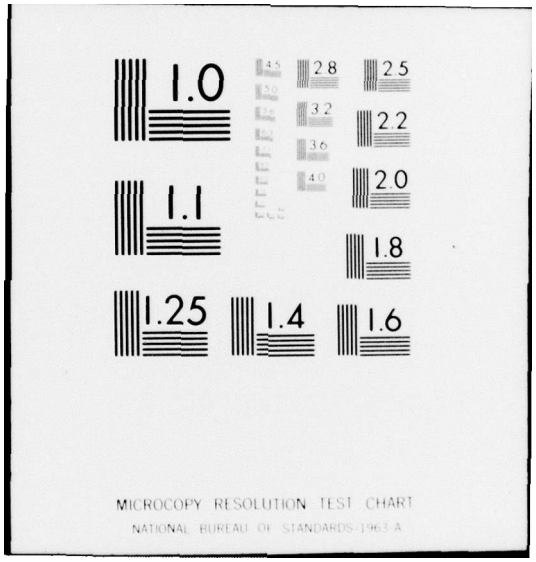
AD-A037 809 ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS F/G 13/2
DREDGED MATERIAL RESEARCH, NOTES, NEWS, REVIEWS, ETC. VOLUME D---ETC(U)
FEB 77

UNCLASSIFIED NL

1 OF 1
ADA037809

END

DATE
FILMED
4-77


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DREDGED MATERIAL RESEARCH

U. S. ARMY CORPS OF ENGINEERS
INFORMATION EXCHANGE BULLETIN

Vol D-77-3
Feb 1977

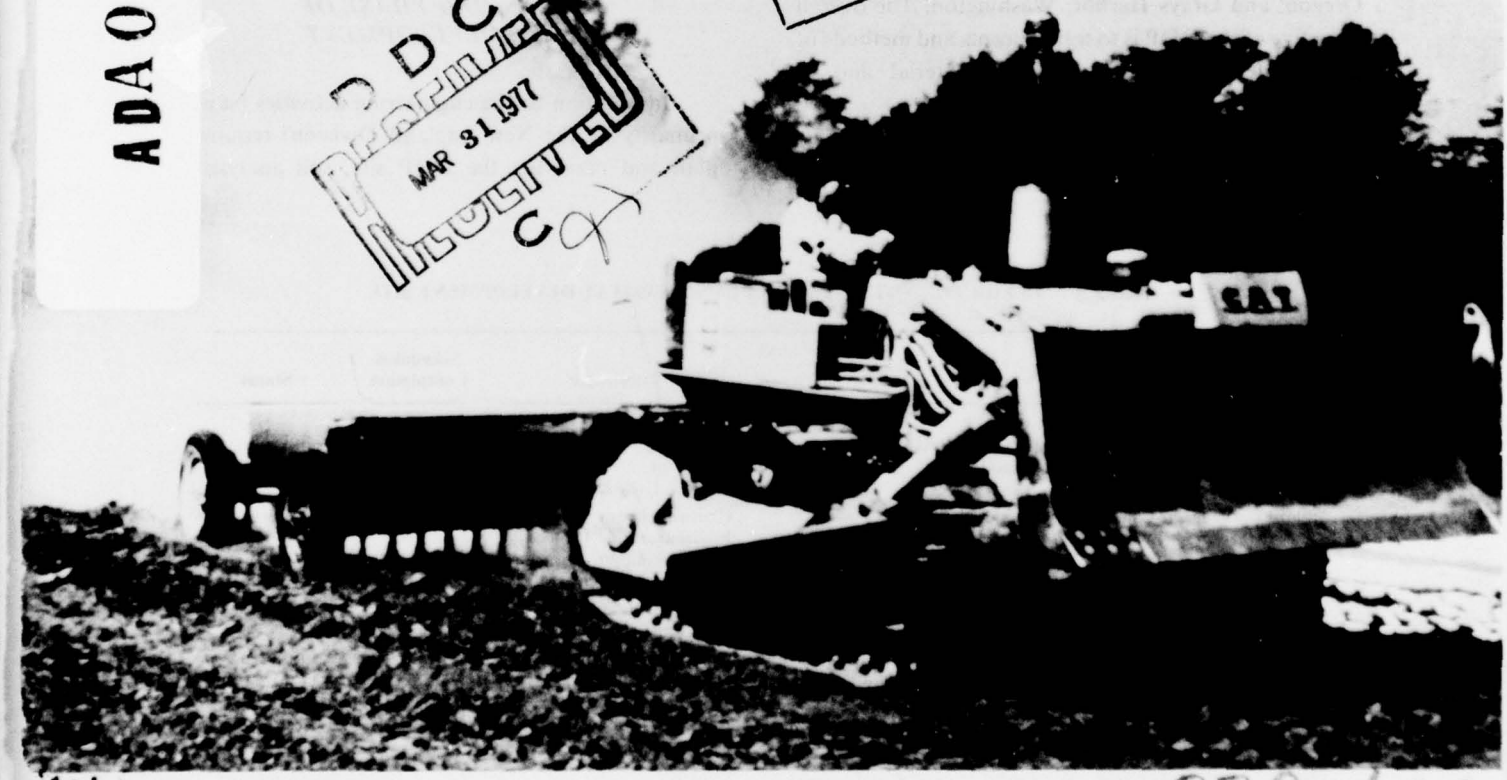
NOTES, NEWS, REVIEWS, etc.

ADA037809

COPY AVAILABLE TO DDC DOES NOT PERMIT FULLY LEGIBLE PRODUCTION

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

DDC
MAR 31 1977
C



The Nott Island disposal area is being used to test reclamation concepts being investigated under the Dredged Material Research Program (DMRP). The following article describes the planning, site preparation (shown in the above photo), and monitoring activities that were designed to evaluate concepts and methods of terrestrial habitat development on the coarse, barren sand of the island. The particular habitat under consideration is Canada goose pasture.

DDC FILE

UPDATE: NOTT ISLAND UPLAND HABITAT DEVELOPMENT SITE, CONNECTICUT RIVER, CONNECTICUT

The Nott Island Upland Habitat Development Site* is located 11.2 km upstream from Long Island Sound. The 31-ha island, owned by the State of Connecticut, has been used nine times since 1936 for the disposal of material dredged from the Connecticut River navigation channel. In December 1974, the New England Division constructed a sand dike enclosure for a 3.2-ha disposal area to be used for habitat development research on the island (Figure 1). Table 1 lists the work units for the Nott Island site.

The Nott Island study is one of 11 such field studies being conducted as part of the Habitat Development Project (HDP) of the DMRP in coastal and riverine areas throughout the United States. General locations of other HDP sites are Branford Harbor, Connecticut; Dyke Marsh, Virginia; James River, Virginia; Buttermilk Sound, Georgia; Port St. Joe, Florida; Apalachicola Bay, Florida; Bolivar Peninsula, Texas; South San Francisco Bay, California; Miller Sands, Oregon; and Grays Harbor, Washington. The overall objective of the HDP is to test concepts and methods of habitat development on dredged material and to evaluate habitat development as an alternative method of dredged material disposal.

* This is the first update on the Nott Island Upland Habitat Development Site to be presented in this information exchange bulletin. A previous article appeared in the July 1975 issue.

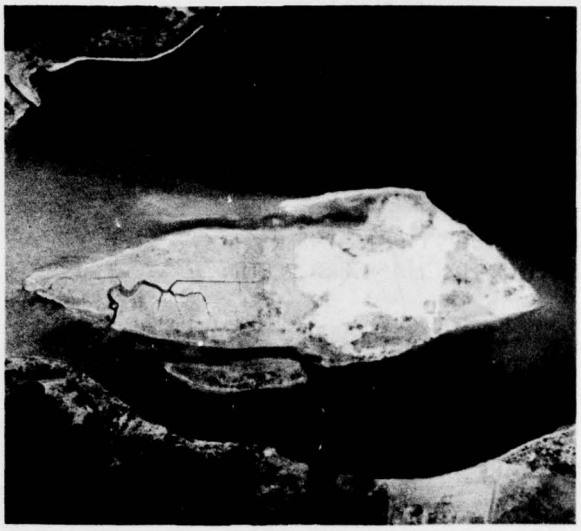


Figure 1. Air photo of Nott Island in April 1975 (scale 1:7200) showing angular disposal area on north quarter of island

PLANNING PHASE OF SITE DEVELOPMENT

In addition to the engineering activities (supplied primarily by the New England Division) required to plan and construct the DHP site, soil analysis and

Table 1
WORK UNITS FOR THE NOTT ISLAND UPLAND HABITAT DEVELOPMENT SITE

Work Unit	Title	Contractor	Scheduled Completion	Status
4B04A	Preoperational Data Collection and Monitoring of Dredged Material Disposal, Nott Island Habitat Development Site	Marine Sciences Institute, Univ. of Connecticut at Groton, Groton, Conn.	Sep 75	Draft report being reviewed
4B04B	Technical Liaison, Nott Island Study	Connecticut Dept. of Environmental Protection, Hartford, Conn.	Jul 76	Completed; no report planned
4B04C	Growth of Selected Plant Species on Dredged Material	Cooperative Extension Service, Univ. of Connecticut, Storrs, Conn.	Jan 76	Completed; no report planned
4B04D	Plot Establishment and Preoperational Data Collection (Experimental Control of *Phragmites communis*)	Connecticut College, New London, Conn.	Jul 75	Completed; no formal report planned
4B04E	Monitoring of Dredged Material Disposal and Reclamation, Nott Island Study	Connecticut College, New London, Conn.	Dec 76	Active
4B04F	*Post-Propagation Monitoring of Flora and Fauna at Nott Island*	*Contract*		*Being planned*
4B04G	*Nott Island Upland Habitat Development: Site Report*	*EEL/WES*	*Mar 78*	*Being planned*

greenhouse studies were instituted in order to select plants that would be suitable for the Nott Island site. Prior to dredging operations, in situ sediment samples from the Connecticut River navigation channel were collected by personnel from the Connecticut Department of Environmental Protection (DEP). Analysis of salinity, pH, and nutrient levels were made by Dr. Walter Washko of the Univ. of Connecticut, Storrs.

Dr. Washko also conducted a greenhouse experiment in which various plants that could provide food for wildlife were grown in Connecticut River sediments that had been supplemented with various amounts of lime and fertilizer (Figure 2). Growth responses of the plants were noted throughout the growing period. Analysis for pH on composite unsupplemented soil samples that had been placed in greenhouse flats yielded pH values as low as 3.6 after several wetting and drying cycles. Such a low pH is indicative of sulfide oxidation. From the experimental results, it became apparent that pH level would be critical for successful plant establishment on Connecticut River sediments. The pH factor, together with plant growth-response data, led to the selection of white clover, red clover, flat pea, Kentucky 31 tall fescue, orchard grass, perennial rye grass, and timothy for large-scale field testing on Nott Island.

SITE PREPARATION

Approximately two-thirds of the total of 17,600 m^3 of sandy material to be dredged from the navigation channel was placed on the Nott Island HDP site by April 1975. At this time dredging and disposal operations were halted in order to accommodate the annual spring shad run and summer recreation traffic on the Connecticut River. Dredging and disposal operations were resumed in December 1975 under less than optimal conditions (Figure 3).

After completion of this phase of the project in mid-January 1976, the newly placed sandy material underwent leveling operations. Approximately 8800 m^3 of finer material was dredged from the recreation channel at Essex, Connecticut, and discharged into the disposal area. The combination of coarse- and fine-grained sediments was planned to take advantage of the drainage characteristics of the former and the nutrient and organic matter content of the latter while minimizing the problems associated with each (sterility and low moisture-holding capacity of the sand and the compaction potential of the fines).

After placement of the finer material, the disposal area was allowed to dewater over the summer of 1976. During the dewatering phase, a series of soil samples were collected and analyzed by Dr. David Hill, Connecticut Agricultural Experiment Station, New Haven. His findings were essentially the same as those of Dr. Washko: low pH was found to be a key factor. The pH values were found to range between 3.4 and 5.2. Another interesting note was that soluble salt content of the surface layer increased with dewatering and averaged over 5 ppt in late June 1976.

Analysis of the soil samples also indicated that the sand and the finer grained material had not been adequately combined by the disposal operation. Therefore, after the dewatering phase, the two types of sediment were mixed with a bulldozer to maximize their

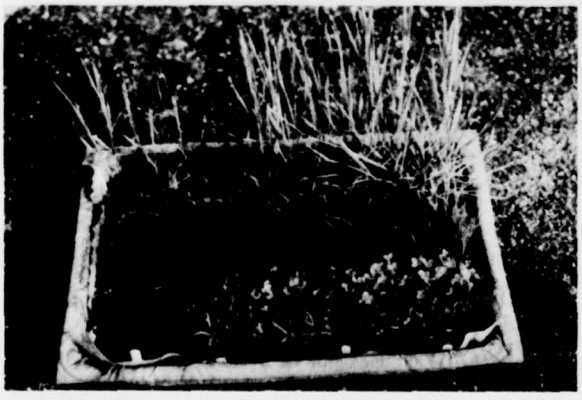


Figure 2. Flat of material from the recreation channel planted to grasses and legumes and treated with different levels of fertilizer and lime

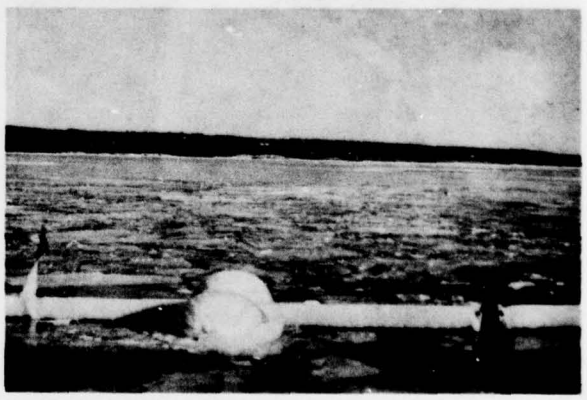


Figure 3. Snow-covered floats and disposal pipe crossing the ice-laden Connecticut River in December 1975

desirable chemical and physical properties.

Planting operations on the HDP site occurred during the fall of 1976. The experimental field design involved two forms of vegetation establishment. One was a set of 96 small monotypic plots to test growth of the seven previously selected plant species against four lime treatments of 0, 1.4, 2.1, and 2.9 tons/ha. The second was a pasture mix of red clover and fescue seeded over the remainder of the disposal site.

The monotypic plots are located in the southwest corner of the disposal area where sediment mixing had resulted in a relatively homogeneous substrate (Figure 4). The soil in each plot was rototilled to ensure further homogeneity, fertilized, limed, and seeded during 13-17 August 1976 by a Youth Conservation Corps group supervised by personnel from the DEP. By 17 September 1976, the remainder of the site had been bulldozed, limed, harrowed, fertilized, and seeded to pasture mix by personnel of the DEP Wildlife Unit.

MONITORING

Initial baseline studies of the plants and animals of Nott Island undertaken prior to site construction, as well as monitoring during construction, disposal, and site preparation, were accomplished by faculty and students from Connecticut College under the direction of Drs. Bill Niering and Scott Warren of the Department of Botany. Negotiations are currently under way for botanical, bird, and mammal studies to be performed on and around the disposal area during the 1977 growing season. Botanical measurements of plant survival, plant performance, and plant invasion will be made. Birds and mammals will be sampled to record use of the new habitat development. Soil samples will be taken and analyzed to follow trends in chemical soil characteristics.

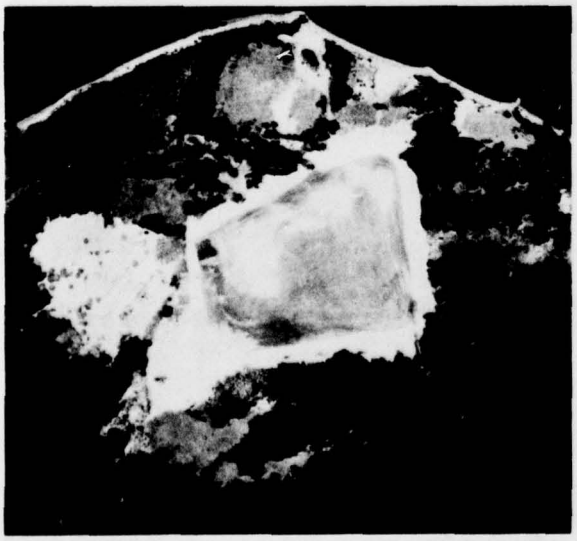


Figure 4. Air photo of Nott Island in September 1976 showing the disposal area after planting. Monotypic plots are located in the extreme lower left corner of the area

In addition to contract reports for the various work units, a synthesis report has been planned that will incorporate all pertinent data collected on the site. This site report will be prepared by March 1978 and will be published during the spring of 1978. Activities at the site continue to be managed by the Environmental Resources Division of the Environmental Effects Laboratory (EEL) at the U. S. Army Engineer Waterways Experiment Station (WES). Contractual support is being provided by the New England Division. The HDP manager is Dr. Hanley K. "Bo" Smith, and the site manager is Ms. Jean Hunt.

UPDATE: WINDMILL POINT MARSH HABITAT DEVELOPMENT SITE, JAMES RIVER, VIRGINIA

The Windmill Point Marsh Habitat Development Site* is located in the freshwater tidal portion of the James River estuary approximately 1.6 km downstream from Hopewell, Virginia. The site was constructed in 1974 and 1975 as a cooperative project between the Norfolk District and the WES during maintenance dredging of the Jordan Point and Windmill Point navigation channels. A summary of all work units for the Windmill Point site is given in Table 1. The habitat development site at Windmill Point is one of nine field research sites addressing the technical aspects of habitat creation using dredged material. Other sites are located at Nott Island, Connecticut; Dyke Marsh, Virginia; Buttermilk Sound, Georgia; Apalachicola, Florida; Port St. Joe, Florida; Bolivar Peninsula, Texas; San Francisco Bay, California; and Miller Sands, Oregon. The Windmill Point study is a part of the HDP and is included under Task 4A, Marsh Development.

* This is the second update on the Windmill Point Marsh Habitat Development Site, James River, Virginia, to be presented in this information exchange bulletin. Previous articles that appeared in the February and September 1975 issues of this bulletin contained detailed discussions of site composition, dredging and disposal operations, initial substrate vegetation invasion, and plant propagation.

Table 1
WORK UNITS FOR THE WINDMILL POINT MARSH HABITAT DEVELOPMENT SITE

Work Unit	Title	Contractor	Scheduled Completion	Status
4A11A	Soils Exploration and Testing	Soil and Material Engineers, Inc., Raleigh, N. C.	Dec 74	Completed; input to 4A11M
4A11B	Dike Design	Dr. Robert Y. K. Cheng, Old Dominion University, Norfolk, Va.	Dec 74	Completed; input to 4A11M
4A11C	Preoperational Biological Assessment	Virginia Institute of Marine Science, Gloucester Point, Va.	Jan 75	Completed; appendix to 4A11M
4A11D	Preoperational Sediment Assessment	Old Dominion University, Norfolk, Va.	Dec 75	Completed; appendix to 4A11M
4A11E	Exploration for Sand to be Used for Dike Construction	Soil and Material Engineers, Inc., Raleigh, N. C.	Nov 74	Completed; input to 4A11M
4A11F	Technical and Administrative Support	Norfolk District, CE, Norfolk, Va.	Jan 77	Completed; input to 4A11M
4A11G	Sediment and Water Chemistry Investigation	Old Dominion University, Norfolk, Va.	Oct 76	Draft report being reviewed; appendix to 4A11M
4A11H	Pollutant Mobilization Studies	Old Dominion University, Norfolk, Va.	Oct 77	Active; appendix to 4A11M
4A11I	Ecological Studies	Virginia Institute of Marine Science, Gloucester Point, Va.	Oct 77	Active; appendix to 4A11M
4A11J	Propagation of Vascular Plants	Environmental Concern, Inc., St. Michaels, Md.	Oct 75	Completed; input to 4A11M
4A11K	Assessment of Acute Impacts on the Macrobenthic Community	Virginia Institute of Marine Science, Gloucester Point, Va.	Sep 76	Draft report being reviewed; appendix to 4A11M
4A11L	Heavy Metal and Organohalide Study	WES	Oct 77	Active; appendix to 4A11M
4A11M	*Windmill Point Marsh Habitat Development Site Report*	*WES*		*Being planned*

SITE DEVELOPMENT

Site development at Windmill Point consisted of constructing a 1065-m-long perimeter dike from sandy dredged material and filling the interior with 167,000 m^3 of fine-textured (mean sediment particle size = 7.7 ϕ or 4.8 microns) sediment dredged from the navigation channel of the James River. Figure 1 shows the 0.6-ha dredged material island that existed at Windmill Point in 1974 prior to the channel dredging. Figure 2 presents the approximately 8.1-ha marsh site as it existed in July 1975, 7 months after construction, when the site had been colonized by wetland plants (Figure 3).

Visible changes in the Windmill Point site since September 1975 fit into two general categories: changes in site geometry caused by dike erosion and settlement, and changes in vegetation associated with plant succession or due to animal grazing pressures. Erosion

Figure 1. This 0.6-ha dredged material island existed at Windmill Point prior to the marsh development project in 1974. It now forms part of the downstream boundary of the new marsh

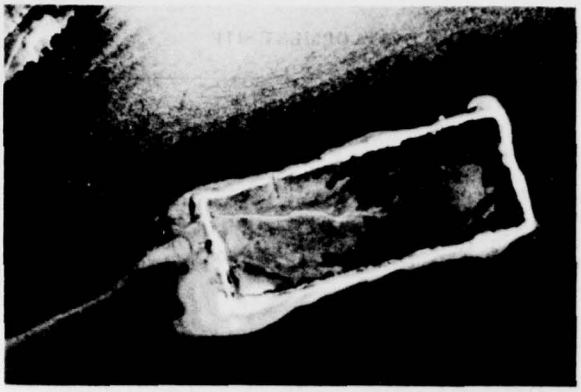


Figure 2. The 8.1-ha marsh-island complex at Windmill Point was established by constructing a perimeter dike from sandy dredged material and filling the site with fine-grained sediments from the adjacent navigation channel

Figure 3. Within 7 months of the completion of construction, marsh vegetation had colonized the site

has occurred along high-energy borders of the sand dike, as evidenced by exposure on the outside of the dike of fine-textured material; however, the marsh itself appears stable. As noted above, the material placed inside the sand dike was colonized rapidly by marsh plants. The dike proper was planted with a mix of grasses and legumes. Vegetation within the new marsh continues to be both diverse and productive, and patterns of succession within that area are being monitored. The plants on the dike have suffered from erosion and heavy grazing pressures from Canada geese and have an uneven distribution and cover.

FIELD MONITORING ACTIVITIES

Monitoring efforts designed to document not only the very visible but also the more subtle environmental changes within and adjacent to the Windmill Point site started before dredging and disposal activities or dike construction began. Baseline inventories consisting of the review of available information and field collections and observations were described in the February 1975 information exchange bulletin. The results of these inventories were used to plan and design the field studies that followed.

Research at this site will continue through October 1977 with major emphasis being placed on the changes in water quality associated with the dredged material marsh substrate, successional development of the plant and aquatic invertebrate communities, area use by fish and wildlife, and food habits of fishes using the marsh. All observations made since July 1976 are being paired with observations in a reference marsh located at Ducking Stool Point, about 0.3 km downstream from the Windmill Point site.

An in-house work unit (4A11L) was initiated in October 1976 to document concentrations of various metals and chlorinated hydrocarbons in selected plant and animal tissues at the experimental marsh. This study will provide information on the migration of these chemical substances into plant and invertebrate tissues known to be directly eaten by fish or wildlife.

Samples were collected from the experimental marsh at Windmill Point, the natural marsh at Ducking Stool Point, and a second natural marsh located within the Presquile National Wildlife Refuge upriver of Hopewell, Virginia. Soils or sediments have been paired with seeds of arrow arum (*Peltandra* sp.); stems, leaves, and roots of cattail (*Typha* sp.); seeds, stems, leaves, and roots of barnyard grass (*Echinochloa* sp.); and soft tissues of the Asian clam (*Corbicula manilensis*). These samples, already collected, processed, and frozen, will be analyzed by a contractor who will be selected in the spring of this year on the basis of responses to a Request for Proposals (RFP). The WES principal investigator in the work is Mr. John D. Lunz.

PRELIMINARY RESULTS

The Virginia Institute of Marine Science, Gloucester Point, Virginia, has completed an assessment of acute impacts of the Windmill Point site on the macrobenthic community. This study served to document bottom habitat lost due to marsh development and reached the following conclusions:

(1) There was an acute impact within the habitat

development site and in the area dredged for material for dike construction. Any acute impacts beyond the immediate vicinity of the habitat development site or borrow pit were undetectable 8 months after construction.

(2) Substantial alterations to the sedimentary regime were caused by the sand dike and borrow pit. (The habitat dike perimeter is a coarse-grained high-energy environment, and the borrow pit is a sink for fine sediments.)

(3) Faunal changes attributable to the habitat development activity were associated with the changes in sediments from the dike construction. However, no widespread habitat changes attributable to habitat development were detected in the Windmill Point area.

(4) Except for those few species that were affected by sediment changes, population changes over the period sampled could have been due to seasonality.

(5) The resilience and opportunistic nature of the tidal freshwater fauna worked to mask and dampen biological impacts of the habitat development.

(6) The benthic communities that are developing within the habitat site are different from those in the surrounding river bottom and will continue to change as the habitat undergoes succession. (Ongoing successional development of the benthic is being studied under Work Unit 4A11I.)

Old Dominion University, Norfolk, Virginia, has completed initial phases of a continuing effort to document changes in the substrate chemistry of the Windmill Point site and the emigration of dissolved and particulate nutrients and metals from the site. Table 2 summarizes information on certain metals and selected nutrients based upon an analysis of total channel sediment; sediment interstitial water; and dissolved nutrients and metals in water leaving the experimental marsh during active dredging, during the period of dredged material consolidation and dewatering after disposal operations had ceased, and 2-1/2 and 3-1/2 months following the completion of disposal operations.

The data demonstrate a lack of any relationship between total sediment concentrations of various metal and nutrient substances and dissolved concentrations released into the environment during and following dredging and disposal operations. The data further suggest that sediment interstitial water chemistry could provide a more accurate, albeit more costly, means of describing potentially polluting sediments. The observation that ammonia (NH_4) is released parallels

Table 2
METALS AND NUTRIENTS IN CHANNEL SEDIMENTS AND DISSOLVED METALS AND NUTRIENTS IN WATER LEAVING MARSH*

Element	Total Sediments mg/kg	Sediment Interstitial Water mg/l	Water Leaving Marsh, mg/l			
			Active Dredging	Dewatering Operations	+2-1/2 Months**	+3-1/2 Months**
Calcium	42	216	63	38	14	16
Cadmium	1.3	0.009	0.019	0.018	0.003	0.003
Copper	49	0.011	0.011	0.006	0.006	0.006
Iron	40,800	57.3	6.01	0.12	0.32	0.52
Mercury†	0.52	0.003	0.002	0.001	0.0000	0.001
Manganese	1,100	6.85	1.10	0.20	0.11	0.38
Nickel	34	0.05	0.04	0.03	0.03	0.02
Lead††	62	0.08	0.14	0.00	0.00	0.00
Zinc	238	0.32	5.31	0.10	0.03	0.03
Total Phosphorus	662	0.457	NA	NA	NA	NA
Total Kjeldahl Nitrogen	4,577	58.3	NA	NA	NA	NA
Total Dissolved Phosphorus	NA	NA	NA	NA	0.155	0.102
Ammonia	NA	NA	18.43	0.25	1.43	1.98

* Values are averages for 10 cores and for each sampling period. Entry NA indicates data were not analyzed.
** Time since completion of disposal operations.
† Entry of 0.0000 denotes mercury content was below detection limit of 0.0001 mg/l.
†† Entries of 0.00 denote lead content was below detection limit of 0.05 mg/l.

observations made by other DMRP studies of open-water disposal and points to a need to describe the length of time ammonia concentrations considered toxic to aquatic life persist in this water.

THE COST OF MARSH DEVELOPMENT

The Norfolk District has developed a record of the construction costs for the site. These records indicate that the selection of marsh development at Windmill Point as a dredged material disposal alternative cost $200,000 more than the unconfined open-water disposal alternative. Considering the approximately 167,000 m^3 of dredged material used for the project, this experiment in marsh development added nearly $1.30/$m^3$ to the cost of the usual disposal operation at this shoal. The added cost resulted from dike construction that was necessary to retain the fine-grained channel sediments and thereby achieve an intertidal substrate elevation. In other situations, this cost will vary depending on the relationship between the type and length of retaining structure necessary and the volume of dredged material retained as well as other factors.

MANAGEMENT

The Windmill Point study is being conducted as part of the HDP of the DMRP (Dr. Hanley K. Smith, Manager). Activities at the site continue to be planned by the Environmental Resources Division (Dr. C. J. Kirby, Division Chief), EEL, WES. Contractual, technical, and logistical support is provided by the Norfolk District. The site manager is Mr. John D. Lunz.

DMRP TASK 5A PLANNING SEMINAR III, MOBILE, ALABAMA

Thirty-two individuals, including members of the DMRP staff, DMRP contractors, and Corps of Engineer and outside technical experts met on 12-13 January 1977 in Mobile, Alabama, to conduct Task 5A Planning Seminar III.

The Task 5A planning seminars have been held periodically to provide the DMRP/Disposal Operations Project (DOP) staff with high-level technical evaluation of on-going research in dredged material dewatering and advice concerning direction of future research. Planning Seminar I, held at the WES in October 1974 (Nov 1974 information exchange bulletin), was concerned with selection of dewatering techniques for feasibility study. Planning Seminar II, held at WES in January 1976 (Feb 1976 information exchange bulletin), addressed the various feasibility studies with a view toward field demonstration of viable concepts. The intent of Planning Seminar III was to determine which field demonstrations should be recommended for full-scale CE District implementation. The seminar was held in Mobile so that the participants could tour Task 5A field demonstrations (Figure 1) being conducted at the Upper Polecat Bay (UPB) disposal area of the U. S. Army Engineer District, Mobile (MDO) (Oct 1976 information exchange bulletin).

In addition to DMRP staff members, the seminar was attended by the following work unit contractors and invited consultants.

Mr. M. R. Bartos, EEL, WES
Dr. K. W. Brown, Texas A&M University
Mr. R. W. Chamlee, Foundation and Materials Branch, MDO
Mr. Ernest Dodson, Geotechnical Branch, OCE
Mr. P. A. Douglas, Foundation and Materials Branch, MDO
Mr. A. W. Ford, EEL, WES
Mr. Jack Fowler, Soils and Pavements Laboratory (S&PL), WES
Mr. A. J. Green, EEL, WES
Mr. M. L. Haden, EEL, WES
Mr. D. P. Hammer, S&PL, WES
Mr. S. J. Johnson, S&PL, WES
Mr. B. L. Kyzer, Navigation and Survey Branch, Charleston District
Mr. J. P. Langan, Navigation Section, MDO
Dr. R. L. Lytton, Texas A&M University
Mr. C. L. McAnear, S&PL, WES
Dr. C. E. O'Bannon, Arizona State University
Mr. M. R. Palermo, EEL, WES
Dr. W. H. Patrick, Louisiana State University
Mr. J. P. Sale, S&PL, WES
Mr. W. C. Sherman, S&PL, WES
Dr. J. W. Spotts, S&PL, WES
Ms. J. P. Stout, Dauphin Island Sea Laboratory
Prof. Lewis Thompson, Texas A&M University
Mr. Jim Washington, Naval Facilities Engineering Command, Navy
Mr. W. E. Willoughby, Mobility and Environmental Systems Laboratory, WES
Mr. Donald York, Port Authority of New York and New Jersey

Although his schedule would not allow him to participate in the formal seminar, Mr. Harry R. Cedergren, drainage consultant of Sacramento, received a briefing and toured the site the day after the seminar concluded.

Figure 1. Scenes of field demonstrations that were part of Task 5A Planning Seminar III

(1) Windmill used as alternate power source for vacuum wellpoints—Work Unit 5A09

(2) Automated meteorological devices that monitor conditions for entire disposal area—Work Unit 5A12

(3) Mr. Braxton Kyzer tests consistency of dredged material in an underdrain dewatering test pit—Work Unit 5A15

(4) Electro-osmotic dewatering demonstration area—Work Unit 5A17

(5) Setup used to test efficiency of capillary wicks for dewatering dredged material—Work Unit 5A10

After a welcome from COL Charles Blalock, District Engineer, MDO, the participants heard and discussed presentations of the various Task 5A contractors as shown in the following tabulation.

Work Unit	Title	Presentation Made By
5A06	Crust Management	Dr. Brown
5A08	Progressive Trenching	Mr. Palermo
5A09	Vacuum Well Points	Mr. Chamlee & Mr. Ford
5A10	Capillary Wicks	Dr. Spotts
5A11	Sand Injection	Dr. Lytton
5A13	Containment Area Management	Mr. Bartos
5A14	Periodic Crust Mixing	Mr. Fowler
5A15	Underdrain Dewatering	Mr. Hammer
5A16	Electro-Osmotic Dewatering	Mr. Douglas & Dr. O'Bannon
5A17	MDO Design Alternatives	Mr. Douglas
5A18	Vegetative Dewatering	Mr. Stout
5A19	Predictive Modeling	Mr. Haden
2C09	Equipment Development	Mr. Willoughby
	Haul Road Construction and Borrow Mining	Mr. Fowler
	Shrinkage Consolidation	Dr. Lytton

These work units were all involved in Phase III—Design Alternative Development.

A field tour of the UPB site was conducted on 13 January 1977 (Figure 1) followed by a general discussion of the research. Extremely valuable input and recommendations on full-scale alternative implementation were received by the DOP staff.

Task 5A is managed by Dr. T. Allan Haliburton, DMRP Geotechnical Engineering Consultant, for Mr. Charles C. Calhoun, Jr., DOP Manager.

DMRP RESEARCH INITIATED

ENVIRONMENTAL IMPACTS AND CRITERIA DEVELOPMENT PROJECT

Task 1E: Development of Dredged Material Disposal Criteria

Field Testing and Verification of Dredged Material Disposal Criteria (ID No. Y113-1E03B). *Dr. G. F. Lee, PE, University of Texas at Dallas*, will conduct field investigations to determine the effects of dredging and disposal operations on water quality and will evaluate the elutriate test as a predictor of such effects. The studies will be conducted at marine, estuarine, and freshwater sites and will provide information on the degree to which the elutriate test predicts solubilization of contaminants from dredged sediments under various conditions of salinity, temperature, dissolved oxygen, and chemical conditions of the sediment and the receiving water. Such information will aid further in the implementation and interpretation of the elutriate test as a regulatory tool for use in evaluating applications for dredging permits. Scheduled Completion Date: May 1977. Estimated Cost: $157,995. Contract Manager: Dr. R. K. Peddicord.

Development of Bioassay Methodologies Using Selected Benthic Organisms (ID No. Y154-1E08). This in-house study, conducted by *Dr. P. J. Shuba* of the *Ecosystem Research and Simulation Division*, will develop bioassay procedures that can predict the effects of dredged material disposal on benthic animals. Two categories of research will be pursued. First, benthic bioassay procedures must be developed that can be used by District Engineers to aid in making decisions as to the suitability of a particular dredged material for aquatic disposal. These procedures should be of reasonable cost, require a fairly short time to complete, and be interpretable with a high degree of confidence. The second area of research will be aimed at developing research procedures that would confirm the validity of the test procedure designed for the Districts as well as advance the state-of-the-art of bioassays conducted with benthic organisms. Scheduled Completion Date: September 1977. Estimated Cost: $270,000. Contract Manager: Dr. R. K. Peddicord.

HABITAT DEVELOPMENT PROJECT

Task 4A: Marsh Development

Salt Pond No. 3 Marsh Development, San Francisco, California (ID No. Y276-4A18). The establishment of marsh plants in an abandoned salt pond that was filled with dredged material from nearby South San Francisco Bay is the objective of *Mr. Paul Knutson* of the *San Francisco District*. Development of an intertidal marsh will be accomplished by breaching the dike on the bay side of the pond. Selected plots within the intertidal area will then be planted with either seeds or sprigs of Pacific cordgrass (*Spartina foliosa*) or Pacific glasswort or pickleweed (*Salicornia pacifica*). These plantings will initiate an effort by the DMRP to study the effects of various propagation techniques,

time of planting, plant spacing efficiency, and varied elevation on selected marsh plants found along the Pacific coast. Scheduled Completion Date: May 1977. Estimated Cost: $50,350. Contract Manager: LT R. T. Huffman.

Postpropagation Monitoring—Salt Pond No. 3 Marsh Development, San Francisco, California (ID No. Y270-4A18A). *Dr. Curtis L. Newcombe* of the *San Francisco Bay Marine Research Center, Inc.*, will monitor the effects of various propagation techniques, time of planting, plant spacing efficiency, and varied elevation observed within planted and control plots of Pacific cordgrass and Pacific glasswort or pickleweed. The data collected on the plants plus insect, bird, and invertebrate surveys will be integrated to develop a quantitative analysis of the new marsh habitat developed at Pond No. 3. The information provided by Dr. Newcombe will aid in the determination of the feasibility of marsh development on dredged material disposal sites along the Pacific coast. Scheduled Completion Date: October 1977. Estimated Cost: $33,000. Contract Manager: LT R. T. Huffman.

Monitoring of Marsh Development on Dredged Material, Apalachicola Bay, Florida (ID No. Y204-4A19). This research effort is being conducted by *Dr. W. L. Kruczynski* of *Florida A&M University*. The work involves monitoring spacing efficiency and elevational studies consisting of planted and control plots of smooth cordgrass (*Spartina alterniflora*) and wire grass (*S. patens*) in order to obtain quantitative information on plant success and production on fine-grained dredged material. The data from this work unit will aid in the determination of the feasibility of marsh development on dredged material disposal sites along the Gulf Coast. Scheduled Completion Date: October 1977. Estimated Cost: $8,490. Contract Manager: LT R. T. Huffman.

Tasks 4A and 4B: Marsh and Terrestrial Habitat Development

Postpropagation Monitoring of Botanical and Soil Parameters at the Miller Sands Marsh and Upland Habitat Development Sites on the Columbia River, Oregon (ID No. Y266-4BO5K). *Dr. Paul E. Heilman* of *Washington State University* is the principal investigator for a postpropagation study that involves periodic collection of quantitative data on plant success and production at both marsh and upland habitat development sites. Various chemical and physical soil parameters will also be studied, as well as a study of seed germination for selected marsh species. Primary emphasis will be placed on those species studied at other habitat development sites. Scheduled Completion Date: December 1977. Estimated Cost: $160,559. Contract Manager: Dr. Scott Boyce.

SECOND INTERNATIONAL SYMPOSIUM ON DREDGING TECHNOLOGY

Minimizing environmental effects, soil mechanics, and spoil control and disposal are among the subject areas on which authors are invited to submit titles and synopses of papers offered for presentation at the Second International Symposium on Dredging Technology. This symposium is sponsored by BHRA Fluid Engineering in association with the Center for Dredging Studies of Texas A&M University and will be held on November 2-4, 1977, at the University in College Station, Texas. Inquiries should be sent to: Organizing Secretary, 2nd I.S.D.T., BHRA Fluid Engineering, Cranfield, Bedford MK43 OAJ, England.

NEW LITERATURE

Jaworski, E. and Raphael, C. N., "The Confined Disposal Program for Polluted Dredged Spoil in the Great Lakes," *Coastal Zone Management Journal*, Vol 3, No. 1, 1976, pp 91-97.

Delay in the construction of containment sites is allowing time for significant adjustments in the confined disposal program of the Great Lakes. Through modification of the pollution criteria and improvements in harbor sampling, fewer containment sites, some with smaller capacities, are now required. Perhaps most important, the delays are providing additional time for upgrading waste treatment facilities which may be reducing future dredging volumes. Unless pollution abatement measures are implemented and technological improvements made regarding containment of the excess spoil water, cleanup of the harbors and connecting channels may not be fully accomplished during the 10-year period in which containment sites are authorized.

Author's Abstract

Arkansas Water Resources Research Center, "An Evaluation of the Effects of Dredging Within the Arkansas River Navigation System," Publications No.

43 to 47, 1976, University of Arkansas, Fayetteville, Arkansas.

Prepared under contract to the U. S. Army Engineer District, Little Rock, this interdisciplinary study addressed the effects on phytoplankton, zooplankton, and benthic associations and fish populations, and the results of each are presented in separate volumes. The first volume contains an Introduction, a Summary, and Conclusions and Recommendations.

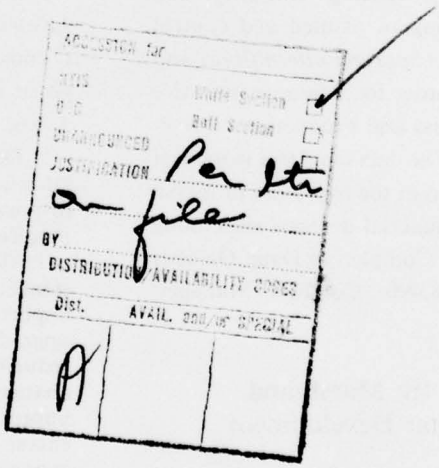
Smith, M. F., *Environmental and Ecological Effects of Dredging (A Bibliography with Abstracts)*, National Technical Information Service, Springfield, Virginia, Oct 1975.

Specific as well as general ecological and environmental effects of dredging and dredge spoil disposal are presented. Citations relate topics such as dredge spoil use in land reclamation, turbidity, effects on aquatic microbiology, fish and shellfish, and spoil disposal techniques. (Contains 136 abstracts.)

NOTE: The DMRP regrets it cannot be a distributing agent for the new items of literature listed in this newsletter. All items presented are available at the time of listing from the publishing or issuing agency and requests for copies should be addressed to them. In many instances, only limited copies are available and the use of Interlibrary Loan or related services is encouraged.

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.

JOHN L. CANNON
Colonel, Corps of Engineers
Commander and Director



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION
CORPS OF ENGINEERS
P. O. Box 631
VICKSBURG, MISSISSIPPI 39180
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DoD-314
THIRD CLASS
U.S.MAIL