

## **Economic Impacts of the Opening of the Bonnet Carre Spillway to the Mississippi Oyster Fishery**

Benedict C. Posadas<sup>ⓐ</sup> and Benedict Kit A. Posadas, Jr.<sup>ᵇ</sup>

<sup>ⓐ</sup>*Associate Extension Research Professor, Coastal Research and Extension Center and  
Department of Agricultural Economics, Mississippi State University.  
Email: [ben.posadas@msstate.edu](mailto:ben.posadas@msstate.edu)*

<sup>ᵇ</sup>*Ph.D. Candidate, Department of GeoSciences, Mississippi State University.*

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### **Abstract**

The negative economic impacts of the prolonged Bonne Carre Spillway opening in 2011 were evaluated using two methods: (i) preliminary and updated assessments method and (ii) economic recovery modeling method. The cumulative foregone landing values of commercial oyster harvesting ranged from \$21.8 million to \$46.0 million, depending on the method used. The negative output impacts reached \$9.6 million in 2011, \$19.6 million in 2012, \$19.9 million in 2013, and \$8.9 million in 2014. Mississippi lost 145–324 jobs per year during the period. Labor income lost ranged from \$1.8 million to \$8 million per year.

**Keywords:** economic losses, freshwater intrusion, oyster restoration, shellfish harvesting

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<sup>ⓐ</sup>Corresponding author.

### **Introduction**

The preliminary assessment of the economic impacts of the prolonged Bonne Carre Spill (BCS) opening in 2011 (U.S. Geological Survey, 2016) was prepared in late 2011 to support the state application for federal fisheries disaster declaration. Using disaster funding, Mississippi had been in the process of restoring oyster reefs after Hurricane Katrina (H. Katrina) in 2005 and the Deepwater Horizon oil spill in 2010 when the BCS opening resulted in 85% oyster mortalities

(Mississippi Department of Marine Resources, 2011). These massive mortalities halted the recovery process of the oyster fishery to its baseline levels in 2002–2004.

Prolonged exposure to freshwater caused massive mortalities of the state's oyster populations and required restoration projects to enable the recovery of the fishery to its baseline status. The restoration efforts included but were not limited to the dredging of unaffected oyster seedstock and relaying them to affected reefs. Oyster shells and other cultch materials were purchased and planted at affected areas.

These restoration efforts will enable the oyster reefs to replenish the damaged oyster populations and become available for harvest when the resources reach market size. These restoration efforts will allow oyster reefs to reproduce more oysters for future openings of the oyster season in the state.

## **Economic Models**

The economic impacts of the prolonged BCS opening were assessed using the preliminary assessment method, when commercial landings data after 2010 were not yet available at the NOAA Fisheries website, and the post-assessment method and economic recovery model (ERM) when landings data from 2011 to 2014 became available in 2016. The preliminary and post-assessment methods used the pre-Katrina years 2002–2004 as the baseline period.

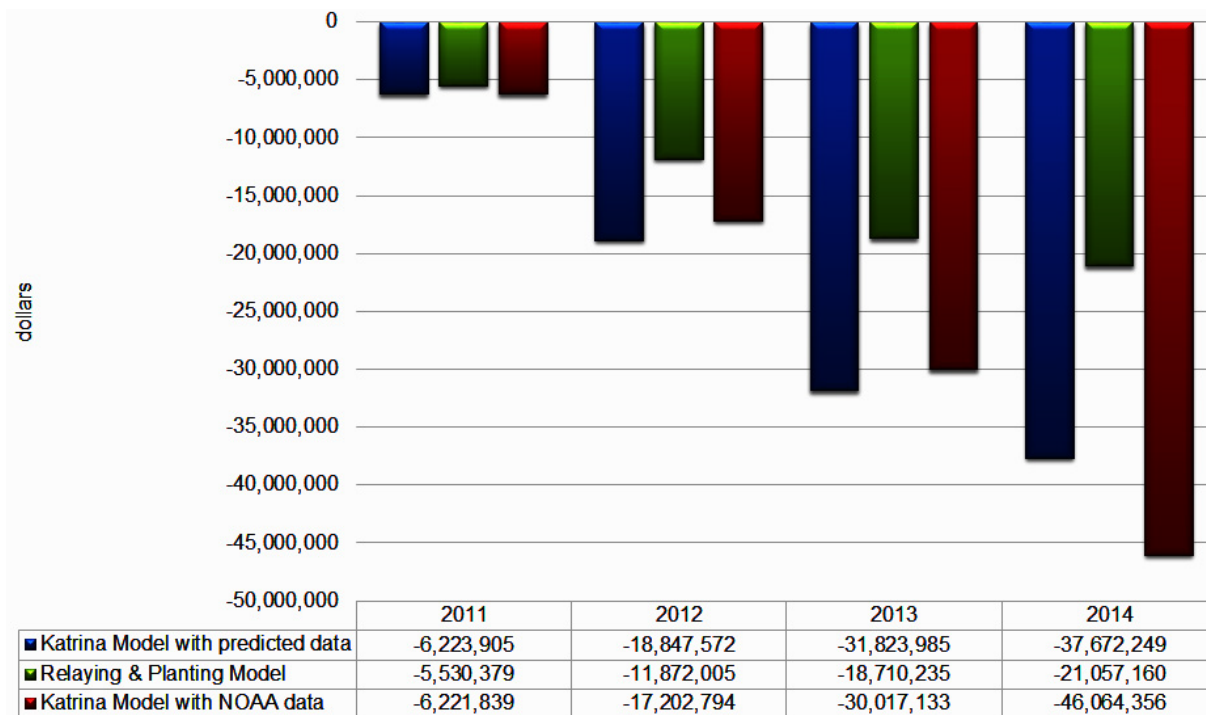
The preliminary assessment of the economic impacts of the BCS opening was prepared in late 2011 to support the application for federal fisheries disaster declaration by the state of Mississippi (Posadas, 2011). A more rigorous assessment of the impacts of the BCS opening was added as part of an overall assessment of the individual and joint impacts of natural and technological disasters to the state oyster fishery since 2005. The oyster relaying and cultch planting ERM attempted to measure the effects of economic, biological, technical, and environmental factors on commercial oyster landings during the past two decades (Posadas and Posadas, 2017).

Once the post-BCS foregone annual oyster harvesting values associated with the prolonged BCS opening were computed, the negative economic impacts were estimated using IMPLAN (2016) models for Mississippi. Oyster harvesting corresponds to NAICS (2016) sector 114112 or shellfish fishing. The income, value-added, and sales impacts are expressed in dollars for the year specified by the user. Foregone output or sales are the gross sales lost by businesses within the economic region affected by the disastrous event. Foregone labor income includes lost personal income such as wages and salaries and proprietors' income or income from self-employment due to the disaster. Foregone employment impacts are expressed in terms of a mix of both full-time and part-time jobs lost associated with the disaster.

## **Direct Economic Losses**

Three different methods were used to estimate the direct losses to Mississippi commercial oyster landings associated with the prolonged BCS opening. The preliminary approach used predicted

data for the H. Katrina model since no data from 2011–2014 were available at that time. Under this method, direct losses equals “predicted monthly landings using H. Katrina model less monthly baseline oyster landings in 2002–2004” (Posadas and Posadas, 2017). The cumulative direct losses under this method reached \$37.6 million (Figure 1).



**Figure 1.** Comparative Direct Losses to Mississippi Oyster Commercial Landings.

With 2011–2014 data available, the preliminary H. Katrina model was modified by estimating the direct losses associated with the prolonged BCS openings as equal to “actual monthly landings minus monthly baseline oyster landings in 2002–2004” (Posadas and Posadas, 2017). With this approach, the cumulative direct loss to Mississippi commercial oyster landings was \$46 million.

With the oyster relaying and cultch planting ERM, the effects of the prolonged BCS opening on commercial oyster landings were calculated. Under this method, direct losses were equal to “actual monthly landings minus predicted monthly landings without disaster” (Posadas and Posadas, 2017). Cumulative direct losses amounted to \$21 million.

Total direct losses estimated by the preliminary H. Katrina model were applied in calculating the negative economic impacts of the prolonged BCS opening. Using the IMPLAN (2016) economic impact program and 2014 data for Mississippi, the negative economic impacts of the BCS opening were calculated (Table 1). Negative output impacts reached \$9.6 million in 2011, \$19.6 million in 2012, \$19.9 million in 2013, and \$8.9 million in 2014. Mississippi lost 145–324 jobs per year during the period as a result of the downturn in oyster harvesting. Labor income lost was \$1.8–8.0 million per year.

**Table 1.** Negative Economic Impacts to the Mississippi Oyster Harvesting Industry.

Year	Employment	Labor Income	Total Value Added	Output
2011	-238	-1,758,557	-3,618,312	-9,620,179
2012	-318	-7,855,340	-10,581,350	-19,574,876
2013	-324	-7,994,211	-10,768,414	-19,920,932
2014	-145	-3,566,886	-4,804,690	-8,888,394
Total	NA	-21,174,995	-29,772,766	-58,004,380

**Notes:** NA refers to not applicable since the number of jobs pertains to the same pool of commercial oyster fishermen and workers in related industries.

The Mississippi oyster harvesting industry underwent economic hardships due to the massive destruction and frequent closures of the state public reefs associated with natural and technological disasters. The absence of access to public reefs caused the shutdown of oyster harvesting activities and associated economic activities. The cumulative values of commercial oyster landings lost in 2011–2014 reached up to \$46 million. Negative economic impacts of the prolonged BCS opening consisted of the reduction in economic output by \$58 million, loss of 145–324 jobs per year, and decline in labor income of more than \$21 million in 2011–2014.

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