

Beneficial Use of Sediments from Dredging Activities in the Gulf of Mexico

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ABSTRACT

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Dredging activities are a potential source of sediment and should be considered in any conservation and restoration planning process. Wise use of sediment resources from dredging is integral to accomplishing the conservation and restoration initiatives and objectives being recommended under the Gulf of Mexico Alliance. Keeping dredged sediments within the natural system or using it in the construction of restoration projects can improve environmental conditions, provide storm damage protection, and contribute to habitat creation and restoration goals. Hundreds of millions of cubic yards of sediments are dredged each year from Gulf ports, harbors, and waterways, much of which could be used beneficially. Currently it is estimated that about 30% of all material dredged from federal channels in the Gulf states is used beneficially and very little of the privately funded dredging is used for beneficial purposes. The U.S. Army Corps of Engineers (USACE) conducts dredging under its navigation maintenance program and much of the dredging conducted is typically done on a scheduled and routine basis. Successful planning of beneficial-use projects utilizing USACE dredging necessitates the early coordination and work of multidisciplinary interagency teams on a regular basis. There is also a need to improve data access and management for dredging activities for use by project managers and planners.



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INTRODUCTION

A collaborative partnership has been instituted through the Gulf of Mexico Alliance (GOMA) among the five Gulf of Mexico states to enhance the ecological and economic health of the Gulf of Mexico. Efforts associated with this partnership have recognized that sediment resources are critical to accomplishing many of the GOMA conservation and restoration initiatives and objectives. As a result, the GOMA's Gulf Regional Sediment Management Master Plan (GRSMMP) development was initiated for managing this valuable resource and it highlighted the need for a comprehensive understanding of regional sediment systems and processes. The intent of the plan was to establish guidelines using the understanding of sediment dynamics (inputs, outputs, movement) to manage sediment resources toward accomplishing environmental restoration and habitat creation while enhancing the abilities of the GRSMMP users to make informed, cooperative management decisions.

The GRSMMP recognizes that sediments from dredging activities can be managed beneficially by combining restoration and conservation efforts with dredging projects. Throughout the Gulf of Mexico, hundreds of millions of cubic yards of sediment are dredged from various ports, harbors, and waterways to maintain and improve the navigation

system for commercial, national defense, and recreational purposes (EPA/USACE, 2007). The U.S. Army Corps of Engineers is the nation's largest dredger through its Civil Works dredging program. The USACE and U.S. Environmental Protection Agency (EPA) have regulatory responsibility for disposal of dredged material that occurs in the waters of the United States (Engler *et al.*, 1988) and this authority originates from Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. Dredged sediments are typically placed into preauthorized confined disposal facilities or within the waters of the Gulf and adjacent rivers, wetlands, and estuaries. Growing scientific and engineering knowledge of using dredged material as a valuable resource has emphasized the practice of beneficially using dredged material as a viable option to traditional dredged material disposal options for many projects. It has been realized that dredged material can be used beneficially for a variety of applications that include habitat creation and restoration opportunities. Using dredged material from navigation channels can offset the need to mine or import sand or soil from other areas. Of the millions of cubic yards of material dredged within U.S. waters, approximately 20% is disposed of in ocean waters; 80% is disposed of or placed through other means in estuarine or freshwaters, or upland or other areas; and approximately 30% of material placed is used for beneficial purposes (EPA/USACE 2007).

In a report prepared by the USACE and EPA (USACE/USEPA 2004), a framework is provided for dredged material management, which includes the assessment of reasonable

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open-water disposal, confined disposal, and beneficial use (BU) alternatives. This document recommends that BU options be given full and equal consideration to other dredged material disposal alternatives. Additionally, it is USACE policy to fully consider all aspects of the dredging and disposal operations with a view toward maximizing public benefits (USACE/USEPA 2004). The framework recommends BU alternatives evaluation that considers (1) BU needs and opportunities, (2) logistical considerations, (3) physical suitability of the dredged material, and (4) environmental suitability of the placement area.

The USACE contracts the dredging of well over 100 million yd³ of sediments annually from federal navigation channels throughout the Gulf states (USACE 2011). In Louisiana alone, 60–90 million yd³ of material are removed from federally maintained navigation channels on an annual basis (NOAA 2000). Although the amount of dredged material used beneficially varies from year to year the USACE estimates that 20 to 30% of the total volume dredged is currently used beneficially, with very little of the privately funded dredging being used for beneficial purposes (EPA/USACE 2007). Getting a single BU project through the planning, engineering, permitting, funding, and construction processes can take years depending on the issues that have to be overcome. Statutory authorities, federal policies, and funding constraints are often cited as obstacles to performing more BU within the Gulf states. Other requirements that take time and resources include regulatory clearances such as National Environmental Policy Act, Clean Water Act Section 404/401, Endangered Species Act, *etc.*, as well as potential real estate and rights-of-way issues that have to be resolved before the planned placement of dredged material at any site.

Federal dredging activities are typically planned 2 to 3 years in advance, which could allow project managers to plan for corresponding BU of dredged sediments. Maximizing BU opportunities is also complicated by the realities of dredging activity schedules and knowing when and where suitable material will be available. However, this type of information is not consistently maintained or easily accessible by those searching for sources of sediment, which emphasizes the need to improve data access for dredging activities and provide ways to better manage such information. Therefore, successful planning of a BU project necessitates the early coordination and work of multidisciplinary interagency teams on a regular basis.

Beneficial Use of Dredged Material in the Gulf

Much of the millions of cubic yards of sediment dredged each year from Gulf ports, harbors, and waterways could be used beneficially to achieve the GOMA habitat creation and restoration initiatives and objectives, as well as for the implementation of other environmental applications. Yet much of the dredged material is disposed of in open ocean disposal areas, confined disposal facilities, and upland disposal facilities. The most commonly cited hurdles to BU of the dredged material are: (1) increased costs; (2) the need for earlier planning and coordination; (3) lack of complementary federal and state regulatory frameworks for evaluating

dredged material as a resource; and (4) a widespread misperception that dredged material is a waste product or pollutant to be discarded instead of a resource.

In the past 20 years, Congress has provided new legislative authorities and funding that enable and encourage USACE to pursue BU opportunities, particularly habitat restoration projects, on a much wider scale. The BU of dredged material embraces the idea that this material can be used in a manner that will benefit society and the natural environment. Linking dredged material placement needs with BU can be most practical, cost effective, and environmentally advantageous when BU planning is integrated with watershed planning processes and regional strategies for managing sediment resources. In such efforts, BU of dredged material can be a management tool that supports watershed plans and other regional goals.

Dredged material can be used beneficially for a variety of applications as described on the beneficial uses website (<http://el.erdc.usace.army.mil/dots/budm/budm.cfm>) and by USACE (2006). Of the applications described, of particular interest to the GOMA initiatives are: (1) habitat restoration and development: using dredged material to build and restore wildlife habitat, especially wetlands or other water-based habitat (*e.g.*, bird-nesting islands and offshore reefs); (2) beach nourishment: using dredged material (primarily sandy material) to restore beaches subject to erosion; and (3) multiple-purpose activities: using dredged material to meet a series of needs simultaneously, such as habitat development, recreation, and beach nourishment, which all might be supported by a single BU project.

When identifying potential BU opportunities for dredged material, it is important to evaluate the suitability of the dredged material in question for a given use (Brandon and Price, 2007). In general, clean, coarse-grained sediments (sands) are suitable for a wide range of BU. However, there are also specific needs for fine-grained sediments as they can be suitable for more limited uses such as wetlands creation or thin layer placement to restore elevations in a subsiding marsh. Although BU projects provide opportunities for broad public benefit, as well as more efficient resource use, there are nevertheless potential challenges to their application. Project costs and logistical issues are often the biggest challenges.

The success of BU projects depends on the creation of partnerships between federal and nonfederal interests. Each of the USACE's BU funding authorities includes a requirement for nonfederal cost sharing of a minimum of 25% for incremental costs. Therefore, BU projects require local leadership and local financial commitments to succeed and this leadership often comes from either the economic development or environmental communities.

Successful projects are most often developed through collaborative and consensus-building planning processes involving USACE, EPA, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and the ports, as well as state and local resource and regulatory agencies and environmental interest groups. The USACE's dredged material management planning program can be the framework for these efforts. There are differences between the Gulf-based USACE districts as to how they coordinate their

annual Operations and Maintenance dredging plans. For example, Galveston and New Orleans districts conduct annual dredging conferences, and Mobile District works to inform state interests through periodic interagency meetings. In Mississippi, a Beneficial Uses Group meets on a monthly basis to discuss dredging activities and BU opportunities. However, none of these efforts is designed to have interagency teams specifically look at the USACE's dredging needs for the next three fiscal years and identify potential BU projects.

Beneficial Use Process

The typical process to identify potential BU projects starts with the preparation of a USACE reconnaissance study to determine if there is a federal interest in a dredging project. Once a federal interest has been determined, the USACE conducts a feasibility study to identify a recommended plan for dredging of a navigation channel and a dredged material management plan (DMMP). These plans address dredging needs, disposal capabilities, capacities of disposal areas, environmental compliance requirements, the potential for BU of dredged material, and indicators of continued economic justification. In the Gulf, most navigation channels have an already completed feasibility study and the projects have already been authorized by Congress. However, because of the anticipated needs, many Gulf ports and navigation districts have recently been seeking channel-deepening and -widening projects, which require new feasibility studies and Congressional authorizations.

As mentioned previously, hundreds of millions of cubic yards of sediment are dredged from various ports, harbors, and waterways to maintain and improve the navigation system for commercial, national defense, and recreational purposes (EPA/USACE 2007) with an estimated 30% of the material being used for BU projects. Typically, getting a single BU project through the process can take anywhere from 3 to 6 years and sometimes longer depending on issues such as regulatory, real estate, or engineering feasibility that have to be overcome. Statutory authorities, federal policies such as the USACE's Federal Standard, lack of federal or nonfederal funding, and federal funding restrictions are often cited as obstacles to performing more BU within the five Gulf states. Other requirements that take time and resources include regulatory clearances such as National Environmental Policy Act, Clean Water Act Section 404/401, Endangered Species Act, *etc.*, as well as potential real estate and rights-of-way issues, which have to be resolved before the planned placement of dredged material at any site.

Ideally, environmental restoration projects should be identified through interagency coordination meetings held specifically to identify BU of dredged material opportunities associated with the maintenance of federally maintained navigation channels. For example, in response to the President's Roadmap for Restoring Ecosystem Resiliency and Sustainability dated March 2010, interagency roundtable meetings were conducted in both Louisiana and Mississippi during May of 2010, specifically to coordinate with the USACE on its upcoming annual Operations and Maintenance dredging activities and to identify opportunities, priorities,

and available funding with the goal of increasing the amount of dredged material that is used beneficially. The roundtable meetings were widely attended by federal, state, and local sponsor partners. Additionally, the meetings were used to identify limitations, constraints, policies, and funding sources that effect the implementation of BU of dredged material projects.

The Louisiana roundtable effort successfully identified BU projects that could potentially result in 2380 acres of newly created wetlands, at a total cost of \$55.1 million (joint USACE-state). Incremental costs for BU projects identified for fiscal year 2011 were estimated at over \$27 million with an additional \$12 million worth of preliminary projects identified for the proposed fiscal year 2012 dredging cycle. In Mississippi, the roundtable effort successfully identified six new potential BU opportunities that would require additional coordination. These roundtable efforts clearly demonstrated the benefits of interagency coordination meetings between the USACE Gulf-based districts and other federal and state agencies, as well as the local sponsors, to proactively identify and plan potential future BU opportunities. The model that was developed demonstrates the need to institutionalize the use of interagency roundtables across the USACE Gulf-based districts as a means to increase the BU of dredged material through increased visibility of project opportunities. This process also serves to increase the ability of the participants to identify opportunities for BU of dredged material.

After a potential BU (USACE/USEPA 2004) opportunity has been identified, successful planning of a project necessitates the early coordination and work of multidisciplinary interagency teams, commonly referred to as an interagency coordination team (ICT), to accomplish ecosystem restoration in the Gulf. An ICT is typically a team of federal and state agency representatives, as well as representatives of the local project sponsor, who work with the USACE throughout the project's life to address the: (1) plan formulation, (2) engineering and construction, (3) environmental compliance, (4) monitoring, (5) maintenance, and (6) management processes to strengthen and streamline the development and implementation of the project.

The use of formalized ICTs in some USACE districts, such as Galveston, has been very successful and has become the standard model for planning projects, which include BU projects; in other Gulf Coast USACE districts, there has been successful BU implementation; however, the establishment of formal ICTs are not quite as prevalent. Keys to successful use of ICTs include: (1) forming the ICTs very early in the reconnaissance (preferable) or feasibility planning stages to allow the multidisciplinary interagency teams to assist the USACE in formulation of alternatives to be studied, as well as studies needed for environmental compliance; (2) a commitment by the federal and state resource agencies, as well as the local project sponsor, to determine how best dredged material can be beneficially utilized; (3) agreement among the participants on a clear statement purpose to guide the group's efforts, coupled with a shared understanding of the intent underlying that purpose; (4) agreement that the participation in development of a BU plan by the participating agencies would not constitute an endorsement of the proposed project

by those agencies individually or collectively. In other words, the ICT is an interagency group actually developing a locally preferred disposal plan, rather than reviewing a proposal in a regulatory setting. When developed, the BU plan would be reviewed in the context of all the key environmental issues being addressed under the National Environmental Policy Act, as well as the other federal and state regulations; (5) development of both a process and clear criteria by which to select BU projects that balance public desires, environmental concerns, and engineering considerations; (6) willingness by the local sponsor or some other party to step forward and fund additional necessary preconstruction studies not provided for in the USACE budget and a commitment to bear the incremental costs of a BU plan; (7) commitment of the team members to bring other technical expertise from within their respective agencies as needed to assist in the development and oversight of the scopes of work for the studies deemed necessary for the evaluation of the project's impacts; (8) implementation of a well-defined program to solicit BU suggestions on the basis of identified sediment needs from various stakeholders and user groups and to coordinate back with those groups to let them know how their collective ideas were given full consideration during the development of the recommended BU plan (Swafford and Gorini, 1993).

The USACE does have the authority to periodically review their dredging programs for existing projects and conduct the necessary studies to complete a revised DMMP as required under USACE policy (EC -1165-2-200). The policy requires that each of its districts prepare a DMMP for maintaining federal navigation channels for at least 20 years. The ICTs are also often used in the development of DMMPs to identify: (1) BU opportunities within and above the federal standard; (2) additional studies or information needs to complete the required regulatory clearances; (3) potential real estate and rights-of-way issues; and (4) potential funding sources to pay for the incremental costs above the Federal Standard.

Engineering Regulation 1105-2-100 (USACE, 2000) for the USACE provides the requirement for the DMMP preparation of, as follows:

Dredged material management planning for all Federal harbor projects is conducted by the Corps to ensure that maintenance dredging activities are performed in an environmentally acceptable manner, use sound engineering techniques, are economically warranted, and that sufficient confined disposal facilities are available for at least the next 20 years. These plans address dredging needs, disposal capabilities, capacities of disposal areas, environmental compliance requirements, the potential for beneficial use of dredged material, and indicators of continued economic justification. The Dredged Material Management Plan shall be updated periodically to identify any potentially changed conditions.

The actions and strategies set forth in a DMMP provide for the management of dredged material for a minimum period of 20 years, while allowing for updating and redefining the base plan/Federal Standard for the project. As such, DMMPs are critical for revising the expectations for BU under existing

USACE Operations and Management responsibilities, as well as defining how additional resources must be brought to bear to accomplish BU within the Federal Standard and above the Federal Standard. Developing DMMPs additionally serve as the groundwork for a more comprehensive regional sediment management planning efforts, which hold the promise of helping achieve much more cost-effective management of sediment resources for both ecological and economic benefit.

Dredging Information

To successfully sustain and enhance coastal ecosystems in the Gulf of Mexico, a broad sediment management effort is needed that may include large-scale diversions, dedicated (sediment) dredging, BU of material dredged from channel maintenance, and other means of capturing all available sediment resources. One of the most important considerations for dredged material managers is advanced knowledge of when suitable material will be available. Maximizing BU opportunities is also very often complicated by the realities of dredging activity schedules, because the lead time necessary for planning for a new BU opportunity is often incompatible with the contracting and implementation of the dredging itself. BU opportunities are very often missed as a result of funding limitations, frequent last-minute appropriations, and short-term decision-making on site-specific dredging activities. These activities often take many months and sometimes many years to accomplish. Ideally, federal dredging activities would be known several years in advance, which would allow managers to work through the details of planning for corresponding BU of that dredged sediment. The fact that USACE's dredging is conducted under its navigation maintenance program means that much of maintenance dredging is typically done on a scheduled and routine basis, which would feed very nicely into an annual interagency roundtable format for identifying potential BU projects. Consequently, increasing the use of interagency roundtable meetings through a formalized process is needed to foster improved communication and project planning between the federal and state agencies, local sponsors, stakeholders, and the interested public working to restore the Gulf of Mexico.

To maximize BU opportunities, necessary details include at a minimum: (1) identifying potential BU sites; (2) coordinating BU opportunity with dredging activities; (3) completing all environmental and regulatory clearances; (4) acquiring real estate or land use easements; (5) resolving resultant ownership issues; (6) permitting BU sites; (7) securing funding; and (8) coordinating availability and staging of necessary infrastructure.

Currently, information on the USACE's dredging is not consistently maintained or easily accessible; consequently there is a need to provide improved data access and management for dredging activities and ways to better manage such information using a database approach that would be accessible to managers and planners. In an effort to begin assembling this type of information, the four Gulf-based USACE districts began compiling information pertaining to USACE dredging projects to create a database of federal dredging activities at all federal navigation projects around

the Gulf. This information was subsequently entered into a database with the intent that it be accessible to those who are planning and managing restoration projects within the vicinity of federal projects. Initially, the type of dredging information identified for population of the database included: (1) project name and location; (2) volume of sediment typically dredged; (3) nature of sediment (sand, silt, clay, *etc.*); (4) associated placement areas; (5) typical dredging schedule; (6) existing BU; (7) tracking of private and local dredging activities through dredging company records, regulatory processes, *etc.* It has been recommended that such a database should also include more information on BU and beach nourishment projects, sources, and volumes of material. Other additional information that would be helpful to include in the database includes dredging windows, contaminant information, shoreline restoration activities, and links to survey data. It is also suggested that the database be expanded to include private dredging activities. The database can be accessed at the following website: <http://rsm.sam.usace.army.mil/projects/index.asp>.

Because of the recognition for the need to compile and manage dredging information, the USACE is developing a more comprehensive dredge information database. CE-Dredge is currently under development and is a collaborative effort between the U.S. Army Engineer Research and Development Center and the USACE Mobile District. CE-Dredge focuses on data, tools, and applications for the planning and management of USACE dredging operations, and follows the fundamentals and architecture established for the eCoastal program. Through access to dredging-related information and databases, the program will provide a standard dredging data management plan and data storage solution for all types (spatial and nonspatial) of related data sets. Similar to eCoastal, the CE-Dredge program will provide customized tools and applications designed and deployed to assist users in performing tasks relative to managing dredging operations. A CE-Dredge workgroup has been established to provide guidance in identifying pertinent information, data, and applications to meet USACE's needs and to allow BU project sponsors to take advantage of this predictability. Additional information and links pertaining to CE-Dredge will be incorporated into this document as development progresses.

Summary and Recommendations

Sediment resources are integral to and a critical resource necessary in accomplishing conservation and restoration initiatives and objectives being recommended under the GOMA. Sediment from dredging activities is a potential source of sediment that can be managed beneficially by combining restoration and conservation efforts with dredging projects. With the USACE dredging of well over 100 million yd³ of sediments annually from federal navigation channels throughout the Gulf states, this dredged material is a potential source of sediment that should be considered in conservation and restoration planning processes. Much of the millions of cubic yards of sediment dredged each year from Gulf ports, harbors, and waterways could be used beneficially to achieve the GOMA

conservation and restoration initiatives and objectives as well as for the implementation of other environmental applications. However, it's estimated that about 30% of all material dredged from federal channels is used beneficially and there are many issues that need to be overcome to maximize BU opportunities. Therefore, successful planning of a BU project necessitates the early coordination and work of multidisciplinary interagency teams on a regular basis. The fact that USACE's dredging is conducted under its navigation maintenance program means that much of maintenance dredging is typically done on a scheduled and routine basis; however, this type of information is not always accessible. Consequently, there is a need to provide improved data access and management for dredging activities and ways to better manage such information using a database approach that would be accessible to managers and planners. Given the information presented in this paper the following are some recommendations for when dredged materials are being considered as a potential resource for restoration activities: (1) dredged material should be promoted as a valuable resource, not spoil, disposal material, or waste; (2) when dealing with a dredging project, reporting requirements in a regulatory process should be levied to track actual dredging activities; (3) develop information on how state Coastal Zone Management programs/USACE regulatory track dredging activities. Develop recommendations for minimum reporting requirements needed to adequately track dredging activities; (4) dredging projects should be included in the sediment sources inventory process; (5) when utilizing dredged material, project managers should coordinate with local sponsors/stakeholders to acquire needed easements, rights of ways, *etc.*; (6) include dredged material in restoration planning process as potential borrow alternative; (7) promote most beneficial disposal practices, even if not being used as borrow for a specific project; (8) consider placement alternatives that would keep dredged sediment within the natural system; (9) develop emergency use plan toward proactive permitting and environmental coordination; (10) states should cooperate in the CE-Dredge workgroup to expand linkage into other dredging databases; (11) the Port Authorities should be included in the BU of dredge material management and planning; (12) gather data on cost of dredging and disposal for consideration when planning restoration activities; (13) gather information on Corps civil works *vs.* regulatory project processes, reporting, *etc.*, in the different Gulf states; (14) ports and navigation districts may have valuable data on private dredging activities that utilizes their disposal areas (DAs); (15) Ocean Dredged Material Disposal Site (ODMDS) Site Management and Monitoring Plans may be a useful source of data; (16) organize and participate in annual dredging conferences to lay out schedules, identify potential sediment sources, coordinate activities, regulatory processes, *etc.*, for distinct geographical areas.

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