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Understanding the Shallow Stratigraphic Architecture of the Louisiana Coastal Zone: the Key to Identifying Potential Sources for Shoreline Renurishment

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The Louisiana coastline west of the modern Mississippi River delta is the product of the complex processes of delta progradation, abandonment, and marine transgression. The stratigraphic architecture of the deltaic plain represents depositional facies associated with each of these processes. Progradational units include prodelta, delta front, distributary channel, and marsh deposits. Transgressive facies are present as tidal inlet channel fills, shoal deposits and nearshore marine deposits. The occurrence of these different facies varies in prominence, lateral and vertical extent. Thus, locating material suitable for remediation projects is complex and understanding the geologic framework is necessary to characterize the distribution of these deposits. For the purpose of shoreline remediation, these deposits can be classified into distinct units of varying grain size and texture. The dominance of mud in the area is due to the fine-grained sediment load of the Mississippi River. The coarse-grained material within distributary channels and tidal inlet deposits is restricted to high-energy current regimes and generally is spatially distinct from the muddy environments.

As part of a shoreline restoration effort, two sand resource studies were conducted in the Barataria and Timbalier regions. More than 1870 line-kilometers of high-resolution single-channel seismic-reflection profiles and 281 vibracores were collected. The surveys identified 14 potential sand sources within an overall fine-grained marine, prodelta, and interdistributary framework. Several of these deposits are associated with delta progradation, backbarrier, and flooding deposits. The delta front and distributary network contribute the majority of coarse-grained material within the overall fine-grained environment. Analyses of these components indicate that these systems can be targeted as suitable sediment resources for shoreline remediation.