ERDC/TN RSM-22-3
July 2022

National Sediment Placement Data Viewer Users Guide

by Benjamin E. Emery

PURPOSE: This US Army Corps of Engineers (USACE) Regional Sediment Management (RSM) technical note serves as a user's guide for the RSM National Sediment Placement Data Viewer. This application was created utilizing over 20 yr* of detailed and verified USACE dredging data, giving users an interactive web-based tool that takes these datasets and displays them on a national map, viewable at the district or project scale. The Data Viewer will quantify the total cubic yards dredged, disposed, and/or beneficially used based on the user selected parameters. Detailed information on the datasets utilized and the verification processes followed to create this application can be found in ERDC/TN RSM-22-4, *USACE Navigation Sediment Placement: An RSM Program Database (1998 – 2019)* (Elko et al. 2022). This technical note attempts to define each of the inputs/outputs given from the Data Viewer and then provide a step-by-step example of utilizing the Data Viewer, accessed here: *https://www.arcgis.com/apps/MapSeries/index.html?appid=0ea8fc0a956f46068428c862e7497233*

INTRODUCTION: USACE is responsible for maintaining and improving over 12,000 mi† of shallow draft (9 to 14 ft) inland and intracoastal waterways, 13,000 mi of deep-draft (14 ft and greater) channels, as well as 400 ports, harbors, and turning basins. To maintain navigable channels on these waterways, USACE performs a significant number of dredging operations to remove the accumulated sediment from the channels. The RSM National Sediment Placement Data Viewer was created in conjunction with a much larger effort to quantify USACE dredging and beneficial use practices. The overall study included quantifying the volume of sediment dredged from federal navigation channels by both contract and USACE-owned dredges, the placement type, and whether sediment was disposed or placed beneficially.

Upon accessing the RSM National Sediment Placement Data Viewer, the user will see the standard home screen shown below in Figure 1. This will include the filters on the left, dredging events and placement data, a map indicating project location, and a series of charts created from the filtered data. These components will be explained in greater detail in the later sections of this report.

* For a full list of the spelled-out forms of the units of measure used in this document, please refer to *US Government Publishing Office Style Manual*, 31st ed. (Washington, DC: US Government Publishing Office 2016), 248-52, *https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf*.

† For a full list of the unit conversions used in this document, please refer to *US Government Publishing Office Style Manual*, 31st ed. (Washington, DC: US Government Publishing Office 2016), 345-7, *https://www.govinfo.gov/content/pkg/GPO-STYLEMANUAL-2016/pdf/GPO-STYLEMANUAL-2016.pdf*.

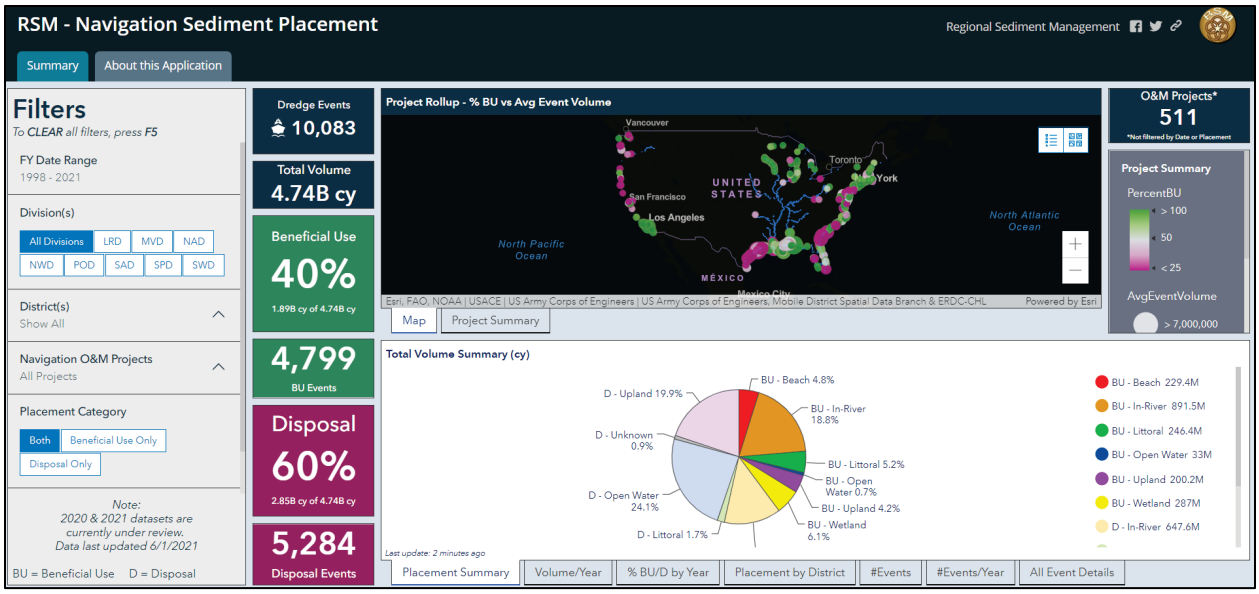

Figure 1. Sediment Placement Data Viewer.

FILTERS: The Data Viewer filters the data, allowing users to filter their query by fiscal year(s) (FYs), division(s), district(s), project(s), placement category, and placement type (Figure 2).

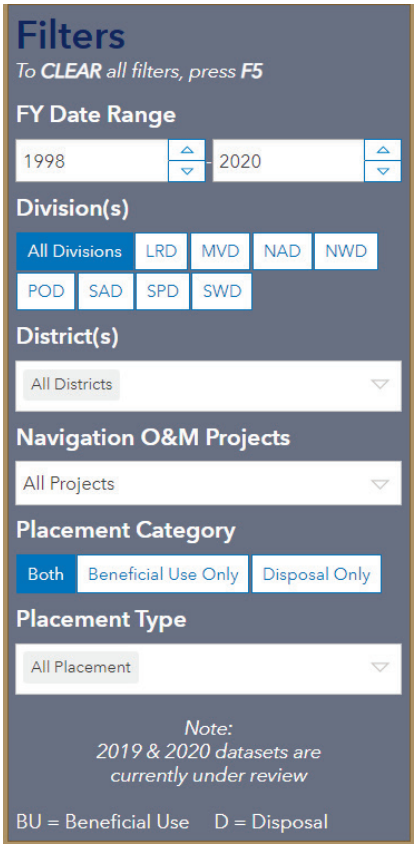

Figure 2. Filters.

FISCAL YEAR (FY) DATE RANGE: The FY operates from 1 October through 30 September, rather than the calendar year 1 January through 31 December. For instance, FY2020 is defined as 1 October 2019 through 30 September 2020. As the RSM Program was founded during the 67th Coastal Engineering Research Board in 1998, this study only includes dredging projects from FY1998 to present.

DIVISION(S)/DISTRICT(S)/NAVIGATION OPERATION AND MAINTENANCE (O&M) PROJECTS: The USACE divides the country into eight regional divisions generally defined by watershed boundaries (Table 1). Each of these divisions oversees several districts that are responsible for maintaining their individual projects, including navigable O&M projects. These projects include navigable waterways, ports, and harbors. Ports and harbors are located solely within one district while some waterways span multiple districts and/or divisions. The Data Viewer allows users to filter at the division, district, and/or specific project level. Below is a summary of the USACE divisions and the districts contained within. (Note: Non-US districts and divisions are not shown.)

Table 1. Eight regional divisions generally defined by watershed boundaries.

Great Lakes and Ohio River Division (LRD) ○ Buffalo (LRB) ○ Chicago (LRC) ○ Detroit (LRE) ○ Huntington (LRH) ○ Louisville (LRL) ○ Nashville (LRN) ○ Pittsburgh (LRP)	Pacific Ocean Division (POD) ○ Alaska (POA) ○ Honolulu (POH)
Mississippi Valley Division (MVD) ○ Memphis (MVM) ○ New Orleans (MVN) ○ Rock Island (MVR) ○ St. Louis (MVS) ○ St. Paul (MVP) ○ Vicksburg (MVK)	South Atlantic Division (SAD) ○ Charleston (SAC) ○ Jacksonville (SAJ) ○ Mobile (SAM) ○ Savannah (SAS) ○ Wilmington (SAW)
North Atlantic Division (NAD) ○ Baltimore (NAB) ○ New England (NAE) ○ New York (NAN) ○ Norfolk (NAO) ○ Philadelphia (NAP)	South Pacific Division (SPD) ○ Albuquerque (SPA) ○ Los Angeles (SPL) ○ Sacramento (SPK) ○ San Francisco (SPN)
Northwestern Division (NWD) ○ Kansas City (NWK) ○ Omaha (NWO) ○ Portland (NWP) ○ Seattle (NWS) ○ Walla Walla (NWW)	Southwestern Division (SWD) ○ Fort Worth (SWF) ○ Galveston (SWG) ○ Little Rock (SWL) ○ Tulsa (SWT)

PLACEMENT CATEGORY: This selection allows users to choose whether to see data totals/charts for beneficially reused dredged material, disposed dredged material, or both.

PLACEMENT TYPE: Placement type is presented in a screenshot of the drop-down selection panel located in the filters (Figure 3). This will allow users to filter among all placement/disposal methods or refine the search to include one or multiple placement types. Definitions of the selections follow Figure 3.

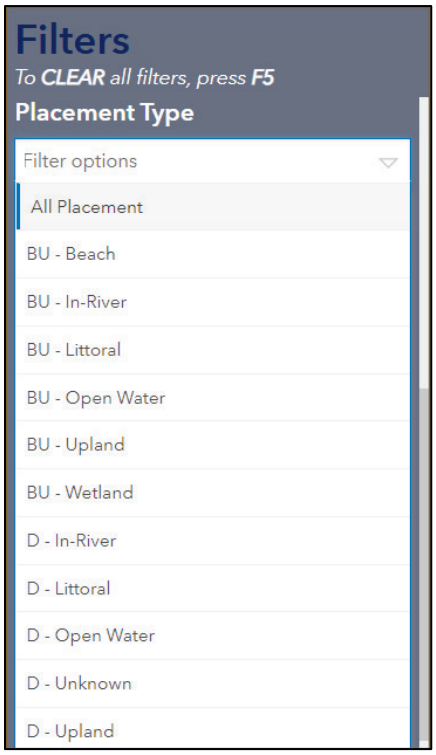

Figure 3. Placement type.

- **BU–Littoral.** Dredged material pumped into the littoral zone of beaches or river systems. The littoral zone placement generally describes nearshore placement extending to the high-water mark. This allows natural deposition of the dredged material onto beaches or for nearshore protection.
- **BU–In-River.** Dredged material placed in river for purposes of keeping sediment in system for natural processes and habitat restoration
- **BU–Open Water.** Dredged material placed in open water, generally in coastal/ocean settings, for habitat restoration of capping purposes.
- **BU-Upland.** Generally, dredged material will be placed by method of trucking for upland capping purposes.
- **BU–Wetland.** Dredged material is generally pumped into wetlands as a slurry or dispersed through thin layer displacement for aquatic/wetland habitat restoration.
- **D–In-River.** Dredged material pumped back into river channels for disposal.
- **D–Littoral.** Dredged material pumped into the littoral zones of coastlines or rivers for disposal.

- **D–Open Water.** Dredged material pumped/dumped into open water dredge disposal areas.
- **D–Unknown.** Unspecified how dredge material was disposed.
- **D–Upland.** Dredged material pumped or placed into designated upland dredge disposal areas.

FUTURE PLACEMENT CATEGORIES: As described in the ERDC/TN RSM-22-XX, *USACE Navigation Sediment Placement: An RSM Program Database (1998 – 2019)* (Elko et al. 2022), the Data Viewer contains dredging records from the Dredge Information System (DIS). At the time of this publication the DIS utilizes the above referenced categories as placement type selections. USACE will update the Dredge Material Management Categories to reflect the placement options shown in Table 2. The data viewer will update placement category selections to be consistent with the USACE guidelines once DIS has adopted these changes. Historic records will also be updated accordingly to reflect the new format.

Table 2. Future placement categories.

Agriculture, Horticulture, Forestry and Aquaculture	Over the past 100 years, considerable and innovative uses of dredged material placement sites have been made by the agriculture, forestry, horticulture, and aquaculture industries. Some placement sites, especially in river systems, have provided livestock pastures. These pastures have not been developed in any way except by allowing natural grass colonization or by planting pasture grasses on them. Other uses involve actively incorporating dredged material into marginal soils. An attractive alternative for disposing of dredged sediments is to use these rich materials to amend marginal soils for agriculture, forestry, and horticulture purposes.
Aquatic Habitats	Aquatic habitats are typical submerged habitats extending from near sea, river, or lake level down several feet. Examples are tidal flats, oyster beds, seagrass meadows, fishing reefs, clam flats, and freshwater aquatic plant beds. They are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region.
Beach Nourishment	Four major types of beach nourishment occur along U.S. shorelines: new borrow material not connected with maintenance dredging, maintenance dredging of an existing channel, placing in the littoral zone, nearshore, or shallow water sites to promote shoreward migration, and rehandling of stockpiled material.
Confined (Diked) Placement	“Confined placement” is placement of dredged material within diked nearshore or upland CDFs via hydraulic or mechanical means. A CDF is an engineered structure for containment of dredged material. They may be constructed as upland sites, nearshore sites with one or more sides in water (sometimes called intertidal sites), or island containment areas. If the material placed in the site will be offloaded for other uses, select a placement category that characterizes the offloaded sediment use.
Confined Aquatic Disposal	Confined aquatic disposal (CAD) (placement) is the dredging of unacceptable contaminated sediments from one or more locations, transporting of the material to a placement site, and controlled capping or covering of contaminated material in open water.

Table 2. Continued.	
Construction and Industrial/Commercial Uses	Harbor and Port Facilities; Residential and Urban Use; Airports; Dikes, Levees and Containment Facilities; Fill Material and Roads; Island and Historic Preservation.
Island Habitats	Islands are upland and/or high zone wetland habitats distinguished by their isolation and particular uses and surrounded by water or wetlands.
Multipurpose Uses and Other Land Use	With careful engineering design, construction, long-term coordination and planning, and proper implementation of operational and maintenance procedures, a placement site having combinations of uses may be developed. Such multipurpose use is strongly encouraged. A park and recreational development built over an existing solid waste landfill using dredged material as a cap is an example of how several of the beneficial uses discussed in the preceding sections can be lumped into a single multipurpose project.
Open-Water Placement	Open-water sites are in riverine, lacustrine, estuarine, and marine environments and are bottom-surface areas with overlying volumes of water, where specific dredged material placement activities are permitted. If the open-water placement is intended for beneficial use, select Aquatic Habitats for the placement category.
Parks and Recreation	Potential recreational uses of dredged material placement sites are practically unlimited. They range from projects as simple as fill for a recreation access road to projects as large as Belle Island in the Detroit River on the United States-Canada border and the Lake Vancouver Park, WA, to projects as complex as the 1,800 ha Mission Bay development in San Diego, CA, supporting both public and private commercial and noncommercial recreation facilities.
Strip Mine Reclamation, Solid Waste Landfill, and Alternative Uses	The reclamation of abandoned strip mine sites that are too acidic for standard reclamation practices, the capping of solid waste landfills, the use of material to protect landfills, and the use of material to manufacture bricks and hardened materials such as road surfaces. All uses require reliable quantities of dewatered dredged material that could be moderately contaminated and still be acceptable. These uses would ultimately provide non-consumptive vegetative cover to unsightly areas, and the areas could be further reclaimed for minimal-use recreation sites and/or wildlife habitat.
Upland Habitats	Upland habitat includes a very broad category of terrestrial communities, characterized by vegetation not normally subject to inundation. Types may range from bare ground to mature forest.
Wetland Habitats	Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include freshwater and saltwater marshes, relatively permanently inundated freshwater marshes, bottomland hardwoods, freshwater swamps, bogs, and freshwater riverine and lake habitats.

OUTPUTS/INTERFACE: When accessing the Data Viewer, filters will default to include all dredging events USACE wide (disposal and beneficial re-use) from 1998 until present. Outputs will update based on user filter selections. The output examples shown in Figure 4 are from the default selections.

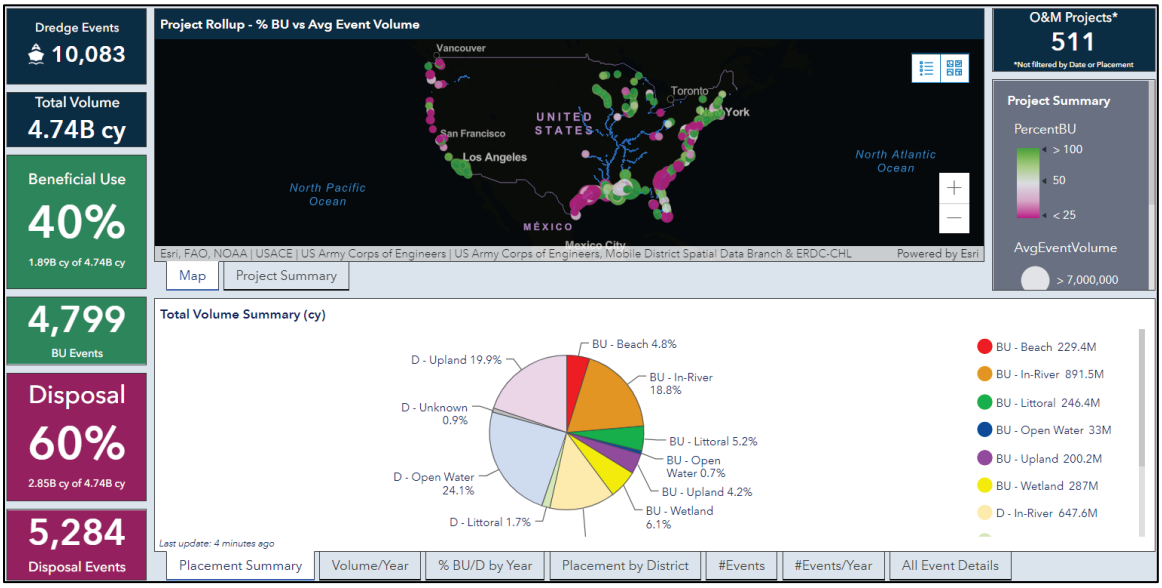

Figure 4. Default output.

Figure 4 shows all data contained within the RSM dredging database. The first green square on the left side of Figure 4 shows the percentage of the total dredged material that was used beneficially (along with total cubic yards) while the first red square shows the percentage of material that was disposed of non-beneficially. The second green square and second red square show the total number of dredging events that used dredged material beneficially or just disposed of material, respectively. If the user sets the filter to show only a placement category of "Beneficial Use Only," or "Disposal Only," the output screen would change to reflect those selects, as demonstrated in Figure 5.

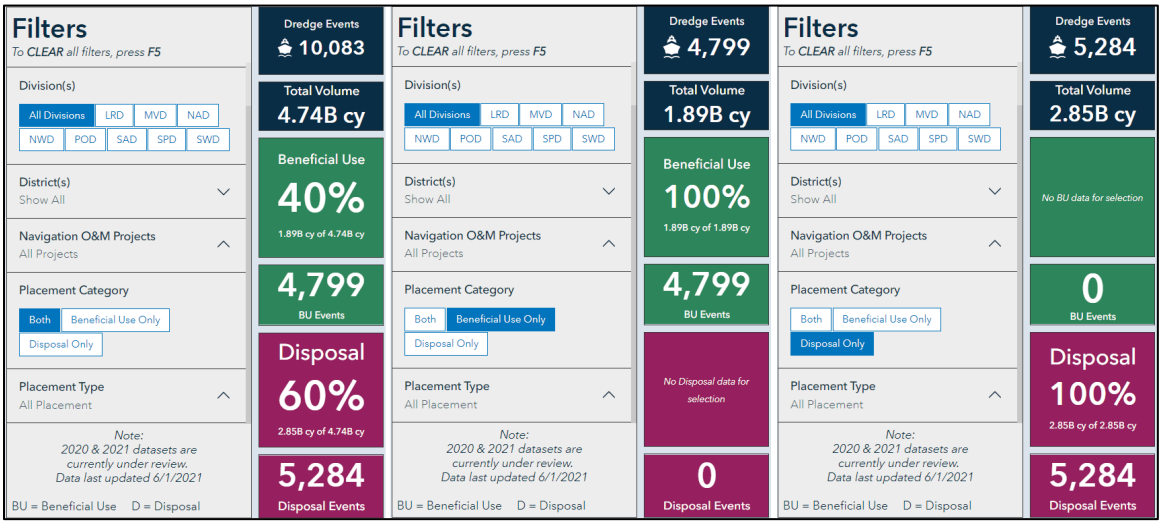

Figure 5. Beneficial use vs. disposal output.

The next part of the Data Viewer is the interactive map shown at the top of the Data Viewer (Figure 6). Based on the user-defined filters, the map will auto-generate with colored circles showing all the included dredging events. These circles will vary in color from pink to green, depending on the percentage of dredged material from that dredging event that was used beneficially. Dark pink indicates that 0% of the dredged material was utilized beneficially while dark green indicates that 100% of the dredged materially was utilized beneficially. These circles will also vary in size, depending on the volume of the material dredged in each event, with largest circles applying to dredging events that remove more the 7 MCY and the smallest circles applying to events removing under 5,000 CY.

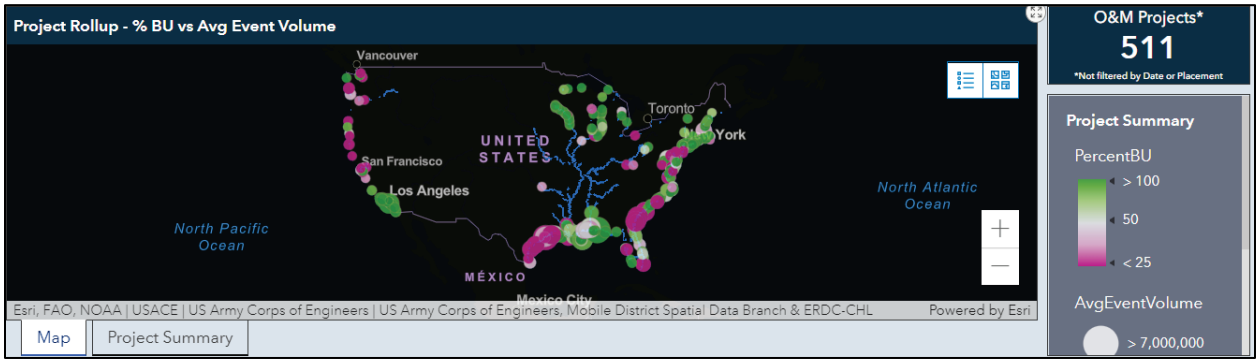

Figure 6. Standard map output.

This map is interactive. The user can zoom in and out on the map by using the plus and minus boxes located in the bottom right. The user can also change the base map by selecting the "four-box" icon in the top right of the map (Figure 7).

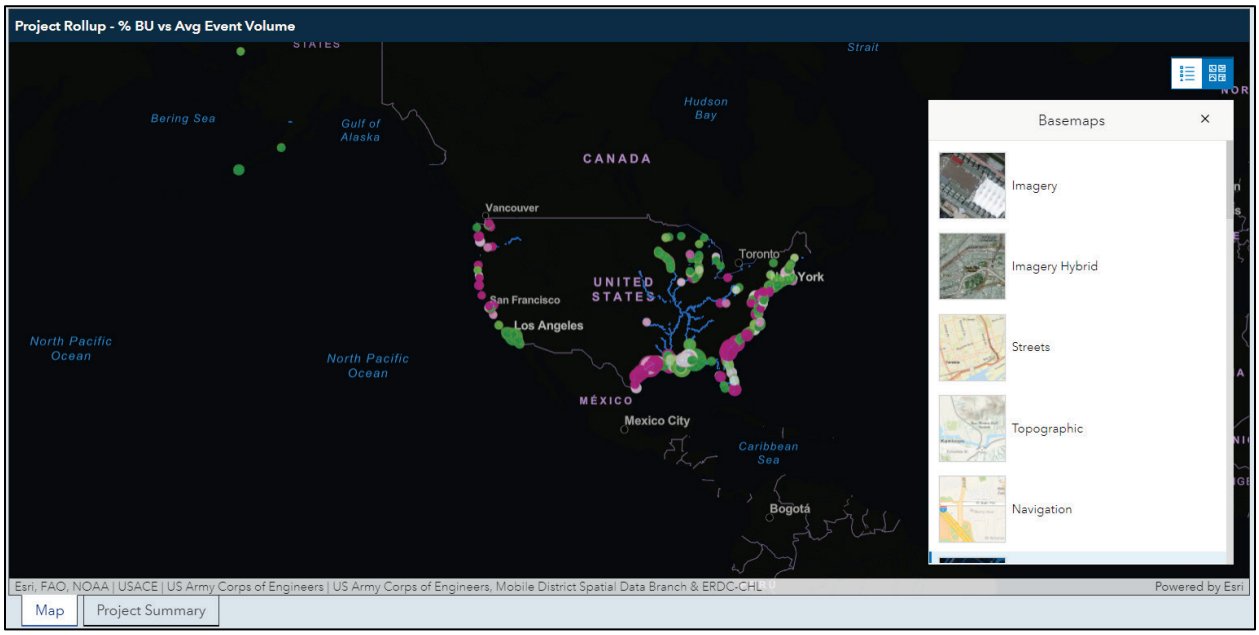

Figure 7. Base map options.

Note the tab labeled "Project Summary" located near the bottom-left corner of the map (Figure 7). When this is selected, it will show project-specific information (Figure 8) for all of the events in the selected parameters.

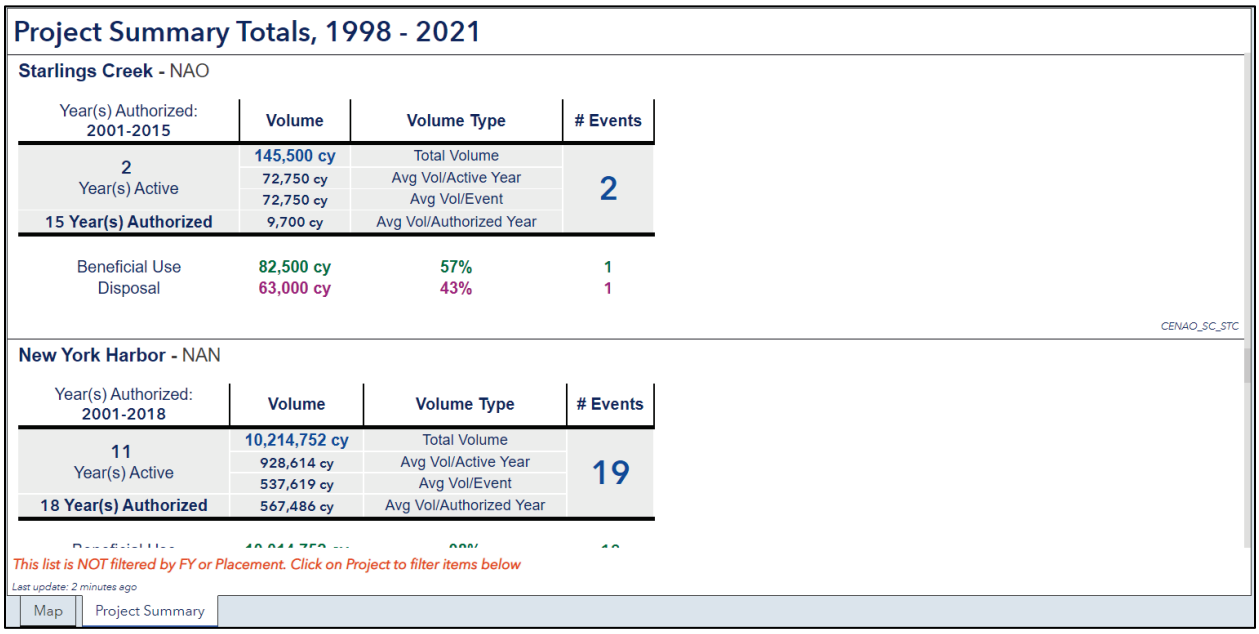

Figure 8. Project summary tab.

The project summary (Figure 8) includes information specific to the project itself, including project name, district code (i.e., LRB), active and authorized years, total number of dredging events included, total volume removed, average volume removed per year and event, and a separation of disposal versus beneficial reuse. This is the background information that will be used to show the outputs in the green and pink boxes on the Data Viewer. These data can also be accessed by selecting a project or district/division boundary on the map itself (Figure 9).

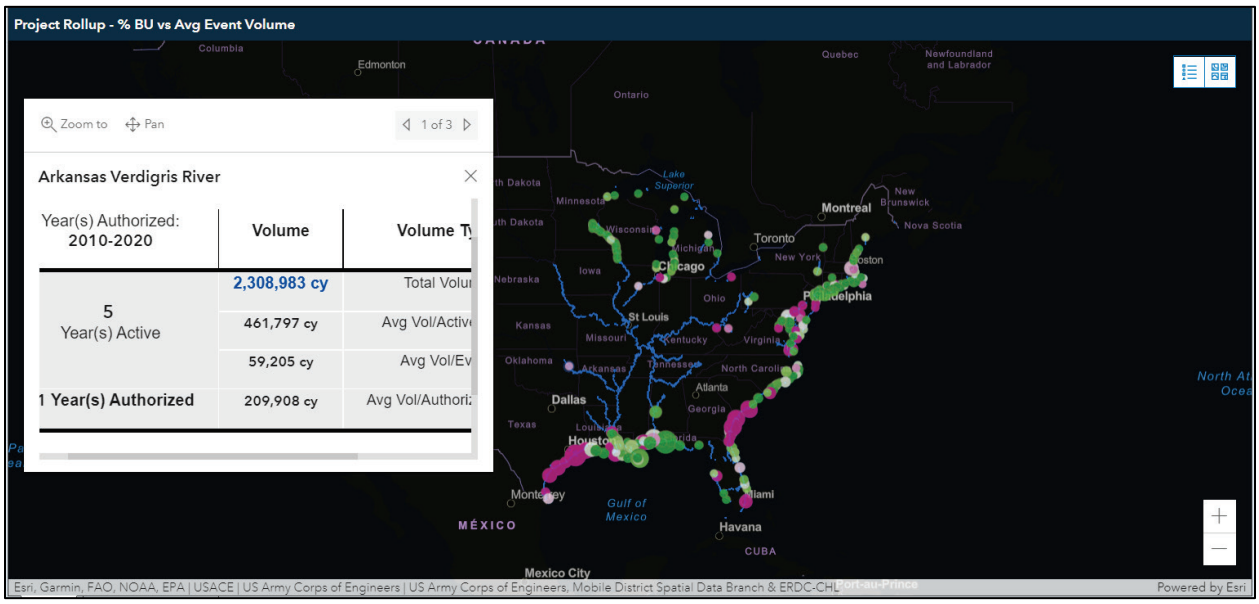

Figure 9. Project map selection.

In the bottom right of the main Data Viewer screen is a series of tabs showing select charts, graphs, and data. For continuity in this report, the following charts represent all data contained within the database, (no filters selected), unless stated otherwise.

The first tab shown is the "Placement Summary" tab (Figure 10) and corresponding chart. This uses all of the dredging data from the selected parameters and separates it by the beneficial use placement or disposal type. By hovering a mouse over any piece of the chart, a pop-up screen will show the total amount of dredged material placed, or disposed of, in that category. This pop-up can also be accessed by hovering over the legend to the right of the chart (Figure 11).

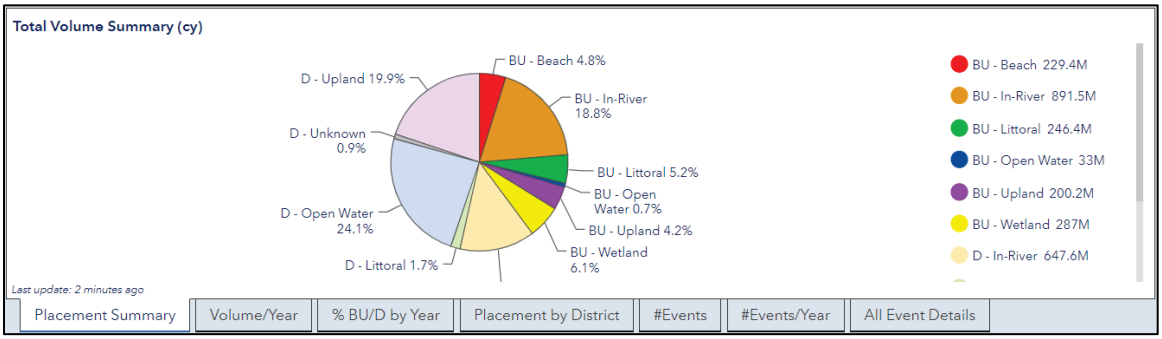

Figure 10. Placement summary tab.

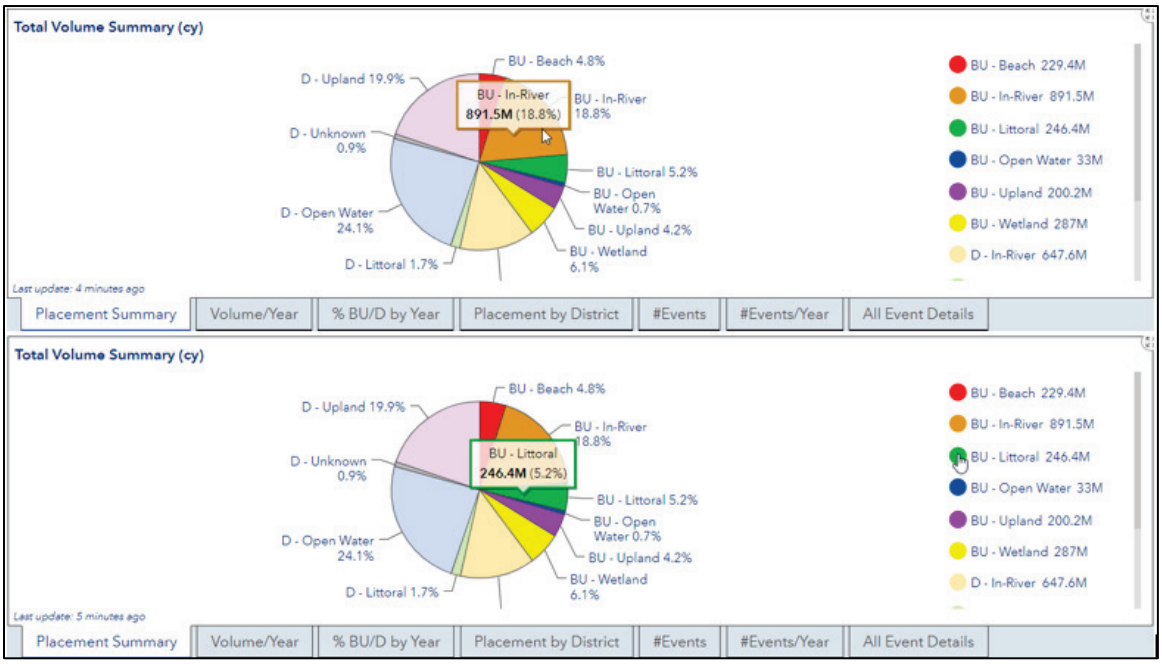

Figure 11. Total volume summary (cubic yards).

While the user can obtain the information pop-up to show by hovering over the legend, actually selecting a colored circle in the legend will filter that category on and off. Notice in Figure 12 that the "BU-In-River" has been turned off and the chart has been adjusted accordingly. To turn the feature back on, the user can select the feature again, and it will turn from gray to color, and the chart will re-adjust.

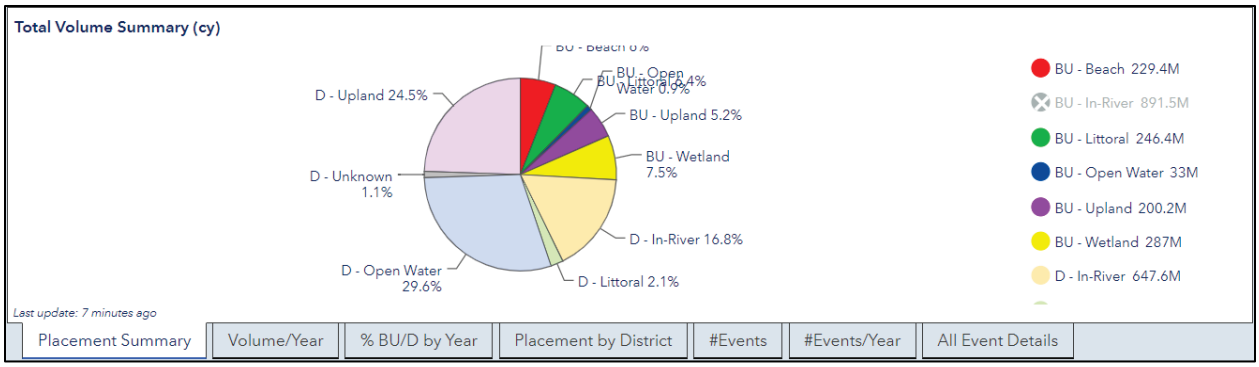

Figure 12. Total volume summary (cubic yards).

VOLUME PER YEAR: The second tab contained in this section of the Data Viewer is the volume per year tab shown in Figure 13.

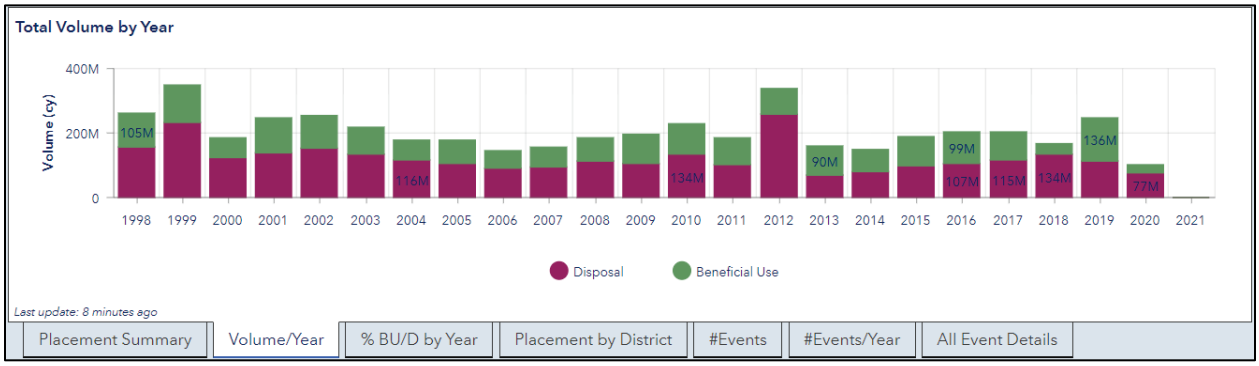

Figure 13. Volume per year (cubic yards).

This chart represents the overall total material dredged per year separated between beneficially used material (green) and disposed-of material (dark pink). For example, in 2016, 107 MCY of dredged sediment was disposed of, and 99 MCY of dredged material was used beneficially, for a total of 206 MCY of material dredged on USACE projects. As with most of the other features in the Data Viewer, this chart is interactive, allowing users to turn the Disposal or Beneficial Use data on or off (Figure 14).

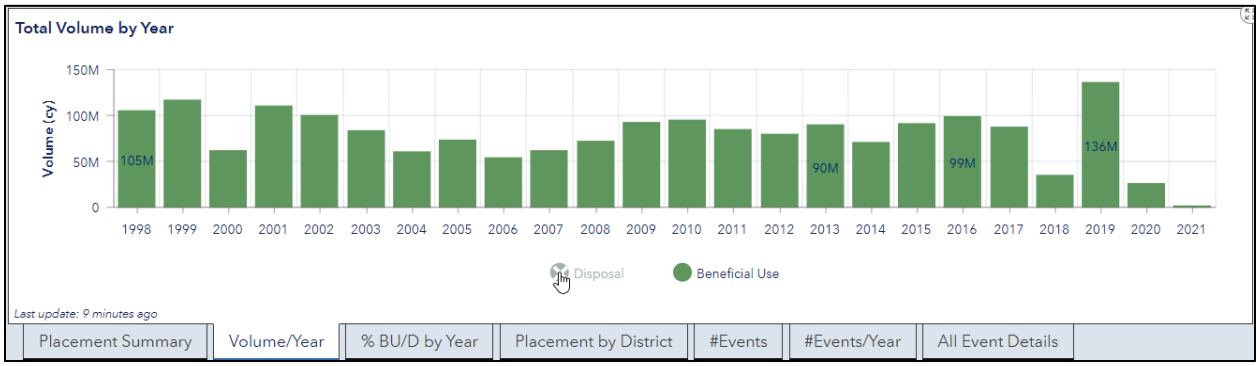

Figure 14. Volume per year, beneficial use only.

AVERAGE PERCENTAGE BENEFICIAL USE VS. PERCENTAGE DISPOSAL OVER TIME: The next tab (Figure 15) shows the average percentage of beneficially used dredged material as it compares to the percentage of dredged material being disposed.

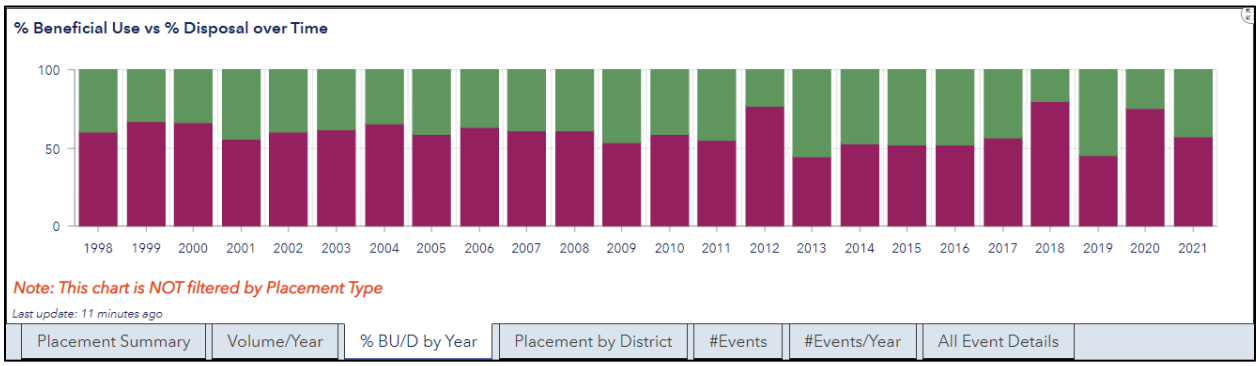

Figure 15. Percentage BU/D by year.

PLACEMENT BY DISTRICT: Figure 16 gives a visual representation of the total dredging amounts and disposal/beneficial reuse methods utilized by each district for the selected time frame. As in other charts, the categories can be turned on and off by selecting the colored icons in the legend. For a detailed explanation of each of the disposal or beneficial use methods shown, please refer to page 4 of this report. For comparison purposes, Figure 16 shows placement activities by district, USACE wide from 1998 to present while Figure 17 shows only South Atlantic Division (SAD) data over the same time-period.

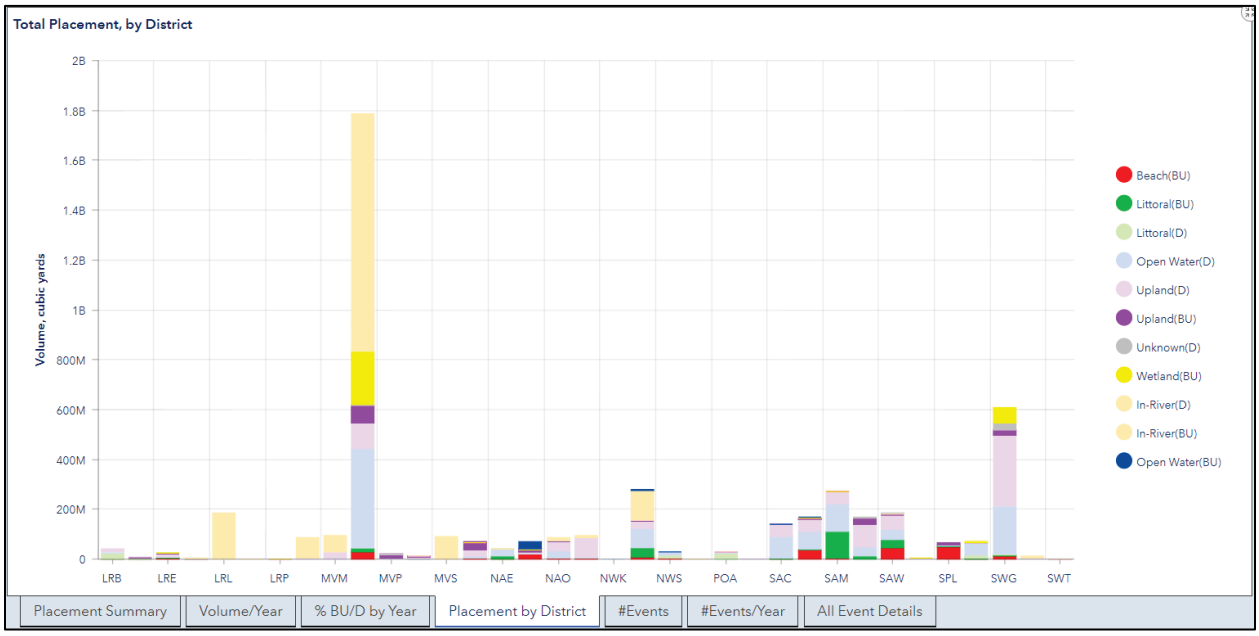

Figure 16. Total placement by district (USACE).

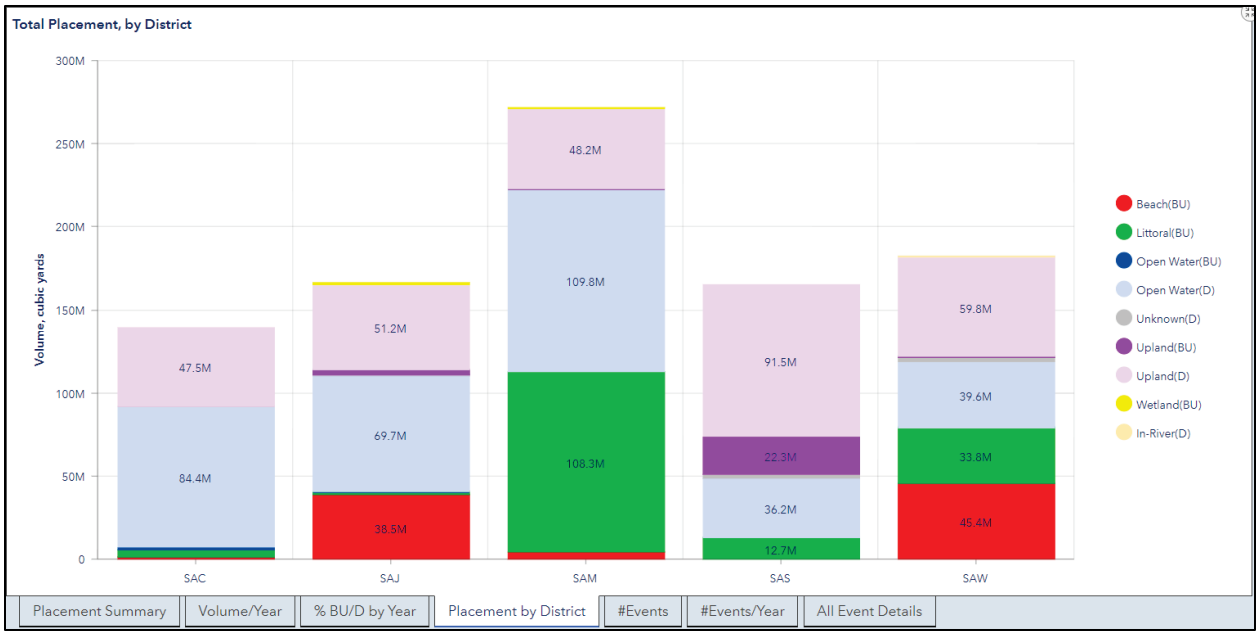

Figure 17. Total placement by district (SAD).

NUMBER OF EVENTS: This tab produces a chart (Figure 18) identifying the total number of events by placement method for the selected data range. For comparison, the first chart shows the entire USACE dredging data from 1998 to present while the second chart was created using only SAD data over the same time period (Figure 19).

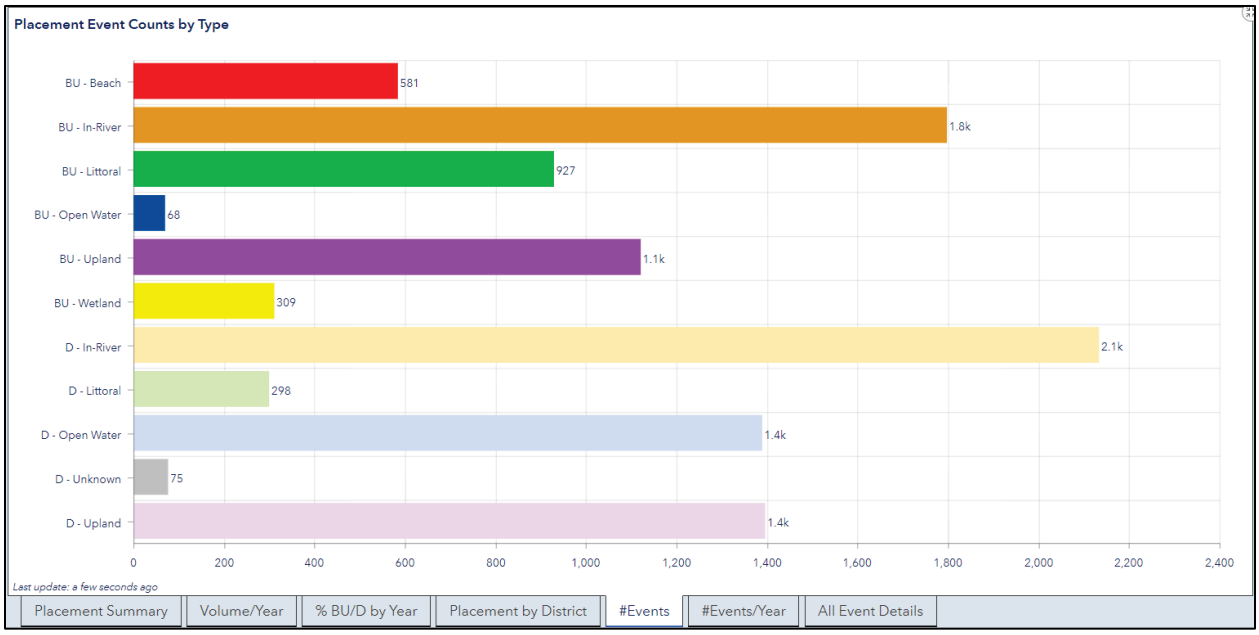

Figure 18. Number of placement events by type (USACE).

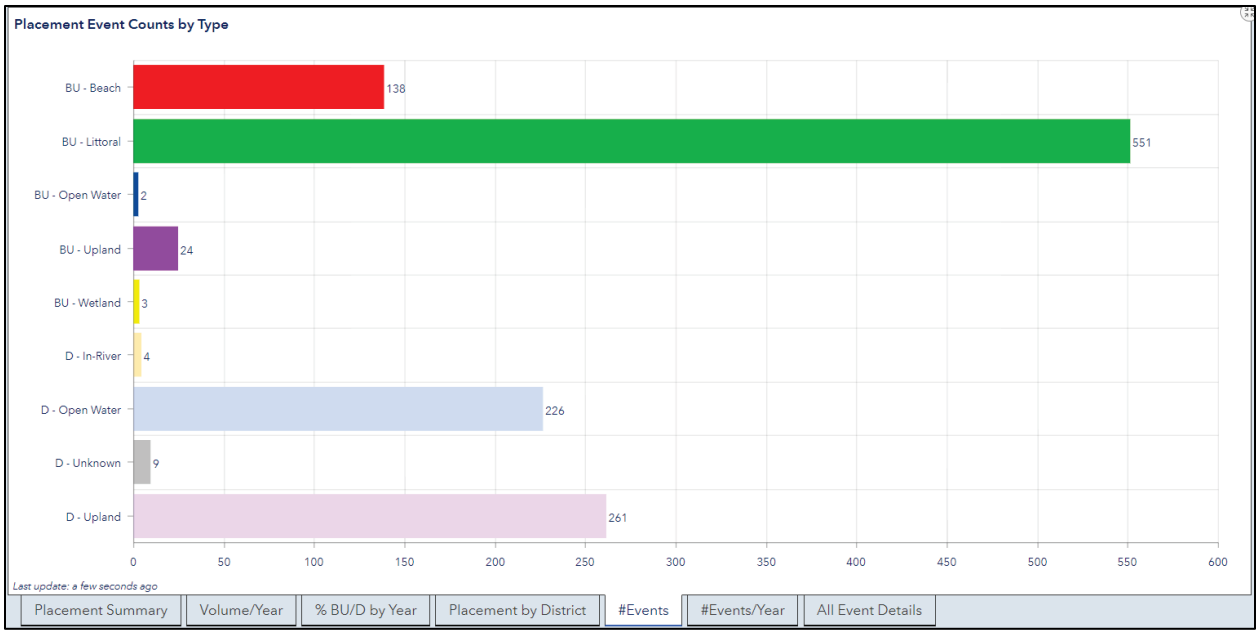

Figure 19. Number of placement events by type (SAD).

Number of Events per Year. This tab produces a chart (Figure 20) showing the number of disposal events and number of events where dredged material was used beneficially.

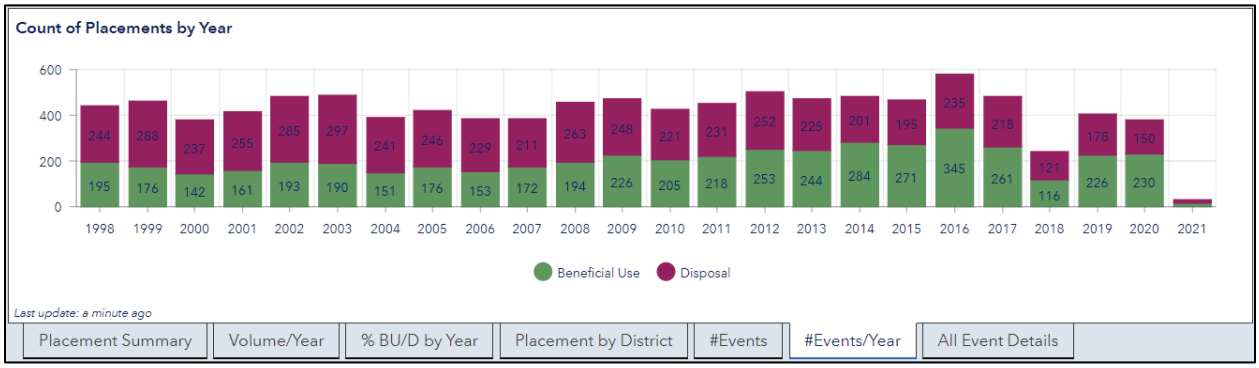

Figure 20. Count of placement by year.

All Event Details. When a user selects this tab, the user will be presented with a full accounting of all projects contained within the filtered parameters, and the data which were used to create the totals and charts. Figure 21 is an example screenshot, showing two separate dredging events included from Cleveland Harbor. If no filtered selections have been made every individual dredging event will be listed and the user can scroll through each event if desired.

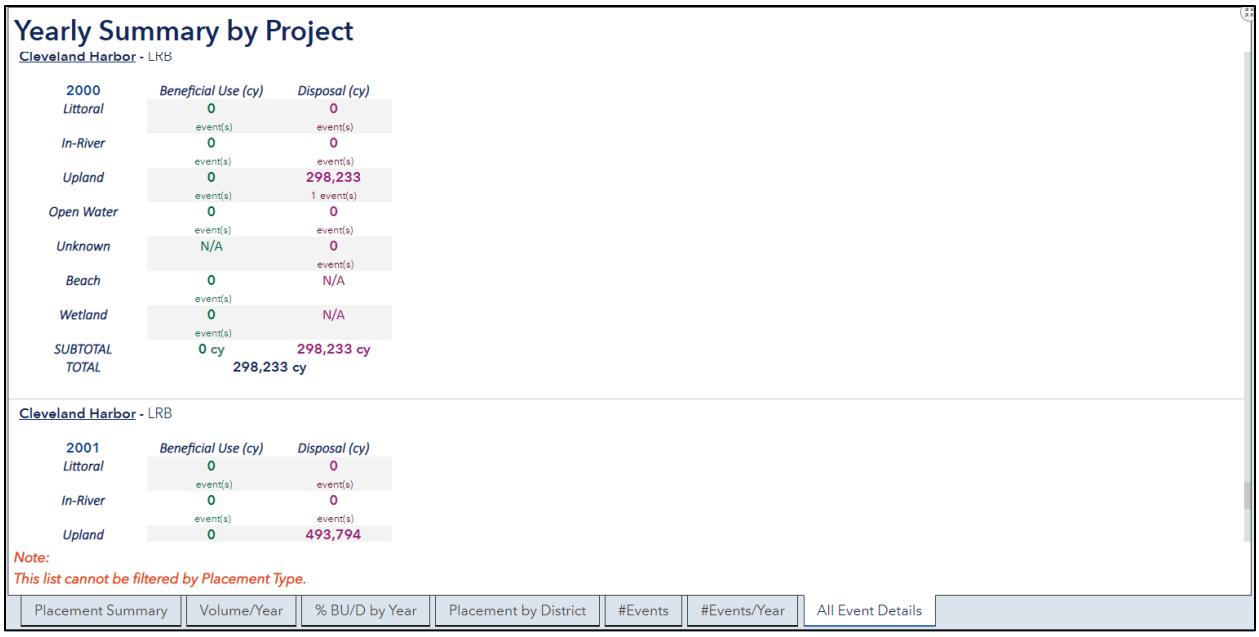

Figure 21. Yearly summary by project.

ADDITIONAL INFORMATION: For additional information, contact Ben Emery, *Benjamin.E.Emery@usace.army.mil*. This study was conducted as an activity of the RSM Program, a Navigation Research, Development, and Technology portfolio program administered by Headquarters, USACE. For information on the RSM Program, please consult *http://rsm.usace.army.mil* or contact the Program Manager, Dr. Katherine E. Brutsché at *Katherine.E.Brutsche@usace.army.mil*.

This technical note should be cited as follows:

> Emery, Benjamin E. 2022. *National Sediment Placement Data Viewer Users Guide*. ERDC/TN RSM-22-3. Vicksburg, MS: US Army Engineer Research and Development Center. *http://dx.doi.org/10.21079/11681/44700*.

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Elko, N., K. Brutsché, Q. Robertson, M. Hartman, and Z. Dong. 2022. *USACE Navigation Sediment Placement: An RSM Program Database (1998 – 2019)*. ERDC/TN RSM-22-4. Vicksburg, MS: US Army Engineer Research and Development Center.