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## Southwest Pass Outlets Bathymetry and Flow Distribution Assessment

Mississippi River Geomorphology and Potamology Report No. 5

The Southwest Pass distributary of the Mississippi River is the primary navigable channel connecting the Gulf of Mexico and the Mississippi River. The average expenditure of the U.S. Government on Southwest Pass and the lower Mississippi River dredging has averaged approximately \$55 million/year for the previous 5 years.

Numerical modeling tools covering this important navigational route are being developed to provide a better understanding of the impact of proposed Mississippi River system changes. Understanding the flow exchange between the Southwest Pass distributary and the surrounding Gulf of Mexico under various river and tide conditions is essential to the development of these analytic modeling tools to be used to predict system response to proposed upriver diversions and dredging templates resulting from navigable channel deepening proposals. The ongoing development of these numerical modeling tools has revealed a data need for bathymetry and velocity information for the four major lateral outlets of the Southwest Pass. Multi-beam channel bed surveys and Acoustic Doppler Current Profiler data were collected over 3 days. The collected data will be used to calibrate the flow exchange and to improve the predictive ability of the multidimensional numerical models and the resulting water/sediment ratios at the four lateral outlets.



### Multi-Beam and Single-Beam Surveys

Survey data were collected between 30 June and 17 July 2014 by Chustz Surveying Inc. Topographic data were collected using a Trimble TSC 3, Trimble R8, and Samsung Galaxy Rugby. The hydrographic data were collected using an Odom Hydrotrac Echo Sounder and a Teledyne RESON SeaBat 7101 multi-beam system. All of the investigated Southwest Pass outlets displayed scour holes of varying degree in size and depth just downstream of their entrances. Burrwood Bayou is unique in that it has two scour holes, the largest of which is on the Gulf side of the emergency closure structure, which would indicate that the flow through Burrwood Bayou is controlled by the emergency closure structure as intended.

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### Acoustic Doppler Current Profiler Data

Acoustic Doppler Current Profiler measurements were taken at each site, including measurements in the outflow channels, and upstream and downstream of the outflow channel in Southwest Pass. Each location included measurements conducted under a variety of tide conditions. The measurements were conducted on 13–15 May 2014 using two RDI 600 MHz WorkHorse Rio Grande Broadband Acoustic Doppler Current Profiler.

### For More Information

To access the full version of *Southwest Pass Outlets Bathymetry and Flow Distribution Assessment* report, click the following link: [http://acwc.sdp.sirsi.net/client/en\\_US/search/asset/1044567](http://acwc.sdp.sirsi.net/client/en_US/search/asset/1044567).

Additional MRG&P reports, historic reports, and MRG&P information can be accessed from the technology transfer section link at the MVD Historic Studies website:

<http://www.mvd.usace.army.mil/Missions/MississippiRiverScienceTechnology/MSRiverGeomorphologyPotamology/FieldData/HistoricStudies.aspx>.

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### Summary of Significant Findings

- Given certain tidal conditions and Mississippi River discharge, the four lateral outlets along Southwest Pass are capable of diverting almost half of the flow entering Southwest Pass from the lower Mississippi River channel.
- The impact of these lateral outlets on Southwest Pass flow and sedimentation dynamics must be considered in any model study that includes Southwest Pass in its domain.
- The loss of stream power along the channel due to the diversion of water through the outlets is likely a primary driver of resulting shoaling patterns in Southwest Pass.
- The flow stratification evident in the velocity profiles indicates that flocculation due to salinity contributes to the sedimentation characteristics observed in Southwest Pass.

