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## **A Post-Katrina Assessment of the “Freshwater Diversion to Lake Pontchartrain Basin and Mississippi Sound”**

### **Introduction**

In 1965, a federally authorized deep-draft navigation canal was completed in Louisiana’s marshes south of Mississippi and immediately began to have damaging effects to both Louisiana and Mississippi. Salt water intrusion by the Mississippi River Gulf Outlet (MRGO) and wetland loss were causing catastrophic impact to oysters. Perret estimated oyster production declined by 60% to 65% just a few years after construction.<sup>1</sup> As a result, a project was developed by the U.S. Army Corps of Engineers to address the deleterious impacts by “introducing water in the Lake Pontchartrain Basin and western Mississippi Sound to improve the habitat and the fish and wildlife productivity”.<sup>2</sup> The multi-state goals described in the 1984 Feasibility Study were laudable, but a consensus on the means to achieving these goals was never accomplished.<sup>3</sup> The devastating effects of Hurricane Katrina on the physical landscape in Louisiana and Mississippi and the ongoing threat of future hurricanes are compelling arguments to reassess the goals and options to a project that would influence the economic and ecologic viability of the Louisiana and Mississippi coastlines.

### **Project Goals**

In the 1984 Feasibility Study of the “Freshwater Diversion to Lake Pontchartrain Basin and Mississippi Sound”, the proposed project management goal to improve the wetland productivity was to be benchmarked by oyster productivity of the target areas in Louisiana and Mississippi.<sup>2</sup> Oysters are an important commercial species to both states but are also considered “the best indicator species to determine the optimum salinity range for the overall commercial fishery in Louisiana”.<sup>4,5</sup> Oysters also directly contribute to the larger ecosystem by filtering water and providing reef surface for other organisms to grow. **Figure 1** depicts the area targeted in the Biloxi Marsh and Mississippi Sound to increase oyster productivity by attempting to optimize the salinity most conducive to oyster health. When salinity is too high, predators invade and reduce production, or when too much fresh water is present, the oyster’s growth is inhibited<sup>6</sup> or may kill an entire population<sup>7</sup>.

In 2003, a team of scientists and engineers were requested by the Lake Pontchartrain Basin Foundation to re-assess the Comprehensive Habitat Management Plan for the Pontchartrain Basin in southeast Louisiana. This team recently completed their report<sup>8</sup> and it includes restoration goals for the entire basin including the area in the Louisiana portion of the 1984 Feasibility Study. The restoration goals were determined by conditions existing prior to the MRGO (circa 1912 to 1932) and are shown in **Figure 2**. Comparison of **Figures 1 & 2** shows that there is good agreement on the target areas of oysters in the Biloxi Marsh and Mississippi Sound. The areas are aligned with the large historic reefs along the Louisiana and Mississippi coasts. It appears that Louisiana and Mississippi may now have agreement restoration goals for oyster production.



**Figure 1:** Map depicting the 1984 Feasibility Study’s preferred alternative to construct a new Mississippi River diversion at the Bonnet Carré’ Spillway. The project assumed the MRGO would remain open and continue to elevate salinity in Lake Borgne. The target benefit area for oyster enhancement is outlined in red. (source, 1984 Feasibility Study<sup>2</sup>). Historic reefs are shown in gray.



**Figure 2:** Map depicting the 2006 proposal to expand the Mississippi River freshwater diversion at Violet, LA. The project proposes a constriction of the MRGO channel south of Lake Borgne. The target benefit area for oyster enhancement (brackish marsh) is outlined in red. Historic reefs are shown in gray. (source, 2006 LPBF<sup>8 & 9</sup>).

The 1984 Feasibility Study estimated that the annual oyster harvest would increase from 8-million pounds to 15.5-million pounds. Since the study, the Caernarvon Freshwater Diversion structure has been operated for 14-years just south of the study area and it has doubled annual oyster production. This project proves the viability of stimulating oyster production with a local freshwater diversion.

In addition to its revision of its Comprehensive Habitat Movement Plan, the Lake Pontchartrain Basin Foundation also implemented a Post-Katrina strategy prompted by the urgency for hurricane protection. The Pontchartrain Coastal Lines of Defense Program prioritizes restoration projects which also have some significant flood protection benefit.<sup>9</sup> Restoration of the Biloxi Marsh with oyster reefs is a priority project. The improved reefs will help sustain the outer marsh which provides a critical natural buffer from hurricane storm surge for both Louisiana and Mississippi. This additional goal of structural reef development may also be of common interest to both Louisiana and Mississippi.

### **Proposed Project Designs**

The 1984 Feasibility Study considered as many as six alternatives to introduce Mississippi River water into the Pontchartrain Basin to manage salinity in the target area to achieve the oyster productivity goals. All of these alternatives shared a common assumption which now appears to be invalid. The alternatives assumed that the MRGO channel would continue as an authorized deep-draft channel. The resulting preferred alternative was a to build a new large freshwater diversion at the site of the existing Bonnet Carre' Spillway structure built for Mississippi River flood control for New Orleans. As a result of the selected alternative, the entire project is often causally referred to as the "Bonnet Carre' Diversion Project", which unfortunately obscures the original goal of the project to enhance the Biloxi Marsh and Mississippi Sound.

The design alternative to build a new diversion at Bonnet Carre Spillway would discharge Mississippi River water 61-miles west of the target area. Two problems with this alternative surfaced following release of the 1984 Feasibility Study. First, effective management of the discharge would be challenging due to the distance water would need to travel and because, along its course, there would be significant and hard to predict influence of the Pearl River discharge from the north and the MRGO to the south. Modeling implied the need to forecast rainfall months in advance to determine the correct discharge. Second, the ecology of Lake Pontchartrain as a conveyance for the diverted water would be jeopardized due to the significant introduction of overly nutrient-rich river water into an algal-bloom prone lake. A re-analysis suggested lower discharges might be acceptable, but a reduction would further inhibit the chance of success in achieving the salinity goals. The design alternative creates an acute dilemma of too little water for the marsh or too much water for the lake. Since the original assumption regarding the MRGO may be invalid, other options may exist which will work in concert rather than in conflict.

The MRGO is now infamous for its role in the devastation due to Hurricane Katrina. It has been documented that during Hurricane Katrina surge water was "funneled" by the configuration of the spoil banks and levees along the MRGO and the Gulf Intracoastal Waterway (GIWW). The accumulated wetland loss, channel, and bank geometry conspired to bring great devastation to the region. The Mississippi Gulf Coast suffered equally from the enormous storm surge impacting the coast. One positive outcome may be the deauthorization of deep-draft navigation on the MRGO. On May 5, 2006, the U.S. Senate passed deauthorization language for the MRGO. It's likely this language will survive some monetary adjustments in the Supplemental

Appropriations bill and achieve passage in the House of Representative. Finally, the problems first identified three decades earlier can be addressed directly at the source of the problems – the MRGO.

With the MRGO closed to deep-draft navigation, there is great opportunity to achieve the original goals of the 1984 Feasibility Study. With a shallow draft requirement, it is possible to reduce the channel profile in St. Bernard, and thus dramatically reduce the salinity highway of the MRGO. However, modeling has already proven that a constriction by itself will not be sufficient. Therefore, the Lake Pontchartrain Basin Foundation has proposed to expand an existing diversion in the Lake Pontchartrain Basin near Violet, Louisiana. **Figure 2** illustrates the new project design elements. A Violet freshwater diversion and choking of the MRGO can achieve the salinity targets originally proposed in the 1984 Feasibility Study. Compared to the Bonnet Carre' diversion, this alternate location reduces the distance the water would travel to Mississippi Sound by 56% (27-miles), and so has promise of being more effective. A diversion at Violet is also highly desirable to restore wetlands that buffer the St. Bernard levees, and a candidate diversion project has been nominated by EPA and NMFS under the Coastal Wetlands Planning, Protection and Restoration Act.<sup>10</sup> Modeling funded by the Pontchartrain Restoration Program is currently underway at the University of New Orleans to determine the needed discharge to reestablish the salinity goals. Results are expected this summer.

### **Conclusion: A Partnership**

This is the time for Louisiana and Mississippi to work together with the new reality of our coasts, and re-assess alternatives to achieve the original goals of the “Freshwater Diversion to Lake Pontchartrain Basin and Mississippi Sound” project. The MRGO deauthorization language recently passed by the U.S. Senate allows six-months to develop an environmental restoration plan for the region. This interim plan is then to be integrated with the Louisiana Coastal Protection and Restoration<sup>11</sup> to be completed in December 2007. The President’s initiative of the Gulf of Mexico Alliance encourages cross-state cooperation and provides another timely opportunity for joint planning.<sup>12</sup> A “combined restoration design” which includes choking-off salinity from the MRGO and a freshwater introduction at Violet in St. Bernard Parish has great promise to restore the estuaries and to help protect our coasts in both Louisiana and Mississippi.. The Lake Pontchartrain Basin Foundation welcomes any opportunity to discuss these developments and opportunities.

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- 2 U. S. Army Corps of Engineers, 1984, Mississippi and Louisiana Estuarine areas: Freshwater Diversion to Lake Pontchartrain Basin and Mississippi Sound- Feasibility Study- New Orleans District

- 3 In 1996, Governor Mike Foster of Louisiana decided Louisiana would not participate in the cost-share  
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- 8 Lake Pontchartrain Basin Foundation, 2006, Comprehensive Habitat Management Plan for the  
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- 9 Lake Pontchartrain Basin Foundation, 2006, Pontchartrain Coastal Lines of Defense Program,  
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- 10 Mississippi River Reintroduction at Violet candidate project for PPL 16 see Task Force proceedings at  
[http://www.mvn.usace.army.mil/pd/April\\_12\\_2006\\_Task\\_Force\\_Binder.pdf](http://www.mvn.usace.army.mil/pd/April_12_2006_Task_Force_Binder.pdf)
- 11 The Louisiana Coastal Protection and Restoration was prompted by the devastation after Hurricanes  
Katrina and Rita and is being jointly developed by the U.S. Army Corps of Engineers and the State of  
Louisiana. See <http://lacpr.usace.army.mil/>
- 12 Gulf of Mexico Alliance home page <http://www.dep.state.fl.us/gulf/files/default.htm>