Concepts for
Large Scale Restoration in Coastal Louisiana
Using Long Distance Conveyance of Dredged Material

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Based on a Technical Workshop
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Introduction

Between 1956 and 2000, Louisiana's coast lost some 3950 square kilometers of land. Recent reports (Barras et al., 2003) present the current loss rate at an average of nearly 62 square kilometers per year. Projections suggest additional losses of over 1295 square kilometers by 2050 as rates slow due to almost complete loss of marshes in some areas. This future landscape degradation is expected to occur despite the efforts of existing restoration programs.

These losses are one of the most significant environmental problems in North America, affecting an original wetlands area of some 14,245 square kilometers in which are located major population centers such as New Orleans, infrastructure for major components of the United States oil and gas supply and port system, and habitat for a large, diverse and commercially important fishery.

It has long been recognized that in Louisiana the sediment within the estuarine basins is a limiting resource for rebuilding and rejuvenating degraded marshes (e.g., Gagliano and van Beek, 1973). Natural process solutions, such as diversions, would introduce new sediments into the system, but gradually over many years, and larger diversions would dramatically alter the salinity regime of the basins (USACE, 2004). There are also concerns regarding the fate of nutrients introduced with the river waters and the potential for eutrophication and perhaps harmful algal blooms.

The introduction of new sediments into the estuarine basins could also be achieved through long-distance pipeline conveyance of dredged materials. A workshop held in October 2003 (Hales et al., 2003) focused on the conveyance technology and clarified for many in the Louisiana restoration community that the movement of dredged material many miles across the coast to areas of need was technologically feasible. Concerns remained, however, regarding the use of large quantities of dredged material to create functional marsh habitat on a large scale (i.e., thousands of acres).

To further explore the issues surrounding the use of long distance conveyance of dredged material to create marsh habitats, a workshop was held in September 2004. The focus was the development of concept proposals for the large scale use of dredged material to restore some of the most degraded areas of the Louisiana coast – those areas where large open water areas must be filled before marsh habitats can be regained and where remaining marshes are extremely fragmented. The objectives of the workshop were to:

1. Develop large-scale concept restoration proposals for four severely degraded areas of the coast
2. Identify potential benefits and impacts associated with the concept proposals and recommend measures to minimize adverse impacts associated with dredging, conveyance, or placement.
3. Identify any developments in research or technology needed prior to development and implementation of the concept proposals.

The Workshop

A Steering Committee assisted Environmental Protection Agency (EPA) and the University of New Orleans (UNO) in the development of an agenda to provide time for focused discussion and the development of new restoration ideas. The workshop was held on September 8th 2004. The agenda for the workshop is provided as Attachment A. Invited participants included experts in both wetland restoration and dredging technology, as well as stakeholders and scientists with background knowledge of the areas of interest.

A plenary presentation by Linda Mathies and Ed Creef of New Orleans District of the US Army Corps of Engineers (USACE) described the accomplishments of the current program for the beneficial use of dredged material and drew attention to some of the challenges faced by USACE and their partners in bringing projects to fruition. Limiting factors included the effect on oyster beds, concerns regarding contaminants in the dredged material, the character of the sediment and its suitability for marsh creation, rights-of-way for the pipeline, landowner resistance, and the potential detrimental effects on nesting birds and waterfowl during placement (these concerns were amplified if the species were listed).

The aim of the subsequent panel discussion was to raise some of the technological issues surrounding the use of dredged material in marsh restoration, and the opportunities that may exist for furthering this approach to restoration. Panel members were Ancil Taylor (Bean Stuyvesant), Lawrence Rozas (NOAA Fisheries), Jon Porthouse (Louisiana Department of Natural Resources) and Andrew MacInnes (Plaquemines Parish). Among the issues noted by the panel were:

- The technology exists and is done other places worldwide
- Marsh geomorphology is important for faunal production, especially the configuration of the marsh edge
- New restoration planning emphasizes the need to both increase the amount of sediment within the estuaries and maintain estuarine salinity gradients
- Local people are the most directly affected by such efforts and frequently they feel threatened. New approaches must focus on getting the public engaged earlier in the process

The focal point of the workshop was the facilitated breakout groups. The groups were charged with development of concept proposals for the use of dredged material in landscape-scale restoration for a particular area of the coast. The concept proposals were to consist of:

- An outline of the use of material to achieve restoration goals
- Consideration of varying uses for the material with geographic locations, any placement considerations, and a description of expected benefits and constraints
- A list of needed research or technological developments

The areas considered by the breakout groups were selected by the Steering Committee to represent different geomorphic settings for restoration. They varied in the amount of

fragmented marsh and open water, the length of fetch, proximity to the river (important influence on potential synergies between dredged material use and diversions), and dominant use (e.g., oyster beds, nursery habitat for shrimp, etc.). Participants were assigned to breakout groups based upon their expressed preferences, their local knowledge, and to attain a balance of backgrounds and expertise among the groups.

The approximate location of the areas considered by the breakout groups is shown in Figure 1. The concept proposals developed by the groups are presented here together with a summary of the general research and technology needs identified during the workshop.

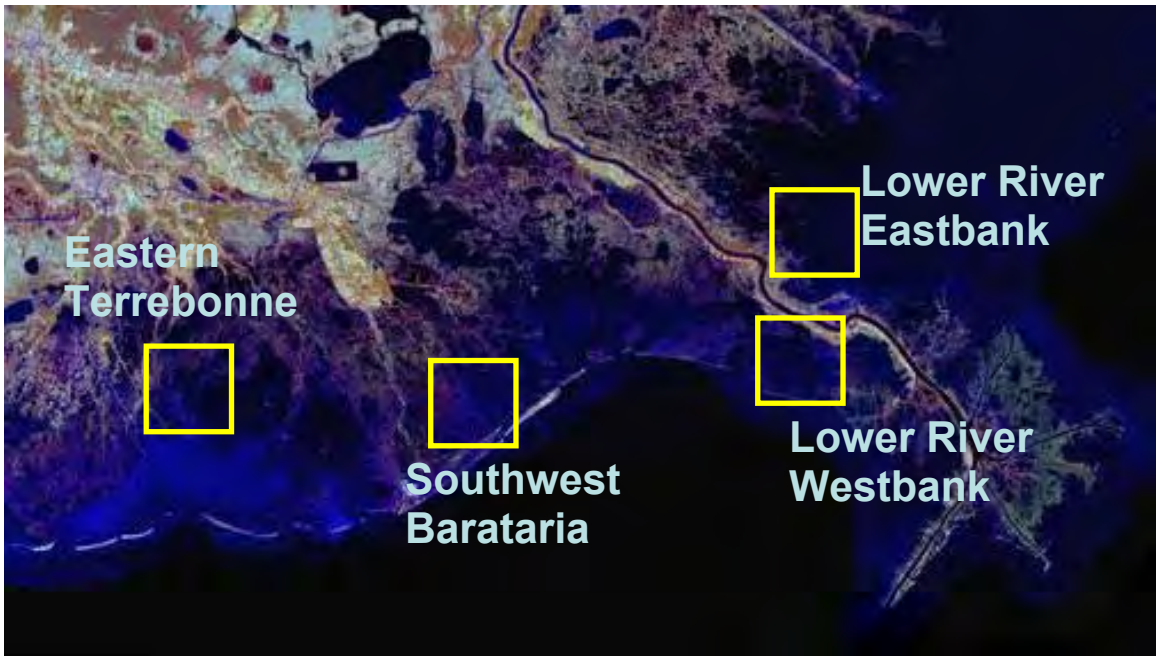

Figure 1. General location of areas considered by breakout groups. For more details refer to the individual concept proposals.

Concept Proposal for Eastern Terrebonne

Area of Interest
This area is east of lower Bayou Terrebonne on the north side of Lake Barre. It is an area of high land loss in the late 20th century that continues today. The fetch to the south extends to the Timbalier Islands and there are no immediate sources of freshwater to the area.

Restoration Concept
The concept proposal includes multiple approaches to restoration. The components seek to moderate physical erosion of the remaining marsh areas and rebuild marsh, shoreline and ridge features to reinforce the skeleton of this severely degraded area.

There are seven elements to the proposed restoration in this area. Some work in combination with one another to increase marsh area and reduce erosion while others focus on particular habitat features of the area. Figure 2 shows how the elements work together in a landscape setting.

Figure 2. Elements of eastern Terrebonne concept proposal. The symbols are described with each element below.

Subtidal barriers (grey line).
This approach addresses the exposure of the lake shoreline to the long fetch to the south and southeast. The use of pipeline conveyed sediments to rebuild a subtidal barrier (Jean Baptiste Ridge) would reduce wave and tidal energy and aperiodic storm surges currently impacting the marsh shoreline. The placed sediment would need to be coarse in order to remain in place. The sediment placement may be combined, in an experimental approach, with oyster reef features. This restoration element provides the 'first line of defense' against physical erosion of the existing and restored marsh.

Bay Rim Reinforcement (red line)
The marsh shoreline exposed at the northern edge of Lake Barre will still be susceptible to wave erosion during major events. Placement of pipeline conveyed material along the marshes at the lake rim will retain the integrity of the shoreline and reduce the rate of shoreline retreat. An intact shoreline is also essential in providing for restoration of the interior marshes. The material will be placed at the shoreline and will close small cuts and channels (i.e. breaches) which allow wave energy to penetrate the marsh but will still provide for access into navigable bayous and waterways. The placed material will need to be mainly sandy in texture to reduce runoff and allow for stacking. It will be placed above marsh elevation, reducing the future need for material placement, and acting as a retention for interior marsh creation and nourishment. This feature will result in a sandy 'berm' around the bay rim. This will provide habitat for avifauna and wildlife refuge. This restoration element is the 'second line of defense' against physical erosion of the existing and restored marsh.

Marsh Creation and Nourishment (light green shading)
Extensive open water and fragmented marsh areas north of the lake rim and south of Madison Bay could be filled with pipeline conveyed dredged material. This material could be finer grained than for elements 1 and 2 – silts and clays would be appropriate. The material would be piped into the open water areas (marsh creation) and allowed to flow across the remaining fragmented marsh (marsh nourishment), possibly by using multiple discharge points, to replenish low areas. The target of the placement would be marsh elevation but minor deviations either above or below the target would be acceptable and may provide additional complexity, including 'edge', to the restored landscape. Natural tidal channels would largely be left open. This created land barrier would reduce the penetration of saline lake waters into the Madison Bay area. The marshes created with an initial pipeline system may need periodic replenishment (on a decadal time scale). Leaving a pipeline from the river in place to introduce freshwater and nutrients after material placement should be explored as an approach to increasing the sustainability of the created marsh.

Rehabilitate Bayou Terrebonne Ridge (brown line)
Pipeline conveyed material can be used to 'simulate' the natural depositional processes which built the landscape. The natural levee along Bayou Terrebonne has become fragmented and dredged material could be placed along the margins of the bayou where coarser sediments would settle out. The finer sediments would flow away from the bayou creating a marsh apron adjacent to a higher levee feature. The sediments would be

naturally sorted as they are transported across the marsh by the tides and outflow from the pipeline. It is possible that this element may need to be developed in phases, with material being placed strategically, and then allowed to redistribute and settle before more material is added. The distribution of sediments would be more important than achieving any specific elevation. The levee would provide habitat for avifauna and wildlife.

Infill Madison Bay 'Hot Spot' (dark green oval)
The pipeline conveyed sediments would be used to infill the extensive open water areas in the vicinity of Madison Bay. The goal would be twofold – to create marshes and to moderate the tidal connection between the bay to the south and the Wonder Lake area to the north. The created marsh should include creeks and channels to provide fisheries habitat but be sufficiently extensive, relative to the current open water, to influence the hydrology of the sub-basin.

Maintain Created Marshes with Freshwater Inflows (blue arrow)
This restoration element does not use pipeline conveyed material per se, but addresses the sustainability of the marshes created with the material. The proposed locks on the Houma Navigation Channel and the floodgates and levees proposed as part of the Morganza to the Gulf project provide an opportunity to manage freshwater flows from the Atchafalaya and direct some flows through the Lake Boudreaux Basin and Bush Canal towards Bayou Terrebonne and Madison Canal to influence the area of interest. Seasonal inputs of freshwater and nutrients will stimulate plant growth and increase the sustainability of the created marshes.

Rebuild Islands in the Bay (black polygons)
Pipeline conveyed material can be placed on and around the small islands in Lake Barre to increase their longevity. These islands are subject to shoreline erosion and the addition of coarse grained material would increase elevation and area. The islands provide habitat for avifauna and an increase in their extent would also provide local protection from fetch-induced waves to marsh shorelines to the north.

Specific Research Technology Needs
No location specific research and technology needs were identified.

Breakout Participants
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Concept Proposal for Southwest Barataria

Area of Interest
This area includes the fragmented marshes north of Grand Isle and ~ 5km east of Bayou Lafourche. The area immediately east of Bayou Lafourche has many planned restoration approaches. This area is adjacent to Caminada Bay with limited fetch to the south and southeast. The outer marsh is broken into large islands separated by arms of the bay.

Restoration Concept
The concept proposal includes multiple approaches to restoration, recognizing that prevention of land loss is easier than rebuilding and that marsh creation should build onto the existing skeleton. Also implicit in the approach is the assertion that rebuilding the landscape structure must be coupled with the restoration of a natural hydrologic regime. The source of material for most of the work would most likely be offshore or the Mississippi River in the vicinity of Myrtle Grove.

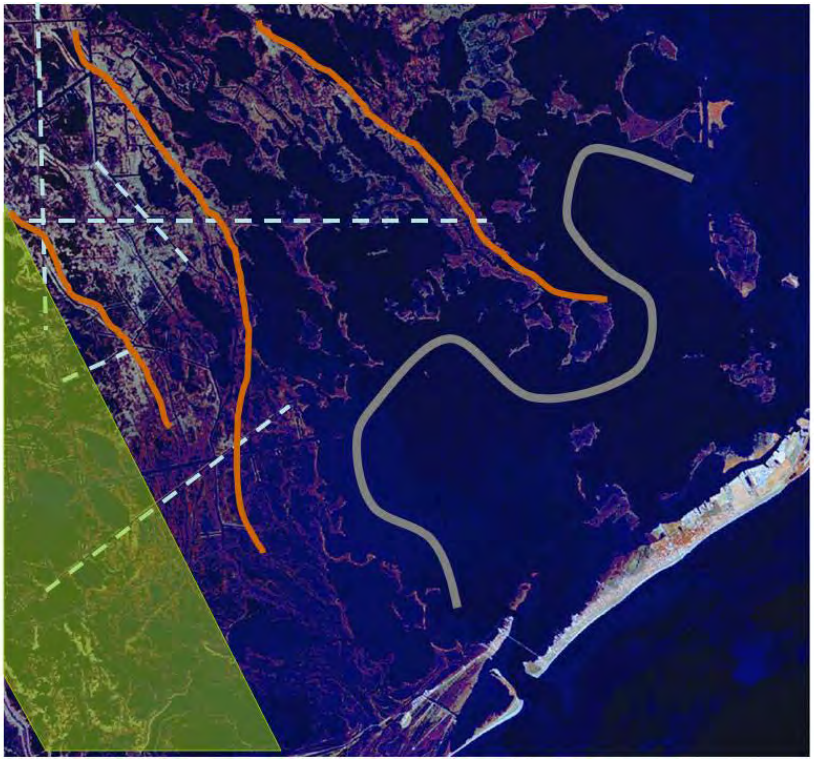

Figure 3. The Concept Proposal for SW Barataria. The symbols are defined with the description of each element.

There are four elements to the proposed restoration in this area. Their relationship in the landscape is shown in Figure 3.

Protect Bay Rim (grey line on Figure 3)
Wave erosion of fragmented marsh shorelines is a major problem in this area. Pipeline conveyed sediments could be used to reinforce the complex bay shoreline through the construction of a discontinuous ridge in the nearshore. The ridge would be higher than marsh elevation, thus eliminating the need to achieve specific marsh elevations during placement. It would serve several functions including:

- Reduced erosion of existing and restored marshes by bay waves
- Habitat structure for nekton and avifauna
- Modulation of tidal flows through adjacent marshes

The design must be sensitive to the need for boat access into frequently used bayous and canals that intersect the bay shoreline. There is some uncertainty regarding the sustainability of such a feature but this new approach to restoration could be conducted in an experimental framework using the dredged material to build protective features in a variety of configuration and cross-profiles.

Artificial Levee Deconstruction and Shallow Infilling (blue dashed lines on Figure 3)
New material introduced into the area via pipelines could be used efficiently by combining placement with the deconstruction of existing dredged material levees. These levees currently alter marsh surface hydrology across much of the area and in some cases result in impoundments – which for the most part have degraded to very shallow open water. Pipeline conveyed material would be used to infill areas of loss adjacent to the levees and fill canals where possible. Crucial to the success of such material placement in re-creating marshes is the restoration of hydrology in the rebuilt areas by degrading or gapping the artificial levees. This would allow tidal exchange for improved habitat use and make the created marshes more sustainable through natural sedimentation processes. There are many opportunities for this approach within the area, several of which are outlined in Figure 3.

Strategic Marsh Rebuilding (green shading on Figure 3).
While not within the focus area, pipeline conveyance of sediment into the area provides opportunities for strategic rebuilding of marshes adjacent to Bayou Lafourche. A pipeline system constructed for bay rim reinforcement or natural ridge rebuilding could be extended to the west and used to create marshes in the lower Bayou Lafourche corridor. This element recognizes that moving the pipeline distribution system several times to deliver smaller amounts of material to many locations is easily designed for and will not affect cost as long as the need is anticipated prior to implementation. Strategic marsh creation would be locally associated with transportation infrastructure related to Port Fourchon. Marsh creation adjacent to the bank of Bayou Lafourche could provide more integrity to the channel itself while marsh creation adjacent to features of the new road and bridge system (e.g., on-off ramps) would reduce wave attack during normal weather conditions as well as storms. Once rebuilt, these marshes would be maintained by the increased flows down Bayou Lafourche and natural recirculation of sediments.

Restore Natural Ridges (brown lines of Figure 3)
Coupled with the rebuilding of marshes and improvement of marsh hydrology, is the need to reestablish the natural skeleton of the deltaic marshes. Pipeline conveyed material

would be used to build supratidal ridges. These ridges would provide habitat for wildlife and be important in wave energy reduction during major storm events. Their role in the landscape is to modulate the natural hydrologic regime once the artificial barriers have been removed (see #2). Ridge elevations can be high allowing them to survive as ridges even in the face of subsidence (natural ridge building occurs over centuries and is associated with delta development). Vegetation cover will provide some protection from wave erosion, although the use of sandy material to build these ridges, if available, would also increase their sustainability. One of the important issues to consider with this restoration approach is the likelihood that such ridges will be colonized by exotic species (i.e., Chinese Tallow). Different approaches to this issue could be encompassed in design and operation (e.g., planting natives, control of exotics, etc).

Research/Technology Needs

This area is close to the Gulf but also close to the Mississippi River mouth. The ambient salinity of waters varies with season according to wind forcing and the effect of the Mississippi River on coastal salinities. The impact of the 'transport' water used to slurry sediments and discharged within them during placement needs to be considered. This water is likely to be either fresher or more saline than the ambient salinity in the area depending on the source of dredged material (the River or offshore). The effects of this water on the local ecosystem should be explicitly considered in restoration planning.

Breakout Participants

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Paul O'Rourke, Jefferson Parish
Ancil Taylor, Bean Stuyvesant
Jim Tripp, Environmental Defense
Gene Turner, LSU
John Uhl, Jefferson Parish
Jenneke Visser, LSU

Concept Proposal for Lower River - Westbank

Area of Interest

This area of Plaquemines Parish has suffered severe marsh loss and extensive open water stretched from the hurricane protection levee in the north to the fragmented barrier shoreline in the south. Figure 4 shows the area considered during the workshop and some of the geographic locations mentioned in the text.

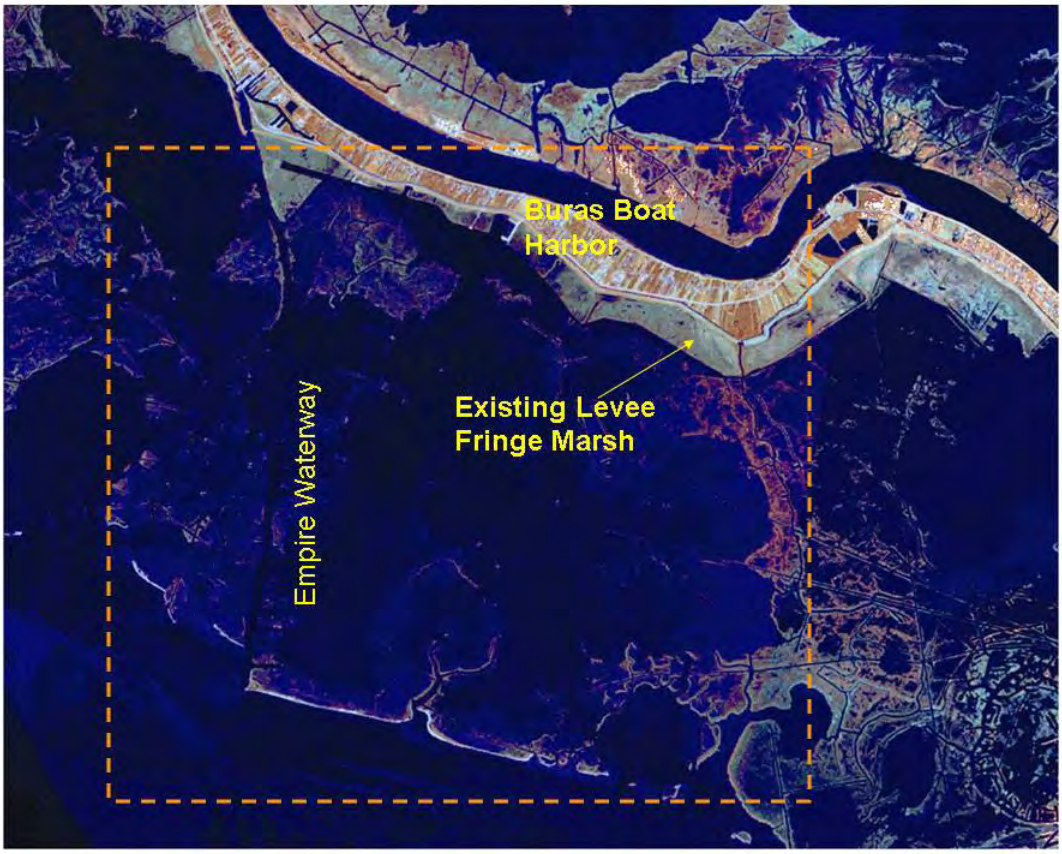

Figure 4. Lower River Westbank. The orange box indicates the area where workshop discussions focused.

Restoration Concept

The restoration concept for this area has three elements (Figure 5). The overall concept is that dredged material can be used to reestablish critical landscape features that provide habitat and protect infrastructure, while allowing for continuing harvest of oysters. All elements would use dredged material most likely from the Mississippi River but if sand resources offshore could be identified, this option should also be considered. In both cases, but especially for offshore sources, care must be taken to avoid increased shoreline erosion associated with a modified wave field over the borrow areas, and adverse effects on scarce shelf habitats at the borrow site. The effect of extensive dredging on hypoxia should also be considered. The three elements are described below.

Figure 5. The Conceptual Proposal. Yellow lines – reinforce barrier islands, green shading – levee fringe marsh, brown lines – reestablished ridges.

Reinforce Barrier Islands

Intact barrier islands are considered crucial in this area for their role in ecosystem restoration and in infrastructure protection. The dredged material would be placed on the existing fragments of the barrier islands with major passes being left open, albeit at a narrower width, to provide for tidal exchange. The new shoreline would be configured to protect any marsh restoration projects (e.g., those associated with diversions) in the inshore open waters, and to provide habitats intrinsic to barrier islands which are now becoming scarce in the region. These include habitat for neotropical migrants and other avifauna as well as fisheries species. The design of the project should also seek to reduce storm surge elevations at the hurricane protection levee and protect local infrastructure, including pipelines.

Levee Fringe Marsh

Dredged material can be used to establish a fringe of marsh, expanding on the existing framework, adjacent to the hurricane protection levee. Within the area, this is the location where marsh creation with dredged material would likely have least effect on the extensive productive oyster grounds in inshore open waters. This creation would most likely use material from the Mississippi River. The material would be contained during placement, to minimize effects on oysters, and the target would be near marsh elevation

with some creeks and channels. Marsh creation in this area would protect the levee itself from wave activity as well as some of the commercial facilities on the seaward side of the levee. The marshes could also assist with water quality improvements in the area, again a benefit to oysters, if some storm water and wastewater discharges were directed through the new wetland areas. Access to the Buras boat harbor would need to be maintained during and after the project.

Reestablish Ridges
Material would be placed in linear ridge features in locations of the former ridges of Scofield Bayou and English Bayou and adjacent to the Empire Waterway. The material would be placed to form a ridge ~ 150'wide. A flanking marsh apron would be formed adjacent to the ridge as the dredged material drains and is reworked by tides and waves. In the case of the Empire Waterway, the dredged material drainage flow would be directed away from the channel and navigation must be provided for during and after construction. The elevation of the ridge would be supratidal and there would be no specific goal for the adjacent area. The use of material with mixed grain sizes would allow natural sorting during the placement process. The ridges would not be continuous, but gaps should be scaled to provide for effective tidal circulation in the oyster grounds while minimizing possible export of sediments. The purpose would be to provide some ridge habitat for avifauna and wildlife while providing some hydrologic control to the extensive inshore open water areas. The ridges would reduce wave activity by breaking fetch and modulating tidal flows. The Bayou ridges may be extended beyond the current remnant topography (Figure 5), if their historic location can be located, to further reduce fetch within the open interior waters. There are potential synergies between this rebuilding of the skeletal framework and the rebuilding of marsh in the interior areas using diversions. The main goal of this project would be to restore hydrology and provide for oyster habitat. Small diversions into the area could be used to modulate salinities and improve ecosystem productivity.

Specific Research/Technology Needs
The following issues should be explored prior to construction in this area to assist in planning/design and potentially improve project performance:

Feeder berms may be a cost-effective way of maintaining barrier beaches once shoreline restoration is complete. This approach should be explored as part of the barrier island element.

The existing levee fringe marsh in this area was originally a 'spoil' disposal area. It is now a marsh. Studies should evaluate the past and current elevation of the substrate to assess how this area has changed over time and inform planning of new marsh creation in the area with dredge material.

Understanding the underlying geology of the area will be crucial to the placement of material for ridge features. Prior ridge formations as substrates would be more likely to support the loads associated with the newly placed material, reducing underlying compaction and allowing for more efficient use of the dredged material.

Breakout Participants
Pat Forbes, LA Governor's Office of Coastal Activities - Facilitator
Chris Alfonso, US Army Corps of Engineers
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Beverly Ethridge, US EPA
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Peter Smith, Waldemar Nelson
Rick Smith, Weeks Marine
Rachel Sweeney, NOAA Fisheries

Concept Proposal for Lower River - Eastbank

Area of Interest
This area in Lower Plaquemines Parish is at the limit of the east bank artificial river levee and there is exchange over and through the river bank in several areas. There are some remnant marshes within Breton Sound fringing the river which have low land loss rates and seem to be maintained by periodic inputs of sediment and freshwater from the river. The area is exposed to long wave fetch to the east. Cold fronts and tropical storms likely generate strong wave activity in the area. Water depths are variable but reach ~10 feet in areas.

Restoration Concept
Given the extensive open water in the area and the long wave fetches, the main use of pipeline conveyed dredged material in this area would be to improve the land building efficiency of a river diversion and trap any existing suspended sediments in the area. Both approaches would seek to retain suspended sediment within the area. This is especially important here as the Chandeleur Sound system includes the most extensive seagrass beds in Louisiana which may be adversely affected by massive sediment plumes from the river diversion. There are two alternative approaches:

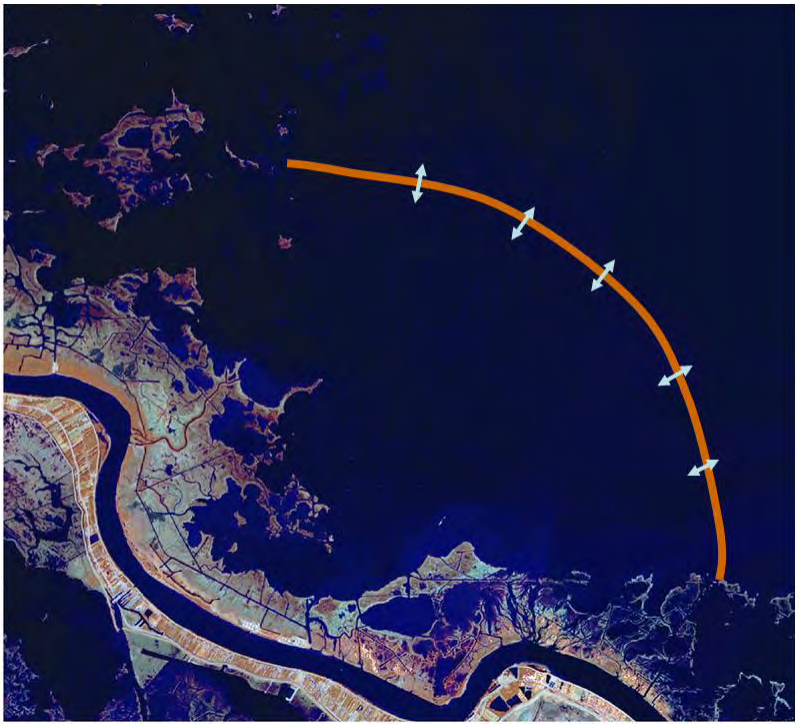

Figure 6. Leaky barrier concept.

<u>Alternative A. Leaky Barrier.</u>
This alternative uses pipeline conveyed dredged material to build barriers within the open bay to reduce wave activity. The concept is outlined in Figure 6. This will allow the

sediments currently coming from the river to settle out but will also enhance the sediment deposition and land building associated with a diversion. The barrier should be leaky and does not need to be at specific marsh elevation. Material could be placed in a ridge feature and side slopes would be determined by the drainage of the dredged material. The side slopes may or may not provide marsh habitat. The ridge itself would provide habitat for birds. Sheltered bay habitat behind the barrier would provide fisheries habitat even without marsh creation. The barrier should be wide enough that the outside margin of the barrier can be allowed to erode, rather than it requiring armoring at considerable expense. The feature should be designed to last only until the area behind is filled in by a diversion. The dimension and location of the leaky barrier would be determined by the size and operational scheme of a diversion into the area. The potential for wave regeneration behind the barrier would also need to be considered.

Alternative B. Advancing Barrier.

This alternative uses dredged material to initially build lower features closer to a diversion structure. As the area behind the structure becomes infilled, the pipeline would be moved to build a new set of structures further from the river. Thus the dredged material would be used in phases to provide some protection to the newly building delta as it progrades away from the source. The material would be placed at intertidal elevation, or slightly below, to form terraces or reef features that would aid in sediment trapping. The concept of phased advancing low barriers is shown in Figure 7.

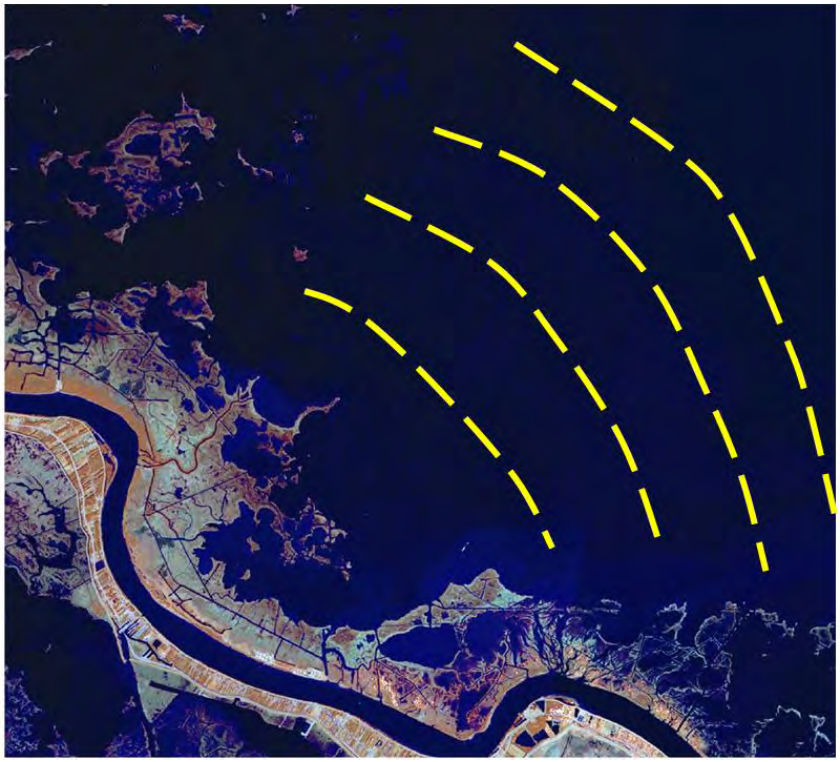

Figure 7. Progressively advancing low barriers.

Specific Research/Technology Needs
The area is close to the Mississippi River and the open water is relatively deep. This provides an opportunity for exploring novel approaches to dredged material conveyance and distribution. Sediment could be conveyed to the site using a combination of pipelines and barges which may allow for material to be brought in from as far as other states cost-effectively. Barges with manifolds or multiple outlets may be used to distribute the sediment.

Breakout Participants
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Rick Broussard, US Army Corps of Engineers
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John Marlin, University of Illinois
Greg Miller, US Army Corps of Engineers
Jay Norwood, Pipeline Systems, Inc.
Greg Steyer, US Geological Survey

Research and Technology Needs.

The development of the concept proposals led to the identification of a number of research and technology needs. Some of these were specific to the landscape configuration of the areas being considered, and they are included with concept proposals for the individual areas. Others were of more general application and are listed here.

Questions remain regarding the effects of massive sediment removal from the Mississippi River on river channel dynamics (e.g., reoriented flow directions and potential levee erosion). These must be explored prior to long-distance pipeline projects that rely on the River for sediment. Also, what is the likely volume and availability of sediment from the River?

Pipeline conveyance allows the import of sediment from outside the estuarine basins for use in ecosystem restoration. While this material could be used directly for project construction, an alternative approach is to use local material for projects and refill the borrow areas with the pipeline. The economic and ecological costs and benefits associated with both alternatives should be explored to maximize efficiency of sediment pipelines.

Dredged material placement projects that seek to achieve appropriate elevations for marsh vegetation and functioning channels for fisheries habitat, provide opportunities to explore the costs and ecological outcomes associated with the design features. Evaluations across a range of placement approaches would inform future marsh creation projects.

The identification of woody species that are salt tolerant would be important in ensuring that ridge features can provide the structure necessary for birds, and may be important in preventing invasion of new ridge features by invasive species.

Summary

The workshop demonstrated the variety of approaches to the use of dredged material and the importance of pursuing long-distance conveyance as a restoration measure. While challenges to implementation such as land rights and pipeline relocations are similar to those faced in most other restoration activities, the long-distance conveyance of material provides for benefits to be realized more quickly than with natural-process reliant solutions such as diversions.

The import of dredged material into degraded estuarine basins in coastal Louisiana can result in a variety of benefits. Importantly, the concept proposals include many ideas for the use of this material other than for direct rebuilding or renourishing of existing marshes. Commonly, proposals call for dredged material to be placed at elevation above the marsh plain to form ridge or berm features with the aim of reducing wave action on shorelines and re-establishing the hydrologic integrity of the areas of concern. In many cases such structural use of the material is combined with strategic rebuilding of marshes or with diversions where the structures aid in sediment retention and the more 'natural' accretion of marsh substrate.

The concept proposals outlined here, and the agenda for needed developments in research and technology, provide a firm basis for further exploration of long-distance conveyance. With concepts for specific areas in hand, additional efforts to identify sediment sources and begin preliminary designs can proceed. The broad based participation in the workshop, and the enthusiasm of the participants, demonstrates that this approach has a lot to contribute to the restoration of Louisiana's coast and that the concepts should be developed into projects for more detailed evaluation as soon as possible.

Acknowledgements

The workshop would not have been possible without the efforts of many people. Members of the Steering Committee were Earl Hayter (EPA), Len Bahr (LA Governors Office), Pat Forbes (LA Governors Office), Chris Knotts (LA Dept. Natural Resources), Benny Rousselle (Plaquemines Parish), Greg Miller (US Army Corps of Engineers), Rick Smith (Weeks Marine), Jim Tripp (Environmental Defense) and Ancil Taylor (Bean Stuyvesant). The productivity of the breakout groups was made possible by the efforts of the facilitators – Barbara Keeler (EPA), John Ettinger (EPA), Rusty Gaude (LSU Ag Center) and Pat Forbes. Sondra MacDonald (EPA) provided guidance on contracting. Laura Dancer (UNO) planned logistics and Justina Horan (UNO), Reggie Graves (UNO) and Mark Ford (UNO) took notes and assisted in preparation.

All participants are thanked for the time and enthusiasm they devoted to the workshop, the breakouts and the report preparation.

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ATTACHMENT A

Final Workshop Agenda

Workshop on Large Scale Restoration Using Pipeline Conveyance of Dredged Material

8th September 2004
University of New Orleans, Lindy C. Boggs Conference Center, Room 256

8.00 am Registration

8.30 am Welcome and Introductions
Workshop Purpose and Structure (Reed)

9.00 am Invited Presentation
"Beneficial Use of Dredged Material in the New Orleans District:
Opportunities and Limitations"
Linda Mathies and Ed Creef (USACE)

9.30 am Panel Discussion
Topic: Issues Surrounding Ecosystem Restoration Using Pipeline Conveyance
Panelists: Ancil Taylor, Bean Stuyvesant
Lawrence Rozas, NOAA Fisheries
Jon Porthouse, Louisiana Department of Natural Resources
Andrew MacInnes, Plaquemines Parish

10.15 am Introduction to breakout sessions

10.30 am Break

10.45 am Breakout sessions
Eastern Terrebonne (Yellow) – Room 204
SW Barataria (Red) – Room 205
Lower River Westbank (Green) – Room 206
Lower River Eastbank (Black) – Room 256

Noon Working lunch
Breakout sessions continue until 2.45 pm

2.45 pm Break

3.00 pm Reconvene in Room 256 for Breakout Reports
Each group will report on their conceptual plans for restoration in their respective area.

4.15 pm Closing remarks.

4.30 pm Workshop adjourns.