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Geomorphic Assessment of Pass a Loutre and South Pass, Mississippi River Delta

Mississippi River Geomorphology and Potamology Report No. 3

A geomorphic assessment was conducted for Pass a Loutre and South Pass, both distributaries located in the bird's-foot delta of the lower Mississippi River. The geomorphic assessment includes analysis of historical changes in channel geometry and flow distribution at the passes, as well as investigation of the effects of natural and man-induced activities. Historical trends in the long-term morphology of the passes are described.

Background

The dominant morphological processes that shape the lower Mississippi River channel and deltaic channels such as Pass a Loutre and South Pass can operate over a very large range of spatial and temporal scales. There are many factors, both natural and man-induced, that can contribute to these processes. The effects of large flood events and tropical storms, changing sediment loads and characteristics, channel maintenance activities, dredging practices, diversions (natural and man-made), subsidence, and relative sea level rise are just a few such factors. Formulating the most accurate assessment of river morphology over these large scales requires evaluation of long-term trends in geometry adjustment, flow distribution, and sediment loading based on observed data. These morphological trends can be determined by means of a geomorphic assessment.

A geomorphic assessment was conducted for the Pass a Loutre and South Pass deltaic channels of the Mississippi River bird's-foot delta. The purpose of the study was to document long-term morphological trends in the channels through the analysis of historical stream gage data, hydrographic surveys, dredge data, and other information on man-induced activity in the study area. The physical limits of the study were from Head of Passes (HOP) to the Gulf of Mexico outlet for both passes, and the time period was focused from 1960 to the present. Specifically, the geomorphic assessment tasks consisted of data compilation, geometric data analysis, analysis of stage and discharge data, and assessment of historical river engineering activity in the study area. The results of all analyses were integrated to develop an understanding of the morphologic trends in the study area. Information derived from the geomorphic assessment assists in evaluating potential activities in the area such as river diversions for freshwater marsh restoration.

Assessment Summary

Both Pass a Loutre and South Pass have demonstrated depositional trends throughout the study period. Average depths in Pass a Loutre have decreased from 4 to 20 feet (ft) throughout the pass due to sediment deposition, with decreases of 80 to 100 ft observed near the head of the pass. Average depth decreases due to sediment deposition observed in South Pass range from 5 to 10 ft. The flow distribution in Pass a Loutre as a percentage of Mississippi River discharge decreased from approximately 30% to 10% during the study period, with only a slight decrease from 15% to 12% observed for South Pass.

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The observed trends of sediment deposition and flow distribution for Pass a Loutre and South Pass are influenced by many factors, both natural and anthropogenic. River floods and tropical storms, changing river sediment regimes, navigation channel maintenance, and dredge material disposal practices have contributed to the geometric and flow distribution changes observed in the passes. Identification of the causative factors with increased certainty will require additional investigation with detailed hydrodynamic numerical models.

Additional Information

To access the full version of *Geomorphic Assessment of Pass a Loutre and South Pass, Mississippi River Delta* report, click the following link: <http://acwc.sdp.sirsi.net/client/search/asset/1036385>

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/mrgp_pubs.

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Summary of Significant Findings

- Mississippi River deltaic channels are part of a dynamic system with morphologic processes operating over large time scales.
- Pass a Loutre and South Pass have experienced depositional trends over the past 5 decades.
- Decrease in flow distribution as a percentage of Mississippi River discharge has been more significant in Pass a Loutre than South Pass.
- Both natural and anthropogenic factors influence the observed morphology in Pass a Loutre and South Pass.

