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DREDGED MATERIAL RESEARCH. NOTES, NEWS, REVIEWS, ETC., VOLUME D--ETC(U)
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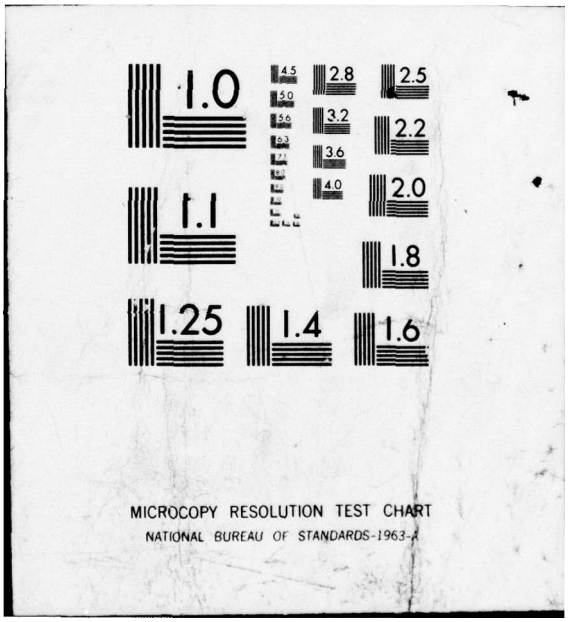
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DREDGED MATERIAL RESEARCH.

U. S. ARMY CORPS OF ENGINEERS
INFORMATION EXCHANGE BULLETIN

Vol D-76-8
Dec 1976

NOTES · NEWS · REVIEWS etc

Volume D-76-8.

The major section in this note describes work unit 4E02,

IS HABITAT DEVELOPMENT FEASIBLE ON SUBMERGED DREDGED MATERIAL DEPOSITS? Work Unit 4E02, part of the Dredged Material Research Program (DMRP) Task 4E, is designed to test the efficacy of establishing seagrass meadows on dredged material placed in subtidal situations. As a part of 4E02, shoal grass was transplanted from one location in St. Joseph Bay, Florida (above), to a barren dredged material substrate nearby. The following article describes newly initiated Task 4E: Aquatic Habitat Development. Also included is a brief discussion of (cont'd on p. 4)

TASK 4E: AQUATIC HABITAT DEVELOPMENT

Aquatic habitats, some of which are among the most productive biological communities on earth, are often influenced by dredging and disposal operations, and the potential for both the creation and the destruction of these habitats is recognized. Several types of aquatic habitats, such as clam flats and oyster beds, have great importance as a source of highly priced consumer products. Others, such as seagrass meadows or grassbeds, provide a source of food and cover essential to sport and commercial fisheries.

The Habitat Development Project of the DMRP initiated Task 4E, Aquatic Habitat Development, in an effort to evaluate the impacts of dredging and dredged material disposal on aquatic habitats and to explore the feasibility of habitat development on submerged dredged material deposts. The concept behind aquatic habitat development is that elevating the bottom of a water body can increase light penetration to the bottom and potentially increase the productivity of organisms utilizing the substrate. Raising the bottom level could concurrently provide for the disposal of a large volume of dredged material. The concept appears particularly appealing for harbor deepening projects or similar situations where large volumes of material must be disposed, a relatively deep water disposal area is available, and where changes in hydrography will not adversely affect tides and currents.

Since aquatic habitats represent a large array of biological communities and systems, it was decided to concentrate on one of the most important, the seagrass meadows. These systems border many coastal areas in the United States. The value of seagrass communities to coastal marine environments is not fully understood; however, it is known that they represent a major component of the coastal ecosystem. Grassbeds are highly productive, provide essential habitat for a wide diversity of organisms, supplement the detrital food chain in estuaries, trap sediments, and stabilize substrates.

As part of Task 4E, two work units have been initiated to provide information on seagrasses and to test the efficacy of establishing seagrass meadows on dredged material placed in subtidal situations. The Habitat Development Project is managed by Dr. Hanley K. "Bo" Smith. Dr. Luther F. Holloway is the manager of Task 4E.

Work Unit 4E01

A contract with the University of Virginia, Charlottesville, Virginia, will provide a "Literature Survey of Seagrass." This work was initiated in September 1976 and will serve to compile pertinent literature on five grassbed plants: turtle grass *(Thalassia testudinum)*, eelgrass *(Zostera marina)*, shoal grass *(Halodule spp.)*, manatee grass *(Syringodium filiforme)*, and widgeon grass *(Ruppia maritima)*. Details of the 8-month study, headed by Dr. J. C. Zieman of the Department of Environmental Sciences, are given in Table 1.

Table 1
LITERATURE SURVEY OF SEAGRASS

Subject	Description of Study
Substrate	Grain size and chemical composition of sediments associated with the grassbed species of interest
Water quality	General water-quality parameters (such as turbidity, salinity, and nutrient status) characteristic of various seagrass communities
Depth	Depth at which each species grows with particular attention to apparent optima for each species
Productivity	Plant productivity of each species
Colonization	Seagrass colonization of bare areas
Energy	Survey of the locations at which seagrasses have been studied and any measurements that have been made of related physical energies, such as waves, tidal currents, or sediment transport
Propagation	Emphasis will be placed on information available on types of propagules and their acquisition, handling and storage, planting methods, stability of new propagules in sediments, seasonal constraints, and hormonal or fertilizer treatments
Tolerance to disturbance	Review the impacts of chemical pollutants, dredging and disposal operations, winds and storms, and other perturbations
Monitoring	Methods that have been used for measuring attributes of seagrass beds will be compiled from the literature. Particular emphasis will be placed on the measurement of those parameters that are most important in seagrass establishment

A limited field investigation of blowouts in seagrass beds will also be conducted. These areas represent holes in beds that are often deteriorating on one side while new plants are growing into the opposite side. Soil parameters will be monitored to help determine the factors which cause blowouts.

Work Unit 4E02

During August 1976, work began on "Grassbed Development, St. Joseph Bay, Florida." The work is

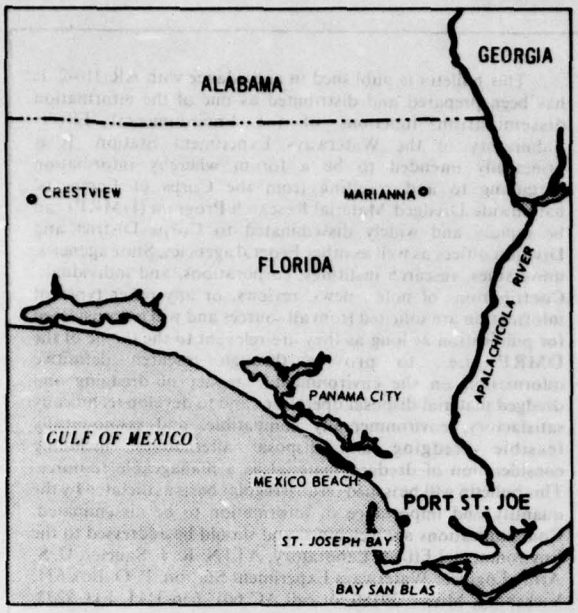

Figure 1. Location of St. Joseph Bay, Florida

Figure 2. PVC coring device being used to remove plugs of shoal grass

Figure 3. Plugs of shoal grass for transplanting onto dredged material substrate

being conducted by Dr. Ronald Phillips of Bellevue, Washington, on dredged material placed at the entrance of the Gulf County Canal into St. Joseph Bay (Figure 1).

Shoal grass *(Halodule beaudetti)* was selected as the seagrass species for transplantation on the site due to its ability to rapidly colonize barren substrates. Plants were removed from a heavily vegetated grassbed in nearby St. Joseph Bay using a coring device consisting of a 6-in.-diam PVC pipe that had been sharpened at the bottom (Figure 2). A typical transplant is shown in Figure 3. The plants were then placed in plastic containers and delivered to the planting site in a boat. At the transplantation site, holes were dug in the dredged material and the plugs of shoal grass were emplaced (Figure 4). Plants were placed at spacings of 3, 6, and 9 m in order to determine the most efficient spacing for transplantation (Figure 5).

Monitoring of the project will consider survival, growth, and spread of shoal grass on the site through the spring of 1977.

Figure 4. Plugs being planted into sandy dredged material

Figure 5. Dr. Ronald Phillips, principal investigator, inspecting plants planted on 3-m centers

NEW DMRP PUBLICATIONS

Palermo, Michael R. and Zeigler, Timothy W., "Feasibility Study for Dyke Marsh Demonstration Area, Potomac River, Virginia, Technical Report D-76-6, November 1976, Environmental Effects Laboratory, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

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Coastal Zone Resources Corporation, "Identification of Relevant Criteria and Survey of Potential Application Sites for Artificial Habitat Creation," Contract Report D-76-2, Volumes I and II, prepared for the Environmental Effects Laboratory, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

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NOTE: Copies of the above reports will be furnished to individual requestors as long as supplies last. Since it is only feasible to print a limited number of copies, requests for single rather than multiple copies by a single office will be appreciated. Please address all requests to the Waterways Experiment Station, ATTN: Ms. D. P. Booth. When supplies are exhausted, copies will be obtainable from the National Technical Information Service, 5205 Port Royal Road, Springfield, VA 22151.

This bulletin is published in accordance with AR 310-2. It has been prepared and distributed as one of the information dissemination functions of the Environmental Effects Laboratory of the Waterways Experiment Station. It is principally intended to be a forum whereby information pertaining to and resulting from the Corps of Engineers' nationwide Dredged Material Research Program (DMRP) can be rapidly and widely disseminated to Corps District and Division offices as well as other Federal agencies, State agencies, universities, research institutes, corporations, and individuals. Contributions of notes, news, reviews, or any other types of information are solicited from all sources and will be considered for publication as long as they are relevant to the theme of the DMRP, i.e., to provide—through research—definitive information on the environmental impact of dredging and dredged material disposal operations and to develop technically satisfactory, environmentally compatible, and economically feasible dredging and disposal alternatives, including consideration of dredged material as a manageable resource. This bulletin will be issued on an irregular basis as dictated by the quantity and importance of information to be disseminated. Communications are welcomed and should be addressed to the Environmental Effects Laboratory, ATTN: R. T. Saucier, U. S. Army Engineer Waterways Experiment Station, P. O. Box 631, Vicksburg, Miss. 39180, or call AC 601, 636-3111, Ext. 3233.

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apparent that an understanding of the potential for ecological harm from the discharge of dredged or fill material into wetland and aquatic areas requires substantial state-of-the-art improvement in a number of fundamental technological areas. Therefore, such state-of-the-art improvements were included in appropriate DMRP tasks and work units and already have provided the basis for the evaluation procedures as well as the discussions of the applicability and limitations of test results in the Interim Guidance. Contributing DMRP tasks, primarily those in the Environmental Impacts and Criteria Development Project, are listed in Table 1. The appropriate tasks are listed with the respective evaluation category from the *Federal Register*.

The Interim Guidance, however, is not intended to establish standards or rigid criteria and should not be interpreted in such a manner. Therefore, the document attempts to provide a balance between the technical state-of-the-art and routinely implementable guidance for using the procedures specified in the *Federal Register* and is expected to provide a continuity among the Corps Districts' and the EPA's evaluation program for Section 404 permit activities.

The Interim Guidance is particularly important in forming a foundation to be augmented by more meaningful and comprehensive evaluation procedures and guidelines as these evolve from current and future DMRP and EPA environmental research. Interagency coordination of the respective programs and development of a joint agency procedures manual is currently being implemented by the EPA/CE Executive Committee on Criteria for Dredged and Fill Material. It is anticipated that the Interim Guidance will be updated routinely through this interagency committee as new and more implementable evaluation procedures are developed and verified. The Interim Guidance will remain in effect until publication of the joint agency procedures manual.

Table 1

DMRP TASKS PROVIDING SIGNIFICANT INPUT TO THE INTERIM GUIDANCE

Evaluation Category*	DMRP Task	
PHYSICAL EFFECTS		
Wetlands Evaluation	4A	Marsh Development
Water Column Effects	1A	Aquatic Disposal Field Investigations
	1D	Effects of Dredging and Disposal on Aquatic Organisms
Benthic Effects	1A	Aquatic Disposal Field Investigations
	1D	Effects of Dredging and Disposal on Aquatic Organisms
CHEMICAL-BIOLOGICAL INTERACTIVE EFFECTS		
Water-Column Effects		
Elutriate test	1C	Effects of Dredging and Disposal on Water Quality
	1E	Pollution Status of Dredged Material
	2D	Confined Disposal Area Effluent and Leachate Control
Mixing zone	1A	Aquatic Disposal Field Investigations
	1B	Movements of Dredged Material
	1E	Pollution Status of Dredged Material
Bioassay	1D	Effects of Dredging and Disposal on Aquatic Organisms
	1E	Pollution Status of Dredged Material
Effects on Benthos	1A	Aquatic Disposal Field Investigations
	1B	Movements of Dredged Material
	1D	Effects of Dredging and Disposal on Aquatic Organisms
	1E	Pollution Status of Dredged Material
Bioassay	1D	Effects of Dredging and Disposal on Aquatic Organisms
	1E	Pollution Status of Dredged Material
SITE COMPARISON		
Total Sediment Analysis	1C	Effects of Dredging and Disposal on Water Quality
	1E	Pollution Status of Dredged Material
Community Structure	1A	Aquatic Disposal Field Investigations

* From Figure 1.

(cont fr p 1) interim guidelines

INTERIM GUIDANCE PUBLISHED FOR IMPLEMENTATION OF SECTION 404

Control of the discharge of dredged or fill material to minimize environmental impacts is the requirement of Section 404(b)(1) of Public Law 92-500 (Federal Water Pollution Control Act Amendments of 1972). Rules and regulations providing this control were published in the *Federal Register* (Volume 40, No. 173, Friday, 5 September 1975) by the Environmental Protection Agency (EPA). These regulations specify that EPA, in conjunction with the Corps of Engineers (CE), will publish a procedures manual for the implementation of the regulations. The manual will provide technical guidance for the evaluation of proposed discharges of dredged or fill material into navigable waters as required by Section 404(b) of the Federal Water Pollution Control Act Amendments of 1972.

Pending publication of the procedures manual, District Engineers are to furnish interim guidance to permit applicants concerning the applicability of specific approaches or procedures to be used in the evaluation process. Consequently, at the request of the Office, Chief of Engineers, the Environmental Effects Laboratory of the Waterways Experiment Station (WES) initiated development of this interim guidance for use by District Engineers in evaluating permit applications. This was published and distributed in May 1976 to all Corps field elements in a document entitled "Ecological Evaluation of Proposed Discharge of Dredged or Fill Material into Navigable Waters" (referred to as the "Interim Guidance" and available from WES as DMRP Miscellaneous Paper D-76-17).

The procedures included in the Interim Guidance represent the current state-of-the-art in the dynamically evolving fields of aquatic and sediment chemistry and biology, and attempt to provide a balance between technical state-of-the-art and routinely implementable guidance for performing the evaluation specified in the *Federal Register*. Evaluation of ecological effects consists of two phases: selection of the appropriate test or evaluation procedures and the interpretation of results for assessment of potential problems. The Interim Guidance defines the applicability of testing procedures to the evaluations specified in the *Federal Register* and presents limitations in interpreting the results.

The Interim Guidance is applicable to all activities involving the discharge of dredged or fill material into navigable waters. The procedures presented are useful in evaluating the discharge and overflow from hopper dredges; hydraulic pipeline discharges; the discharge and overflow from bottom and end dump barges and scows; and the runoff, effluent, or overflow from a confined land or water disposal area.

General approaches required for ecological evaluation involve estimation of physical effects and chemical-biological interactive effects, both of which are discussed in the Interim Guidance. Procedures for alternate site comparisons are also presented. Detailed procedures include those for conducting the elutriate test and estimating the mixing zone that must be used in interpretation of the elutriate test, performing bioassays, conducting total or bulk sediment analyses, and evaluating biological community structure.

The scope and comprehensiveness of the required evaluation may be seen in Figure 1, taken from the Interim Guidance, which shows the sequence of evaluations that must be applied. The Interim Guidance follows the general priority of importance of testing and evaluation procedures and general order of test application given in the *Federal Register*.

During conduct of the DMRP, it has become

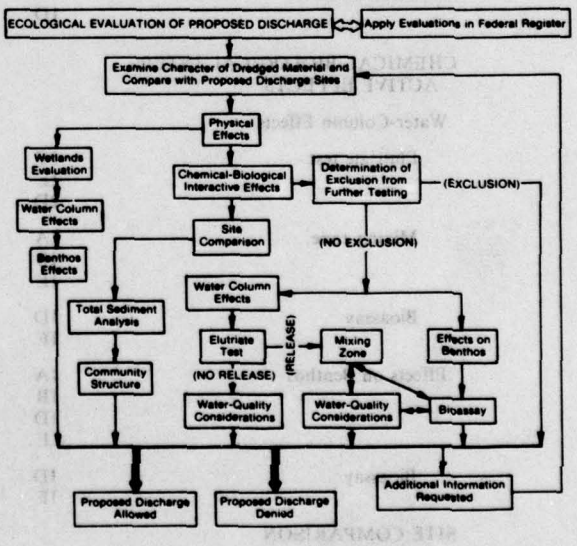

Figure 1. Sequences of testing and evaluation procedures