

I. Introduction

This report presents the findings of an independent Federal Review Team that was created to evaluate dredged material disposal practices and processes at the Mouth of the Columbia River (MCR). The report reviews the background information, synthesizes our observations, and provides commentary and recommendations on various aspects of dredged material management. The findings in this document represent the collective opinion of the Review Team.

II. Purpose of the Review Team

In response to concerns regarding potential impacts of dredged material disposal practices at the MCR, the Portland District (NWP) of the US Army Corps of Engineers convened an independent Review Team with expertise in disposal site management and monitoring and coastal wave dynamics to evaluate these concerns. A primary cause for creation of the Review Team was the fatalities associated with the capsizing of the fishing vessel, *Miss Brittany*, August 7, 2001 in the vicinity of the dredged material disposal Site E, followed by the capsizing of two small recreational vessels on Labor Day weekend near the MCR.

III. Proceedings of Review Team

A. Charge from the District Engineer

The Review Team met with the Portland District Engineer, Colonel Randall Butler, the senior District staff, and North Pacific Division staff on 18 September 2001 to discuss the role of the Review Team. Colonel Butler asked that the Review Team examine any and all information the team felt necessary to investigate MCR management practices. He made all documents and staff available to the Review Team. He asked that the Review Team both identify operations that could be improved and note those that have been done well. Based on these findings, he asked that the Review Team provide recommendations on any aspect of District operations and management that the Review Team believed would improve future operations.

B. Review Team Composition and Background of Members

The Review Team was comprised of four individuals with expertise in (1) ocean dredged material site management, (2) ocean dredged material site monitoring, and (3) coastal wave dynamics. The Review Team was comprised of four members from locations outside of the Pacific Northwest: two from the US Environmental Protection Agency (EPA) and two from the US Army Corps of Engineers (USACE).

Review Team Members and Backgrounds		
Name	Office	Areas of Expertise
Thomas Fredette, PhD (Review Team Chair)	US Army Corps of Engineers, New England District Concord, MA	Dredged Material Disposal Site Designations, Management & Monitoring
Edward Hands	Engineer Research and Development Center Vicksburg, MS	Coastal Waves, Currents, and Seafloor Responses
William Muir	US EPA Region 3 Philadelphia, PA	EPA's Designated National Ocean Dumping Expert
Brian Ross	US EPA Region 9 San Francisco, CA	Ocean Disposal Site Designations, Management, and Monitoring

C. Activities of the Review Team

The Review Team conducted its investigation using a combination of briefings, interviews, document reviews, and Review Team meetings. These were conducted from 17-20 September 2001. A preliminary findings briefing was held with the District Engineer and senior District staff on 20 September 2001. The Review Team departed Portland, Oregon on 21 September 2001 and continued its investigation reviewing requested documents and speaking with various staff members as needed. The Review Team received all the information that it requested, and believes this information was adequate to evaluate operations at the MCR and to reach the conclusions and recommendations contained in this report.

1. BACKGROUND INFORMATION

The Review Team convened in Portland, Oregon on 17 September 2001 at the USACE Portland District office and began with a series of background information briefings on the dredged material management practices in the vicinity of the Columbia River mouth. These discussions were held with Portland District staff members Eric Braun, Doris McKillip, Hans (Rod) Moritz, and Mark Siipola, USACE Northwest Division staff, Jim Reese, and John Malek, US EPA Region 10 ocean disposal coordinator.

These discussions focused on the use of the multiple disposal sites in the region over the last few years (Figure 1a and 1b) and in particular 2001. The Review Team developed a list of documents and information needs that District and EPA Region personnel readily provided from their files.

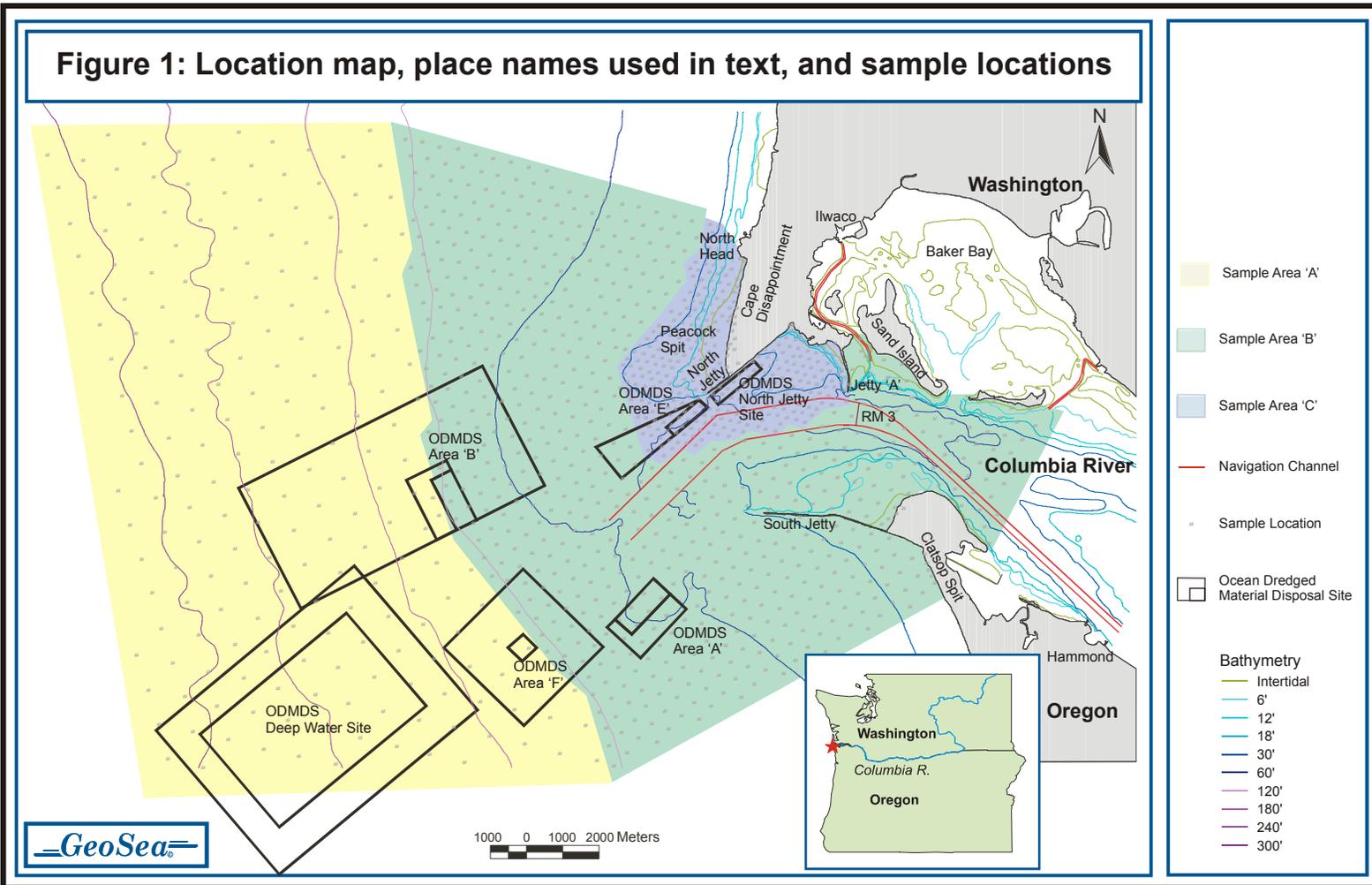


Figure 1a. Map of disposal sites near the mouth of the Columbia River (reproduced from McLaren and Hill, 2001).

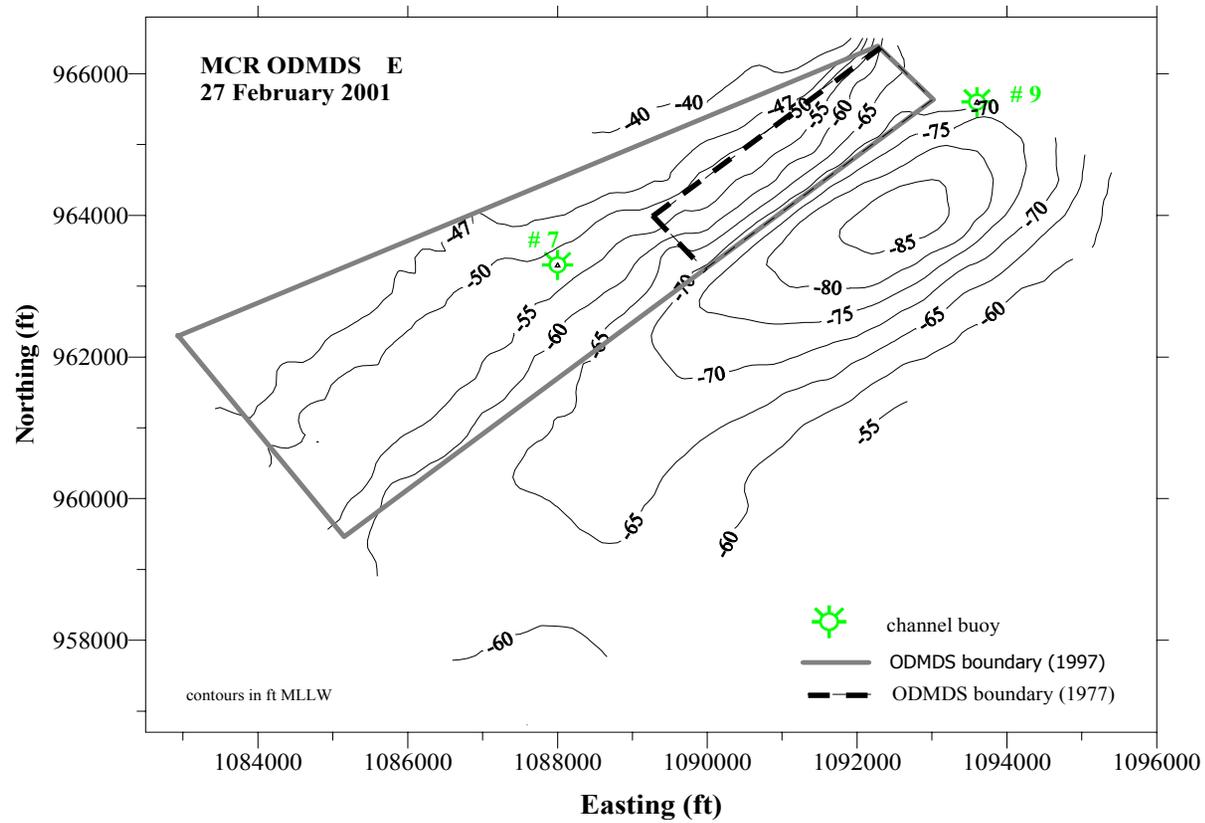


Figure 1b. Site E showing the 102 (1977 boundary) and 103 (1997 boundary) portions of the site.

Key, basic information gained from these background discussions included the following:

- ◆ The Columbia River mouth is renowned as one of the most dangerous coastal inlets in the world (USACE 1999).
- ◆ Peacock Spit, immediately north of the entrance channel, is the predominant bathymetric feature affecting wave climate in the area.
- ◆ For the last century, Peacock Spit has been undergoing long-term erosion; this erosion could eventually jeopardize the integrity of the North Jetty.
- ◆ There is an annual need for 4-5 million cubic yards of capacity for maintenance dredged sediment from the federally authorized navigation channel MCR project.
- ◆ The optimum time to dredge the MCR project is from June to November because of sea state, river flow conditions, and navigation needs.
- ◆ Site E, adjacent to Peacock Spit, has been the primary site used in the past few years (especially since 1997) for placement of dredged sand from the MCR with lesser amounts going to Sites F and the North Jetty.
- ◆ Sediments placed into Site E are dispersed from the site over time by waves and currents.
- ◆ Site F is close to its maximum capacity and is non-dispersive.
- ◆ The North Jetty Site has limited annual capacity (~500,000 cubic yards), but is dispersive.
- ◆ Site E is managed to maximize retention of sand in the littoral system, minimize potential to adversely affect wave climate, minimize conflicts with the Dungeness crab fishery and maximize dredging efficiency.
- ◆ These site management goals, in part, conflict with one another which requires balancing among them.
- ◆ The sand retention goal is prescribed in state water quality certificates.
- ◆ The wave climate goal is prescribed in a court mediated Settlement Agreement (SA).
- ◆ The fishery conflict goal is prescribed in the same court mediated Settlement Agreement and prohibits placement of sediment in the deeper, westerly portion of Site E after August 15th.
- ◆ The District manages contract and Corps dredges with a goal of minimizing sediment mounding within Site E.
- ◆ The District conducts bathymetric surveys to assess accumulation of sediment in Site E.
- ◆ The District conducts modeling based on the results of bathymetric surveys to predict potential wave amplification by the sediment accumulation.
- ◆ Because of its limited annual capacity, the 102 designated portion of Site E is only a short-term and partial solution for managing sediments from the Columbia River mouth.
- ◆ Studies are underway by the District and EPA Region 10 to designate additional 102 sites in the region that will adequately serve the long term MCR maintenance needs and address the multiple management goals for the area.

- ◆ The District coordinates with EPA and other interested parties through frequent and multiple lines of communication.

2. BRIEFINGS, INTERVIEWS, AND FACT FINDING

Briefings and Interview. Following its initial background briefings, the Review Team requested three specific briefings as part of its investigation. The first was presented by Mr. Hans (Rod) Moritz on bathymetric surveying of the disposal sites and computer wave modeling. The second was with Captains Neal Nyberg and Ron Henry, Masters of the Corps dredge *Essayons*. The third was with Lieutenant Sean Regan, US Coast Guard, who is leading the investigation into the boating accidents that occurred during the summer of 2001 in the Peacock Spit area.

Fact Finding. The Review Team requested numerous documents and information summaries from District staff for review. In addition the Review Team conducted interviews with District staff Mark Siipola, Eric Braun, Doris McKillip, and Rod Moritz, and Mr. John Malek of EPA Region 10. Additional documents were provided to the Review Team, at their request, in the days following the sessions in Portland.

IV. Findings

A. Overview of Site Management

Site E is located immediately west of the North Jetty at the mouth of the Columbia River (Figure 1). This is an extremely challenging area for any size vessel, including large hopper dredges, to operate in. As summarized in USACE, 1999:

The Columbia River entrance is characterized by exceptionally strong wave-current interactions. As a consequence, the river entrance has been recognized as one of the most dangerous coastal inlets in the world. The sea state at the river entrance during storm conditions can be characterized by high swells from the northwest to southwest combined with locally generated wind waves from the south to southwest. Such combined seas at the river mouth can be particularly dangerous to the mariner, especially when opposing ebb currents cause dramatic wave growth, steepening, and breaking incoming waves.

Because of these characteristics, only hopper dredges are feasible for maintaining the federal channel at the MCR, and dredging can only occur during the summer months.

Site E is actually made up of two federally authorized disposal sites that are technically managed separately (Figure 1). The original Site E, which comprises a rectangle in the eastern portion of the area, was designated as a permanent ocean dredged material disposal site in 1986 by EPA, pursuant to Section 102 of the MPRSA. As a permanent, EPA-designated “102 site” this area must be managed in accordance with a Management and Monitoring Plan (MMP) written and/or approved by EPA Region 10.

The most recent version of the MMP for this site, dated January 1998, was in force during 2001.

In 1997, the Portland District created an expansion of the original Site E (as well as further expanding Site B) pursuant to Section 103 of the MPRSA. Site selections by the USACE under Section 103 are temporary (not to exceed five years, with one five year extension possible) and for project-specific use. MMPs are not required for temporary “103 sites”, but EPA must concur in the USACE’s proposed selection of such sites. Among other things, the USACE must establish to EPA’s satisfaction that any existing 102 sites in the vicinity are either not available or not sufficient and practicable to use for the project at issue. EPA did participate in development of the 1998 MMP, and that MMP did cover management at both the “102” and “103” portions of the ODMDS.

Every year, on average, about 4.5 million cy of sand are dredged from the MCR navigation channel. Between 1977 and 1987, Sites A and E received most of this dredged material. Beginning in 1988, the USACE voluntarily restricted disposal at Site E to approximately 1 million cy per year based on concerns that deposited material eroding from the site might migrate into the estuary or back into the navigation channel. However, disposal at Site E increased starting in 1998 partially in response to a need identified by requirement of the State of Washington to retain as much sand as possible be retained in the near shore littoral system in order to retard coastal erosion to the north. From 1998 through 2000, an average of approximately 3.4 million cy was placed at Site E each year. In 2001, a total of 3.6 million cy was placed at Site E.

As noted above, there are three other ocean disposal sites in the area. However, Site F (as designated by EPA in 1983 and expanded in 1993) (Figure 1) is now in effect the only other potentially available ocean disposal site because EPA Region 10 has deactivated Sites A and B, in part due to mounding, in 1992/1993. Site F has three key limitations, however. First, it is not dispersive in the manner of Site E, and has limited capacity. Second, it is directly off shore of and in line with the navigation channel, and is where pilot vessels meet incoming shipping. Third, material disposed in this area is likely to be lost to the near shore littoral system. The other available disposal option for some of the material dredged from the MCR federal channel is the recently established site immediately south of the North Jetty. The “Jetty” site is a CWA Section 404 site, rather than an ocean dumping site under the MPRSA, since it is inside the baseline of the Territorial Sea. Material placed at the Jetty site is in part sacrificial sand that helps to protect the North Jetty from being undermined due to erosion. The site has a capacity of approximately 500,000 cy per year.

Potential new sediment management alternatives have been evaluated in a comprehensive EIS (USACE, 1999). This evaluation considered the feasibility of direct upland or beach disposal, estuarine disposal, and continued ocean disposal at various locations. These alternatives were found to be not feasible for a number of reasons, and the EIS proposed action included continued use of a shallow water dispersive disposal site where Site E presently exists (along with continued use of the Jetty site), and establishment of a new deeper water offshore site that would not have the constraints or potential impacts of the previously designated sites including Site F. Retention of sand in

the near shore littoral system was identified as one of the main objectives of the overall approach, and hence maximizing the volume of sand that could be disposed at the Shallow Water site plus the Jetty site would continue to be a primary management goal. Designation of these new proposed disposal sites has been delayed, however, leaving Site E, Site F, and the Jetty site as the only alternatives presently available for management of dredged material from the MCR.

B. 2001 Events

1. SEQUENCE OF EVENTS

The Review Team constructed a timeline to better understand the events that occurred at Site E during the summer of 2001 (Figure 2). The events displayed on the timeline are briefly reviewed here and further detail on these events, as necessary, is contained in following sections. The basic management approach reflected in the 2001 timeline is similar to what the District has followed in each of the last several years.

The District first developed their site-use recommendations for the year, based on disposal site surveys from late 2000, in their annual report (USACE 2001) produced in January 2001. Prior to the dredging cycle, another bathymetric survey of Site E was conducted on 30 May 2001. This survey identified areas that had not eroded substantially since 2000, and was therefore the basis for the District's selection of specific "no disposal" areas for 2001 within the overall disposal site. Placement of sediment at the site in 2001 was performed by both a contract and a government dredge. The District provided relatively detailed sediment placement directions to the contractor in Contract Plans and Specifications and required the contractor to (1) survey its portion of the disposal site every 48 hours to avoid mounding and (2) to report their sediment placement positions. The District provided less specific sediment placement directions to the Corps dredge, *Essayons*, through a series of Dredge Orders, and did not require reporting of placement positions. The District conducted periodic surveys of the Site during placement by the *Essayons*, but these surveys were less frequent than those conducted by the contractor.

Sediment placement at Site E began on 2 June 2001 and continued until 14 August 2001. The contract dredge, *Padre Island*, conducted work from 1-3 July until a collision with the #7 channel buoy on 3 July necessitated repairs. The *Padre Island* continued its work from 30 July to 14 August 2001. It placed a total of 820,820 cubic yards in the western portion of Site E. Concurrently, the *Essayons* placed sediment in Site E from 2 June to 3 August 2001. Most of this sediment was placed in the eastern portion of the site. The first of the surveys conducted by the District occurred on 30 June 2001, after the *Essayons* had placed about 900,000 cubic yards of sediment at the site. This survey showed that a mound had been formed in the eastern area of Site E adjacent to where the *Essayons* was placing sand, but it was not reviewed until 12 July 2001 (by which time additional sediment had been placed by the *Essayons*). The *Essayons* was then directed to dispose in the western portion of the site. The District conducted another survey on 19 July which showed the mound height had increased from 30 June. This began discussions of the possibility of re-dredging the sediment mound and placing it at

Site F. A 30 July survey showed the mound was eroding with the cessation of nearby disposal. The District continued its evaluation of whether to dredge or monitor the progress of erosion. On 7 August 2001 the fishing vessel *Miss Brittany* capsized resulting in the loss of life to two crewmen. The District was aware that the *Essayons* would be leaving the Columbia River area soon and decided to dredge the mound at the site as the best course of action. Additional surveys confirmed that this was accomplished. Also, during the entire summer period the District's usual site manager was on a 120 day detail to another portion of the District.

Based upon our investigation we learned that the *Essayons* placed most of its hopper loads around a very localized area where the currents were very strong with the belief that the sediments would be dispersed. While this did not result in shoaling in the immediate placement area, it appears to have resulted in the creation of a mound a short distance away. The District staff were not receiving plots of *Essayons* sediment placement positions and therefore were unaware of this practice.

A detailed review of the Year 2001 management and actual placement at Site E are presented in the following sections.

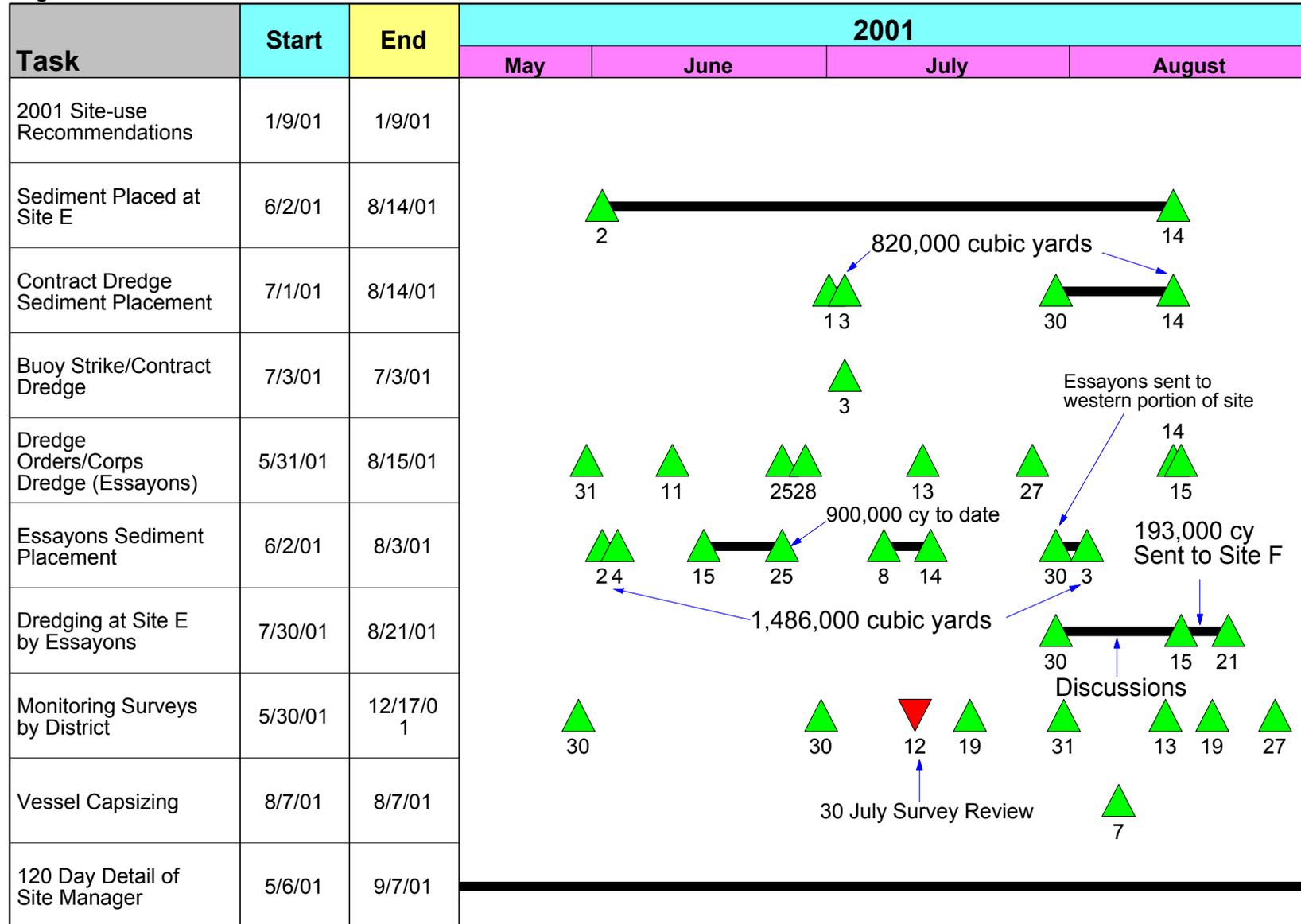


Figure 2. Time line of events in 2001.