspect of business. During the interviews, the companies were asked questions about the nature of their operations and their reliance on the MRGO. Interviewers attempted to determine the vessels that the companies used for their operations and the type and quantity of commodities each facility was transporting. An incremental analysis was performed to determine the impacts of different channel depths on each firm. The full survey is available in the Economics Appendix of the Interim Report to Congress that was released in December 2006 (see pages 19-25).

TABLE 8
Companies Consulted

All American Crewboats	Crosby Tugs	Michoud Assembly Facility
Antill Pipeline Construction	Delta Towing	New Orleans Cold Storage
APM Terminals	Dupre Brothers	Noble Energy
Bertocci Contracting	Dupuy Storage	O'Meara Inc
Biloxi Marsh Lands	Ensco Marine	Parker Drilling
Bisso Marine	Estis Well Company	Pearl River Navigation
Blanchard Towing	International Shipholding Corporation	Peltex
Boh Brothers	Jefferson Marine	Pontchartrain Materials Corporation
Bollinger Gulf Repair	Joseph Domino	Port of New Orleans
Buzzi Unicem	Kearney Companies	Settoon Towing
Caillou Island Towing	Lafarge Cement	Shell Beach Marina
Cenac Towing	LeBoueff Brothers Towing	Southern Scrap
Central Gulf Towing	Lee Marine	St. Ann Boat Service
CG Railways	Maersk	Tipco
Corcoran Towing	Manson Construction	US Gypsum

Through the industry interviews, it was found that some of the companies currently experience transportation inefficiencies because the MRGO has not been maintained since Hurricane Katrina. For those companies, the interviewers attempted to determine what the impacts were, and their estimated dollar values. The inefficiencies and additional costs reported by each company¹ are listed as follows:

- Company 1: Container ships currently are docking at locations along the Mississippi River because they cannot access the terminal. Moving containers from the river to the terminal costs \$185 per container.
- Company 2: Deep-draft vessels can no longer dock at this company's facility and they have to receive shipments of product via barge. The company estimates that there is \$7.50-per-ton increase in handling costs from using barges.
- Company 3: Certain vessels are unable to dock at this company's facility and as a result, the company has to truck their product to terminals on the Mississippi River, causing additional labor, overtime, security, and equipment rental costs. The company estimates additional costs are \$15 per ton.
- Company 4: Since deep-draft vessels are unable to dock at this company's facility, the company experiences additional costs due to unloading two products off ships in midstream. The additional costs are estimated as \$13 per ton for one product and \$15.90 per ton for the other product. These costs include stevedoring, demurrage, lost dock revenue, barge rentals, and fuel charges.

Area businesses estimated their costs to move facilities to other locations at \$244 million. These estimates were not produced by the Corps of Engineers and do not reflect depreciation, but rather actual purchase for a new or used facility with comparable infrastructure and transportation networks. Assessing the reliability of the cost estimates presented by the affected businesses is difficult. The wind damages from Hurricane Katrina and the subsequent flooding have changed the effective age of structures in the study area. Lack of channel dredging since Hurricane Katrina has further complicated the analysis.

For the remaining structures, a depreciated structure value could be found using the Marshall and Swift system of valuation. This value is based on the type of construction, effective age of the structure, quality of construction, facility improvements, expected useful life of the facility, and area of the state that contains the improvement. Along the water there were several steel warehouses which were inundated in water and suffered rust damage. While some of these warehouses are now used for storage of raw materials and spare parts, others are empty. Some of the other facilities are considered "special purpose" facilities and the only remaining value of their buildings is scrap. For example, while silos on a property are an asset for a cement company, they serve no other purpose and may need to be removed for the land to function as a factory.

¹ The inefficiencies were provided by the companies and not verified by the USACE.

III. Navigation Considerations

To calculate the impact of de-authorizing deep-draft navigation of the MRGO on transportation costs, the first step was to identify the number of trips going through the channel for both deep-draft and shallow-draft vessels. To accomplish this, the vessel origin-to-destination routings through the Inland Reach of the MRGO were extracted from the USACE detailed vessel records for the years 2000, 2002, and 2004. For purposes of analysis, the average traffic from these three periods was held constant through the 50-year period of analysis. Based on mileage and industry verification, all deep-draft trips diverting from the MRGO would have to use the Mississippi River, adding 4 hours per one-way trip to their travel time. The extra time is calculated by taking the additional distance from the Mississippi River to the Gulf of Mexico (37 miles), and dividing that by the average vessel operating speed (9.2 miles per hour). An overview of annual traffic variation is contained in Table 9. The table displays the total MRGO trips by vessel draft and vessel type for the period after project construction through 2004. While ship traffic has declined over the past 34 years, it is difficult to predict the future amounts of traffic on the MRGO. Since there is no clear forecast, a conservative practice is to use the three-period average.

Shallow-draft trips were divided into two groups: those that use the MRGO as an alternate route when the IHNC Lock is not operable², and others that use the MRGO on a regular basis as an alternate to the Mississippi River. According to the USACE Lock Performance Monitoring System (LPMS) data and industry information, there are approximately three major events per year during which shallow-draft vessels use the MRGO as an alternate route. Approximately 100 vessels use this alternate route per year³. The resulting trip around the IHNC Lock takes approximately 24 hours. Due to the distance and the uncertainty of the weather in Baptiste Collette, few vessels elect to travel along the MRGO to bypass the lock; however, vessels can save a considerable amount of time if the lock is down for a period of greater than 24 hours and/or there is a long queue. The additional time lost from not having access to the MRGO is 48 hours⁴. For the second group, it was assumed that the MRGO reduced travel time by four hours.

² The number of trips was estimated assuming that the IHNC Lock is closed for more than 24 hours at least three times per year (estimated using Lock Performance Monitoring System [LPMS] data for 2000, 2002, 2004, and 2005). That number was then multiplied by the number of towboats per day that use the IHNC Lock (also obtained from LPMS data).

³ These vessels are in addition to the towboat trips presented in the Table 2 of this appendix. As previously noted the estimate of 100 trips was estimated using LPMS data.

⁴ The 48 hour figure is based on the time spent waiting for the lock to return to operations and was estimated at 24 hours plus the additional queue time once the lock is operational.

TABLE 9
Total Tonnage and Trips by Vessel Draft and Vessel Type
Mississippi River – Gulf Outlet Traffic (1970-2004)

Year	Total Tonnage 1000's	Self-Propelled Vessel Trips Loaded Draft Increment (ft)						Tows and Barges		Total Vessels
		34-36	30-33	21-29	19-20	<=18	Sub-Total	Towboats	Barges	
1970	4,013	16	83	275	80	1,017	1,471	1,225	2,113	4,809
1980	5,541	62	259	744	88	4,951	6,104	1,315	1,540	8,959
1990	6,960	48	214	559	105	391	1,317	1,110	1,883	4,310
1995	5,701	18	230	589	40	186	1,063	620	1,326	3,009
1996	5,042	76	283	503	67	133	1,062	519	982	2,563
1997	5,253	136	400	520	64	2,677	3,797	696	1,098	5,591
1998	4,007	98	277	487	42	796	1,700	462	665	2,827
1999	5,369	117	342	532	48	381	1,420	296	652	2,368
2000	5,850	193	358	590	49	351	1,541	188	657	2,386
2001	4,173	117	282	468	25	658	1,550	377	414	2,341
2002	3,290	83	222	310	10	1,068	1,693	488	409	2,590
2003	2,847	34	99	346	18	1,405	1,902	692	1,303	3,897
2004	1,206	8	13	266	13	1,672	1,972	448	164	2,584

Source: U.S. Army Corps of Engineers, Waterborne Commerce of the U.S., IWR-WCUS, Part 2.

Using the WCSC transit records, the vessels were classified as either “towboats,” “barges,” or “self-propelled.” For each of these classifications, the hourly operating costs were obtained from the USACE Economic Guidance Memorandum (EGM) 05-06 for deep-draft vessels and EGM 05-01 for shallow-draft vessels. To determine the operating costs for each vessel, information regarding the commodities transported, vessel horse power, and DWT was used. The costs from the Economic Guidance Memorandums were calculated using the 2004 figures. Using the average hourly rates and the estimated changes in transportation time, the transportation inefficiencies for each passage were calculated. Table 10 shows the vessel operating costs used⁵.

⁵ For self-propelled vessel trips with vessel drafts of less than 12 feet, the average hourly rate for a towboat was used to calculate transportation inefficiencies. This was done because the vessels that are classified as self-propelled and operating at depths of less than 12 feet have a cost structure closer to that of shallow-draft vessels like towboats.

TABLE 10
Vessel Operating Costs

Variable	Towboats	Barges	Self-propelled (U.S. Flag)	Self-propelled (Foreign Flag)	Tanker (Foreign Flag)
Cost determinant	1800-2000 HP	Weighted average of daily operating costs by commodity transported	Weighted average of daily operating costs by commodity and tonnage transported	Weighted average of daily operating costs by commodity and tonnage transported	DWT 20,000
Total hourly cost	\$211(US\$ 2004 price level)	\$6.7 (US\$ 2004 price level)	\$1,124 (US\$ 2002 price level)	\$627 (US\$ 2002 price level)	\$ 665 (US\$ 2002 price level)
Additional Hrs.	Additional time using Mississippi River (in hours)				
	4	4	4	4	4
Additional Cost	Additional transit cost per trip				
	\$847	\$28	\$4,517	\$2,520	\$2,673

U.S. Army Corps of Engineers, Economic Guidance Memorandums (EGM 05-01, Deep-Draft Cost and EGM 05-06, Shallow-Draft)

For the incremental analysis, it was assumed that vessels with a draft of the incremental depth or less would continue to use the MRGO. The transportation inefficiencies are calculated only for those vessels with a draft greater than the incremental impact. For example, with a depth of 32 feet, all vessels with a draft of 32 feet or less would continue to use the MRGO, and all vessels with drafts greater than 32 feet would be assumed to divert to the Mississippi River. It was assumed that with a draft of 32 feet, there would be advanced dredging that would allow adequate underkeel clearance for vessels with drafts of 32 feet to pass. It was also assumed that those vessels would use an alternate route once the maintenance of the channel stops. Table 11 shows the transportation inefficiencies, as represented by the net increase in transportation cost associated with using the Mississippi River instead of the outlet channel, at each of the incremental depths alternatives. The \$2,526,000 shown in Table 11 is the impact of transportation cost inefficiencies of not having the MRGO available for deep-draft navigation. The inefficiencies are comprised of those vessels with drafts greater than 12 feet that would not be able to use the MRGO. If the channel were completely closed, average annual transportation inefficiencies would be \$3,700,000. That figure includes all deep-draft vessels which use the MRGO as a quicker route from the Gulf of Mexico and all of the shallow-draft vessels which use the MRGO as an alternate route when the IHNC Lock is not functioning.

TABLE 11
Transportation Inefficiencies for Selected Channel Depths
(Net Transportation Cost Increase Due to MRGO Depth Reductions)

Depth	Transportation Inefficiencies (annual)
36 feet	\$0
32 feet	\$455,000
28 feet	\$1,102,000
24 feet	\$1,878,000
20 feet	\$2,279,000
16 feet	\$2,413,000
14 feet	\$2,454,000
12 feet	\$2,526,000
0 feet (not maintained) *	\$2,454,000
0 feet (closed) *	\$3,700,000

* Not maintained indicates that maintenance would cease and the channel would shoal over time. It is assumed that the controlling depth of the channel would be 12 feet in approximately 7 years. This differs from “closed” which indicates that the channel would be physically blocked and/or not accessible by a defined date.

IV. Economic Considerations of Flood Damage Reduction

Recent storm surge modeling studies (Appendix D) suggest that the Inland Reach of the MRGO does not significantly influence the development of storm surge in the region for large storm events. As a result, complete filling of the MRGO (or blockage or partial filling) is not expected to provide a significant reduction in storm surges cause by severe events.

Because studies show that the Inland and Sound Reaches of the MRGO have a minor effect on storm surge during severe storm events, closing the MRGO would lead to a negligible reduction in storm damages from severe events. For less severe events, it is expected that the Hurricane Protection System would offer protection for homes and businesses located inside the levee system.

Homes and businesses in southern St. Bernard located outside of the levees system were largely destroyed during Hurricane Katrina. For those wishing to rebuild, the Department of Homeland Security’s Federal Emergency Management Agency (FEMA) is providing advisory guidelines that can be used as building standards in order to minimize the flood impact in areas subject to waves and velocity floodwaters caused by hurricane storm surges. For most of these areas outside of the levees, it is recommended that structures be built to a minimum elevation of 17 feet.

It is assumed that the majority of structures that are being rebuilt outside of the levees would follow FEMA elevation guidelines. Therefore, any induced storm surge from smaller storms resulting from the MRGO would have little impact on structures located in the area outside of the levee. A reduction in storm surge resulting from closing the MRGO would have a minimal impact on the total amount of storm related damages.

V. Summary of Economic Analysis

Deep-Draft Channel

Analysis of deep-draft navigation indicates that maintaining the authorized dimensions of the MRGO between the GIWW and the Gulf of Mexico is not cost-effective. Average annual O&M costs to dredge a single shipping lane in the MRGO deep-draft channel are \$12.5 million. However, maintaining a single shipping lane, which is half of the authorized dimensions, only produces approximately \$3.7 million per year in transportation efficiencies, based on NED criteria. Efforts to operate and maintain the fully authorized dimensions (i.e. a two-lane channel, 500-feet wide by 36-feet deep) would be even more costly and would not produce greater navigation benefits. The analysis indicates that the maintenance of a deep-draft navigation channel of any dimension in the MRGO is not economically justified.

The \$3.7 million-per-year in transportation inefficiencies that navigation would incur if the MRGO channel were not available are comprised of two sources. The first source is the increased travel time (approximately 4 hours) that both deep-draft vessels and shallow-draft vessels would have to incur by having to use the Mississippi River to reach their ultimate destinations. The second source is from the shallow-draft traffic that uses the MRGO as an alternate route when the IHNC Lock is not operable. Approximately 100 vessels use the MRGO as an alternate route per year. The resulting trip around the IHNC Lock takes approximately 24 hours. However, vessels can save a considerable amount of time if the lock is down for a period of greater than 24 hours and/or there is a long queue. The additional time lost from not having access to the MRGO has been estimated to be approximately 48 hours.

Shallow-Draft Channel

The economic information available also indicates that it is not cost-effective to maintain a shallow-draft channel between the GIWW and the Gulf of Mexico in terms of NED criteria. The benefits of authorizing the MRGO to 12 feet are the reduction in the transportation inefficiencies compared to the total closure option for the channel. If the MRGO were to be closed between the GIWW and the Gulf of Mexico, shallow-draft vessels would have to take a longer alternate route along the Mississippi River. In addition the MRGO would no longer be available as an alternate route to the GIWW for shallow-draft traffic when the IHNC Lock is not functioning or is congested. Taking these two issues into account, it is estimated that the average annual benefits of authorizing the MRGO to 12 feet is \$1.2 million. The total average annual costs to maintain a 12 foot shallow-draft channel is approximately \$6 million

Economic Analysis of Remaining Alternatives

Based on the economic analysis described previously, the selected plan is a full closure to both deep-draft and shallow-draft vessels. Two alternatives were developed before selecting a plan and are discussed below.

Alternative 1 – Construct a Total Closure Structure across the MRGO at Bayou La Loutre

The MRGO channel would be de-authorized for navigation. No additional Federal funds would be used to maintain any channel on the MRGO between the GIWW and the Gulf of Mexico. A closure structure would be constructed just south of Bayou La Loutre and would tie in with the southern Bayou La Loutre Ridge to totally block the MRGO channel. The structure would not allow passage of vessels traveling the length of the MRGO. The closure structure would be a total rock closure built in one construction effort. The estimated total project construction cost of the total closure structure is \$24,684,150 based on October 2006 price levels. Interest during construction is estimated to be \$452,000.

Alternative 3 – Cease All the MRGO Operations and Maintenance Dredging Activities

The MRGO channel would be de-authorized for navigation. No additional Federal funds would be used to maintain any channel on the MRGO between the GIWW and the Gulf of Mexico. There would be no construction costs, except 1) aids to navigation would be considered for removal and 2) the USACE would dispose of some existing disposal and channel easements. The estimated total project construction cost of this alternative is \$825,000 based on October 2006 price levels. Interest during construction is estimated to be \$18,700. Under this option, commercial and recreational shallow-draft vessels could still use the MRGO until the MRGO channel filled in to a depth that prohibited their navigation. It is estimated that some reaches of the MRGO would become impassible to vessels greater than 12-foot draft in approximately seven years.

Table 12 presents a comparison of project construction costs by alternative. More detail on the construction cost categories is presented in the Engineering Appendix and in the Real Estate Appendix. Table 13 presents the categories of average annual costs and benefits by alternative. The estimates represent 2006 price levels and were developed assuming a 2008 base year, a 50-year period of analysis, and the current federal discount rate of 4.875 percent.

TABLE 12
Project Construction Costs by Alternative
(October 2006 Price Levels)

<u>Construction Items</u>	Alternative 1	Alternative 3
	Cost (\$)	Cost (\$)
Mobilization and Demobilization	85,000	
Stone Placement - Channel Proper	11,773,000	
Stone Placement - Overbank Tie- Ins	403,650	
Crushed Stone Blanket	3,400,000	
Geotextile Separator Fabric	31,500	
Clearing and Grubbing (Overbank)	11,000	
Engineering and Design	863,700	
Construction Management	1,256,300	
Real Estate	1,401,000	125,000
Removal of Aids to Navigation	700,000	700,000
Contingencies	4,759,000	
Total Project Construction Costs	24,684,150	825,000

TABLE 13
Average Annual Benefits and Costs by Alternative
(October 2006 Price Level, 50-Year Period of Analysis, 4.875 Percent Discount Rate)

	Alternative 1	Alternative 3
	Cost (\$)	Cost (\$)
<u>Investment Costs</u>		
Total Project Construction Costs	24,684,150	825,000
Interest During Construction	452,000	18,700
Total Investment Cost	25,136,150	843,700
<u>Average Annual Costs</u>		
Interest and Amortization of Initial Investment	1,264,000	42,300
Deep-Draft Transportation Cost	2,500,000	2,500,000
Shallow-Draft Transportation Cost	1,200,000	871,400
OMRR&R	172,000	
Total Average Annual Costs	5,136,000	3,413,700
Average Annual Benefits	\$12,500,000	\$12,500,000
Net Annual Benefits	\$7,364,000	\$9,086,300
Benefit-Cost Ratio	2.4 to 1	3.7 to 1
Benefit-Cost Ratio (computed at 7%)*	2.3 to 1	3.7 to 1

*Per Executive Order 12893