Beneficial Use of Dredged Material to Fill Holes from Oyster Shell Mining in Mobile Bay

FY 16 Regional Sediment Management- Engineering With Nature In-Progress Review

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http://blog.al.com/live/2013/06/fisherman_describes_shrimp_boa.html

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BLUF: The purpose is to investigate opportunities and develop a strategy to beneficially use dredged material to restore the bay bottom in areas where historic dead oyster reef shell mining activities created numerous holes in the Mobile Bay.

Problem Statement/Issue(s)

Management of approximately 4 million cubic yard of material dredged per year from the Mobile Bay Federal Navigation Channel.

Thousands of acres of natural bay bottom deepened in areas of the north eastern and central portion of the bay to depths greater than 15 ft through the removal of dead reef oyster shell first permitted in 1946 and ending in 1982.

Approach to Address Issues

- Continue to leverage with the Mobile Bay Interagency Working Group (IWG) to investigate opportunities and develop strategies to beneficially use dredged material in the bay.
- Restore existing bay bottom habitat with dredged material.

USACE RSM PDT

- Larry Parsons, RSM Project Manager
- Nate Lovelace, Dredge Material Project Manager
- Elizabeth Godsey, RSM Engineering Technical Lead

Stakeholders/Partners

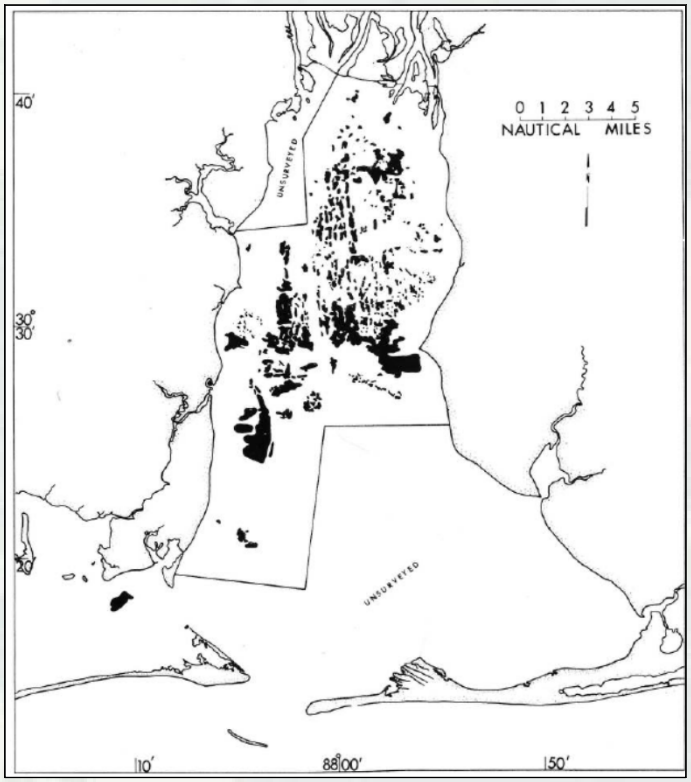
- Alabama State Port Authority (ASPA)
- Alabama Dept. of Environmental Management (ADEM)
- Alabama Dept. of Conservation and Natural Resources (ADCNR), State Lands Division
- ADCNR, Marine Resources Division (MRD)
- U.S. Fish and Wildlife Service (FWS)
- National Marine Fisheries Service (NMFS), Habitat Conservation Division
- Mobile Bay National Estuarine Preserve (NEP)
- Dauphin Island Sea Lab (DISL)

What key leveraging opportunity(s) of stakeholders/partners

- Hosting Mobile Bay Interagency Working Group Meetings
- Providing historic and current oyster mapping locations
- Providing assistance in scoping and conducting field work

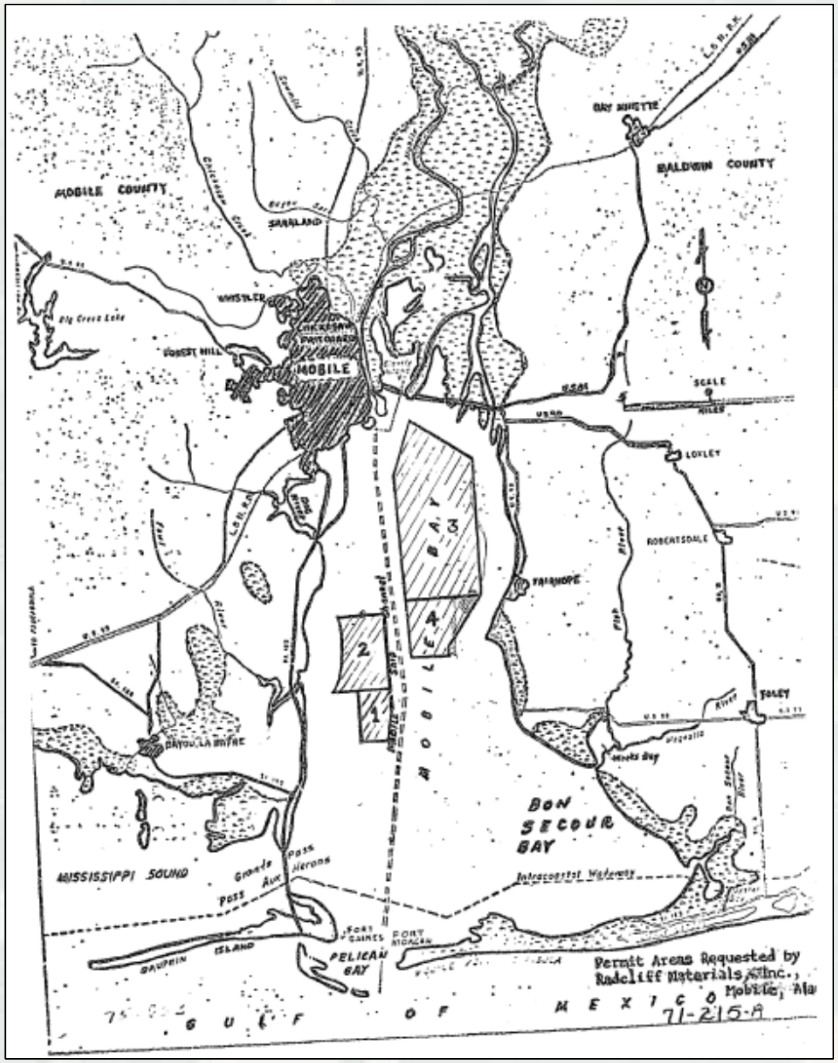
What is Dead Reef Shell?

- The geologic record shows fossilized oyster reefs throughout all of Mobile Bay and even north of the Causeway in to the Delta. Extinct oyster shell reefs are also known as mudshell or dead reef shell (Ryan, 1969).
- Radio carbon dating found shells were 6500 years old in the northern bay/delta and 2100 years old in the area where Gaillard Island is now (Ryan, 1969).
- Overburden is between 25 feet in the northern area and 4 feet or less over the southern deposits (May, 1971).
- A survey conducted by Radcliff Materials, Inc. (primary dead reef shell dredging company) and supplemented by data presented in the May (1971) report the total volume of dead reef shell in Alabama is estimated to be 93 million cubic yards in the area shown in the figure.



Dead Reef Shell Dredging

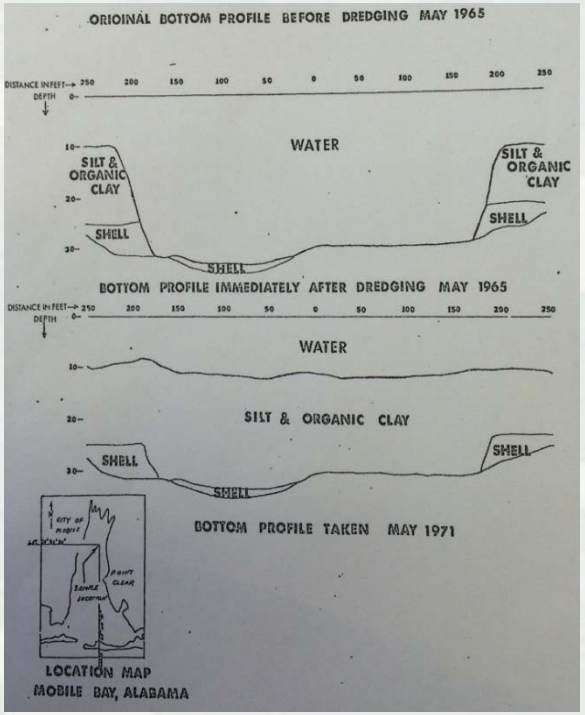
- The first permit to dredge dead reef shell was issued in 1946 but through anecdotal information shell dredging has been done in Mobile Bay as far back as the 1890's.
- Permitted dredging area is shown on the right from permit issued in 1973.
- Almost exclusively dredged by Radcliff Materials, Inc.
- Shell used for concrete, roads, chemicals, poultry feed.
- Majority of dredging east of the ship channel in areas 3 and 4.
- The total volume of shell extracted between 1947 and 1968 was 40 million cubic yards based on information obtained from Radcliff Materials, Inc. and published in May (1971).

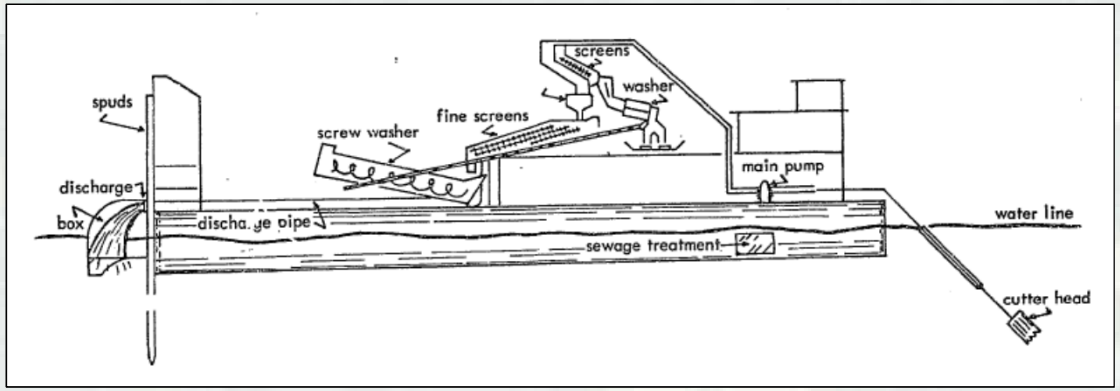


Dredging Dead Reef Shell Process

- Dredging was done using a cutterhead dredge with a discharge immediately overboard after shell had been extracted to the rear of the dredge in an attempt to refill the dredge cut.

- Based on after dredged surveys many of the holes were not refilled, with surveys showing dredge cuts older than 1 year.





Approach to Address Issues
(Tools, Models, Technologies)

- Reviewed historic surveys and literature throughout Mobile Bay to identify potential location of historic dredged oyster shell mining pits

- Conducted acoustic surveys to determine if dredged oyster shell mining pits still remain and if so to what depths

- Conducted physical sampling in areas identified in the acoustic surveys and other areas based on historical data to determine the sediment composition in locations known to be mined and shown on hydrographic surveys and existing undisturbed native bottoms

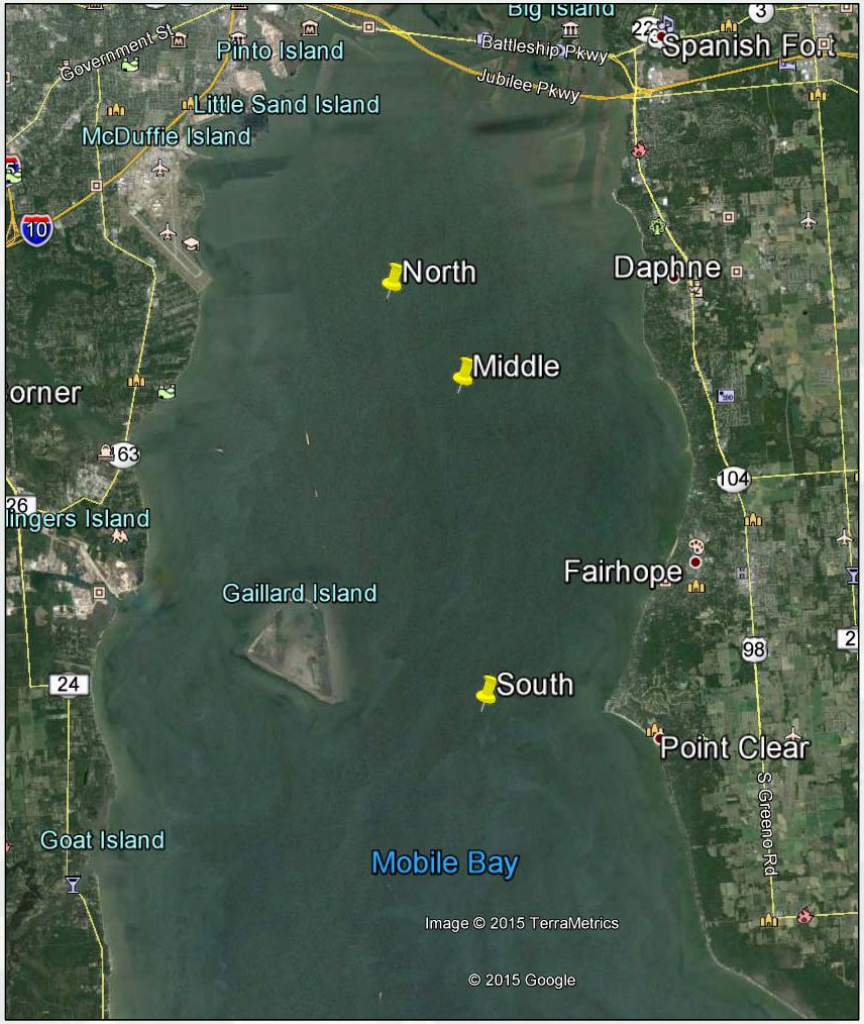
Investigation Sites

- Surveys from 1960/61 and 1984/87 were used to determine areas of interest for further acoustic surveying and physical sampling and probing. Literature/permit review was also used to verify locations
- Three areas (shown on right) are chosen based on proximity to channel, dredge cut depth greater than 20 feet as shown on historic surveys, and at least 4 data points greater than 20 feet for spatial extent.

  North: 30.603, -87.998

  Middle: 30.575, -87.988

  South: 30.485, -87.977
- Additional Investigation is underway to determine a baseline location for comparison.



UPs – 3 Positives from effort

- Data adds further validation to the 2012 Multiagency Regional Sediment Management/Beneficial Use geophysical scale modeling system
- Demonstrates to the Mobile Bay RSM/BU group that the Corps in coordination with the multiagency group continues to actively pursue additional environmentally and economically sound uses of dredged material from the Mobile Harbor
- Provided additional research, science and data which is helping develop an implementation strategy and could help move future federal as well as non federal actions forward

DOWNs – 3 Negatives from effort

- Project may not be not favorable for beneficial use of Mobile Harbor Dredged Material
- Project will be more costly and likely will need to fall under the 204 Authority
- Will require more coordination with environmental agencies

Value to the Nation

- Leveraging resources -- Across USACE programs and project partners to reduce cost to projects.
- Increased partnership -- State oyster restoration program is currently paying $50 per ton for 57 stone, this cost could be reduced to $25-30 per ton if Tennessee Tombigbee gravel is found suitable for oyster restoration.
- Capacity of upland placement site saved -- Use of dredged material from existing upland disposal areas along the Tennessee Tombigbee Waterway would prolong availability of existing placement sites.
- Environmental benefits -- Restoration of oyster habitat which provides for juvenile fish and invertebrate habitat, increase feeding grounds for game fish (ie. grouper, snapper, ect.) and improved water clarity (plankton and suspended sediment filtration).

References

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Ryan, J. J., 1969. A Sedimentologic Study of Mobile Bay, Alabama. Sedimentological Resources Lab. Dep Geol., Florida State University, Tallahassee, Florida.

Schroeder, W.W., Cowan, J.L., Pennock K.R., Luker S.A., Wiseman, W.J., 1998. Response of Resource Excavations in Mobile Bay, Alabama, to Extreme Forcing.