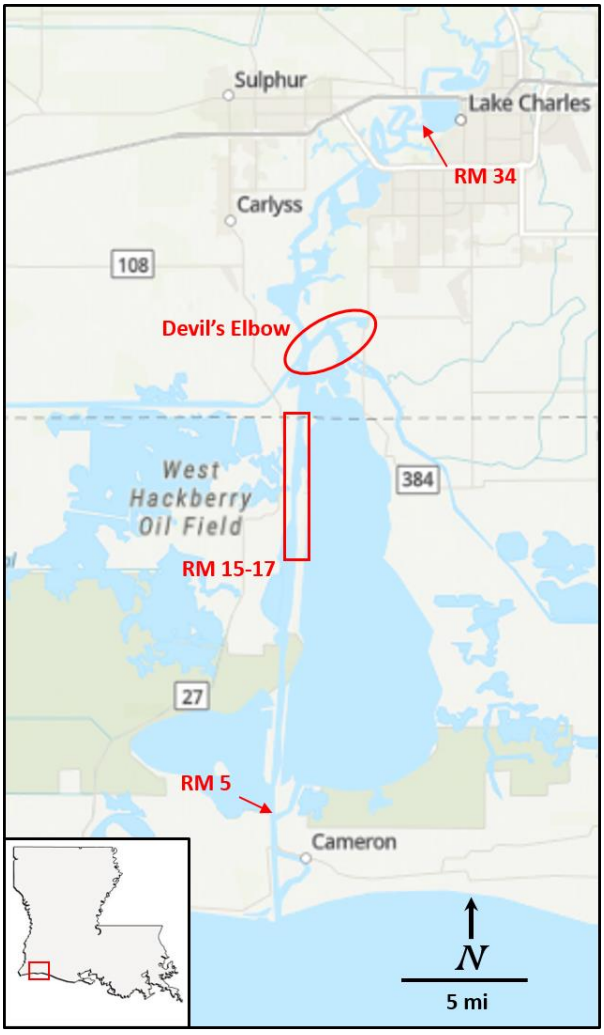
US Army Corps of Engineers®
Engineer Research and Development Center

National Regional Sediment Management Program
New Orleans District (MVN):
Investigation of Sources of Sediment Associated with Deposition in the Calcasieu Ship Channel (CSC)

Description

This project is a continuation of an FY19 RSM demonstration study that utilized geochemical fingerprinting of probable sediment sources and shoal material samples from the Calcasieu Ship Channel (CSC) to estimate the relative contribution of each source to the channel's sediment load. Results from that study suggested that shoals are generally derived from marine and riverine end members (i.e., sediments originating from the Gulf of Mexico and the Calcasieu River above mile 35), and that local inputs from the CSCs banklines or adjacent lakes and marshes may not substantially add to sedimentation within the CSC template. However, the limited shoal material sampling was not designed to resolve sources in specific reaches of the channel. Building off the previous findings, shoal material from two high-shoaling channel segments (Devil's Elbow and RM 15-17) will be collected and analyzed for the presence of key geochemical signatures to resolve localized shoaling sources. Additionally, to develop quantitative values of the offshore component of shoaling, sampling will be conducted to establish a more robust offshore/inshore mixing model of the stable isotope signatures.



Map of Project Area

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Issue/Challenge To Address

The Calcasieu Ship Channel (CSC) is a deep-draft Federal Channel located in Southwest Louisiana. It is the channelized lowermost segment of the Calcasieu River, connecting Lake Charles to the Gulf of Mexico. Between river miles 5 and 34, approximately 4 million cubic yards per year (mcy/yr) of sediment is dredged to maintain the channel. The New Orleans District Office of the US Army Corps of Engineers (MVN) has sponsored past studies to determine sediment budgets of the area and sources for shoaling (e.g. Perkey et al., 2020, Brown, in Review, Fischenich, 2004). The sediment budget conducted by Brown in 2018 investigated the potential transport pathways for offshore sediments into the CSC with simulations on an existing AdH/SEDLIB model. Results from the FY19 geochemical fingerprinting supported Brown's model results indicating that significant amounts of offshore sediments were shoaling within the lower CSC (Mile 5-17). However, the fingerprinting results also indicated that Brown's most recent sediment budget was overestimating sediment shoaling from regional bankline and wetland sources. This study will build off of the FY19 geochemical data set and target specific, high priority shoaling areas in an attempt to identify shoaling sources within a smaller area of concern and also develop an inshore/offshore mixing model based on the stable isotope data to provide quantitative estimates of shoaling from those two sources.

Successes Lessons Learned

Lessons learned will be compiled during the duration of this study.

Expected Products

- Identification of local sources of sediment to high shoaling regions in the CSC
- Quantification of the offshore component of shoaling in the lower CSC system
- Final report and presentation

Stakeholders/Users

Stakeholders include the Lake Charles Harbor and Terminal District, and the Calcasieu Water Safety Committee.

Projected Benefits Value Added

Depending on the conclusions of this study, there is a potential for significant value added, in terms of a reduction in dredging costs. If the investigation reveals that a significant portion of the sediment that is deposited in the CSC is derived from sources for which there is potential mitigation, then the dredging costs could be reduced significantly. In addition, the lessons learned from this effort may be applicable to other Federal navigation channels – potentially resulting in even greater cost savings and navigation efficiencies.

Leveraging Opportunities

This study will leverage several existing and ongoing studies. This study builds off of the FY 2019 RSM characterization of source material, which was informed by CSC sediment modeling and gradation studies performed by Brown (in preparation), Channell et al. (2004), and Fischenich (2004). In turn, the results of this study would help confirm and refine CSC source material estimates developed by Brown (in preparation) and The Water Institute of the Gulf (2019). Additionally, the methods proposed in this work were informed by work performed on Calumet River sediment sources (Perkey et al., 2017).

Points of Contact

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Participating Partners

There are no participating partners

References

Brown, Gary (in preparation). Investigation of Sources of Sediment Associated with Deposition in the Calcasieu Ship Channel. FY18 RSM project report prepared for US Army Engineer District, New Orleans.

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