DRP-5-11
January 1995

Dredging Research Technical Notes

Current Corps of Engineers Data Management Practices

Purpose

This technical note describes the results of a survey of Corps of Engineers districts on data management practices presently being used. The information is applicable to all Corps districts that collect and manage data on dredging projects.

Background

The Corps' mission to maintain navigation and administer a disposal permit program results in the Corps collecting and managing data on numerous dredging projects. The data collected vary depending on the needs and requirements of the specific project. Appropriate data and information are required to allow evaluation of the disposal activity in compliance with the Clean Water Act (section 404), or section 103 of the Marine Protection Research and Sanctuaries Act, and the National Environmental Policy Act. Over 30 Federal environmental laws and Executive Orders must be addressed in the evaluation process.

The Dredging Research Program's (DRP) Open-Water Disposal Site Management work unit conducted a survey of Corps districts (Table 1) to determine data collection and data management practices being used. Specific areas surveyed included the type of data collected, data management practices, disposal site management data, disposal site monitoring data collected, and information on beneficial uses of dredged material. A summary of the survey topics and questions is provided as Table 2. The results of this survey are summarized in Table 3 and in the following text.

Additional Information

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Table 1
Corps District Surveyed

Districts Surveyed		
Baltimore	Mobile	Portland
Charleston	New England	San Francisco
Galveston	New Orleans*	Savannah
Jacksonville	New York	Seattle
Los Angeles	Norfolk	Wilmington*
	Philadelphia	

*No information obtained.

Table 2
Summary of Survey Topics and Questions

Data Type
- Bathymetry
- Tracking location of dredge
- Type of dredging equipment
- Quantity of dredged material
- Change in volume calculation
- Monitoring data
- Bioassays
- Sediment chemistry
- Sediment physical characteristics
- Other

Disposal Site Monitoring
- Monitor (Yes or No)
- Conduct physical monitoring
- Conduct chemical monitoring
- Conduct biological monitoring

Beneficial Uses
- Nearshore disposal
- Other beneficial uses

Data Management
- Hard copies in file cabinet
- Use/type of PC spreadsheets
- Use/type of PC databases
- Use/type of GIS
- Data management tool needs
- Provide data to others

Site Management
- Control placement location
- Track dredge/scow location
- Control frequency of disposal
- Different types of material
- Use capping
- Specify type of method
- Other
- Need site management tools
- Management by material/site
- Coordinate management in Corps
- Role of EPA
- Site management plan
- Problems with sites
- Running out of sites
- Mounding problems
- Material moving from site
- Seasonal windows and species

Table 3
Summary of Responses to Survey Questions

Question on Subject Categories	Responses and Percent of Responders
Data type	
Bathymetry	Yes (95%)*
Tracking location of dredge	Yes (70%)
Type of dredging equipment	Yes (70%)
Quantity of dredged material	Yes (85%)
Change in volume calculation	Yes (50%)
Monitoring data	Yes (85%)
Bioassays	Yes (65%); Sometimes
Sediment chemistry	Yes (60%); Sometimes (45%)
Sediment physical characteristics	Yes (70%)
Other	Effluent, turbidity, total organic carbon
Data management	
Hard copies in file cabinet	Yes (100%)
Use/type of PC spreadsheets	Lotus (45%); Other, QuatroPro
Use/type of PC databases	DBase (35%); Other, Oracle
Use/type of GIS	Yes (35%); ArcInfo, Intergraph
Data management tool needs	GIS (30%) DBase, capping Models, SYSTAT, BMOP, EIS Prep, WP, Workstation
Provide data to others	Hard-copy (65%); Floppy
Site management	
Control placement location	Yes (100%); Coordinates (35%) Inspector, Buoy
Track dredge/scow location	Yes (100%); Inspector (45%) Blackbox, Datalogging
Control frequency of disposal	No (60%); Yes (35%)
Different types of material	Large grain for beach, berm and road (80%)
Use capping	No (85%); Yes
Specify type of method	Yes, for capping, WQ (45%)
Other	No response
Need site management tools	Capping models, GIS, yield determination, fan array sonar
Management by material/site	Yes, human and environmental conflicts, particle size, contamination (80%)
Coordinate management in Corps	Varies from one to another
Role of EPA	Some involvement by EPA
Site management plan	Yes (80%)
Problems with sites	Yes (60%); mounding, movement offsite, capacity, environmental concerns
Running out of sites	Yes (45%)
Mounding problems	Yes (35%)
Material moving from site	Yes (30%); Maybe
Seasonal windows and species	Yes (100%); Mostly fish (salmon)

(Continued)

*Percentage of responders. Values are given for those questions to which the percentage of response was greater than 30 percent.

Table 3 (Concluded)	
Question on Subject Categories	**Responses and Percent of Responders**
Disposal site monitoring	
Monitoring	Yes (90%); Mostly physical
Conduct physical monitoring	Yes (80%); Mostly bathymetry
Conduct chemical monitoring	Yes (65%); When needed
Conduct biological monitoring	Yes (70%)
Beneficial uses	
Nearshore disposal	Yes (80%); Mostly beach nourishment
Other beneficial uses	Yes (85%); Wetland creation, beach disposal, landfill cover, thin-layer disposal

Data Type

Data generated by Corps districts can include information on operational and technical aspects of dredging equipment; physical, chemical, and biological data on the material to be disposed; reference and disposal sites; and volume/quantity data on dredging and disposal sites. Responses from the survey indicate that data are collected for all of these aspects of dredging, dredged material disposal, and disposal site management. Data for bathymetry and quantity of dredged material are collected routinely. Data on the type of dredging equipment and location of the dredge during operation are generally collected as well as monitoring data on the disposal site. Bioassay, sediment chemistry, and sediment physical data generation varies depending on dredging/disposal methods (open-water, upland, etc.), dredging/disposal location, and indication of need.

Data Management

The amount of data to be managed varies from a minimum amount as required under Corps regulatory authority and Federal Civil Works projects to extensive amounts for Corps districts that dispose in environmentally sensitive areas. As indicated above, one dredging project can generate a tremendous amount of data. Because these data may be necessary to interact with other Corps district elements, as well as State and Federal offices, the ability to transfer and communicate data quickly and concisely is important. How data are managed will determine the ease of data transfer. The most efficient method of data management is by personal computer (PC) spreadsheet and database software. Responders to the survey indicated that PC spreadsheet (mostly Lotus) and database (mostly DBase) software are used by the majority of Corps districts. However, very few of those surveyed indicated that data provided to others were in floppy disk format. Hard-copy format is still the most widely used method of data storage and transfer.

A not-so-new tool for geographic data storage and interpretation is a Geographic Information System (GIS). Corps districts are beginning to utilize

GIS, either by obtaining the hardware/software, in cooperative work with other Federal agencies, or through contracting. GIS was identified as the data management tool most needed by Corps districts. However, few Corps districts have the funding or manpower available to devote to establishing long-term data management systems.

Disposal Site Management

Disposal site management practices vary significantly among Corps districts, depending on requirements of various resource agencies, state and local authorities, and public and commercial use.

Typically, physical characteristics of dredged material (more than chemical) and disposal site conditions determine management strategies. For example, grain size dictates where dredged material is placed, such as sand on roads or beaches. Tracking of the dredge or scow is conducted mostly by inspectors and usually only for special projects such as capping or compliance projects. Controlling dredged material placement is accomplished mostly by geographic coordinate specification for the purpose of minimizing management area or maximizing site capacity. The frequency of dredging is not a concern to most Corps districts except to meet state regulations or avoid wildlife conflicts. Most of those districts surveyed have seasonal windows in which to dredge, primarily to avoid fish migration or spawning. About half the districts surveyed specify dredging and disposal methods to dredging contractors, usually in capping projects or to meet water quality requirements. Capping projects occur in only a few districts, however.

Most Corps districts surveyed indicated they have developed a site management plan for at least one site. Most also indicated that they are having problems at their disposal sites, including mounding, movement of dredged material offsite, disposal sites filling up, environmental concerns, and land purchasing problems. About half the districts surveyed have the problem of running out of disposal sites. Coordination of site management activities among Corps elements is handled differently from one Corps district to another. Some Corps districts indicated involvement by the U.S. Environmental Protection Agency (EPA) in site management.

Disposal Site Monitoring Data

According to the survey, most Corps districts monitor disposal sites to some extent. Large data sets can be generated from physical, chemical, and biological data collected from disposal sites. Physical data consist primarily of bathymetric monitoring of disposal sites. Other physical data include suspended solids, flow rate, and turbidity. Chemical monitoring is conducted only when necessary and generally not on a routine basis. Sediment chemistry data are the most widely collected, followed by tissue (plant and animal) and water data. Biological monitoring data, including bioaccumulation, diversity, and community structure, are collected by most districts surveyed, mainly for baseline data.

Beneficial Uses Information

Although the survey did not address data collection from beneficial use activities, information on beneficial uses of dredged material can be useful to the various Corps districts seeking disposal alternatives that achieve public support. Most districts surveyed indicated that dredged material is being used for beneficial purposes, including berms for beach nourishment, wetland creation, direct beach disposal, shallow aquatic disposal, thin-layer disposal, and landfill cover.

Conclusions

The results of this survey indicate that data storage, management, and sharing activities are not progressing at a rate equal to information management technology advances. Although this is a problem that exists among Federal agencies as a whole, some agencies have taken the lead in developing and utilizing the technology that is currently available. One problem to be recognized is the incompatibility of software (such as ArcInfo and Intergraph, QuatroPro and Lotus, etc.). This is not to suggest that the Corps have uniform spreadsheet, GIS, and database software, but to recommend that the needs and capabilities of the users be considered.

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