

## The Dredge Cycle: DredgeFest NYC

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Dredging—the mechanized transport of underwater sediments—generates unique and fluid landscape typologies. Consider a dredged material containment facility: enormous, dunelike and teeming with uninvited wildlife, which functions as logistical material depot for a plethora of other landscapes, from remedial caps placed on toxic waste sites to fabricated islands for wetland restoration. This research project presents results of cumulative investigations into dredging processes and introduces a framework to situate dredging within the wider context of the human manipulation of earthen material: the Dredge Cycle.

The Dredge Cycle is not limited to the activities and direct products of dredging machines (dredge as a linear act of industrial engineering), but encompasses a broad range of anthropogenic sediment handling practices. It includes both intentional moments of applied energy, as well as unintentional complexes of aggregate forces feeding back upon one another as natural processes are alternately short-circuited and artificially extended. The combined influences of global agriculture, deforestation, mining, urbanization, and earth-moving drags geology into our orbit, from dams trapping enough sediment to produce seismic events to ubiquitous erosion control silt fences preventing sedimentary flows from escaping from construction sites. Like the analogous rock, water, and wind cycles, the Dredge Cycle has become ubiquitous, operating wherever humans alter sediments' migrational trajectories. Relative to those cycles, this cycling is quickened, intense, and concentrated, approaching the event horizon at which acceleration produces not just a difference in speed, but a difference in kind.

We began our investigations by producing and publishing speculative design projects that would demonstrate the value that architects might bring to the aqueous landscapes of dredge. As we began to enter into conversations with engineers, corporations, and government agencies, we realized that there were two major barriers to architectural participation in these landscapes. First, dredge is largely an invisible infrastructure. Although essential to economic and environmental processes in nearly every contemporary coastal and river city, it is rarely a topic of broad public conversation. Second, though there is a growing interest in such

landscapes within architecture, that interest has remained primarily speculative, in large part because working relationships between architects and those actors with actual agency in the landscapes of dredge do not exist.

In an effort to grapple with these limitations, we launched an event series in the fall of 2012. By organizing public events, we are opening up a conversation about the dredge cycle, at once documentary and speculative, while using the events as an opportunity to build connections between disparate communities and to frame new design questions. We believe that these conversations are necessary to create opportunities for architecture in the landscapes of dredge.

The drawings presented here, which describe the Dredge Cycle and land it within the New York-New Jersey Harbor, were part of the exhibition for that event. Other core components included a symposium, featuring a diverse mix of corporate practitioners, government agencies, designers, theorists, and industry experts, and a harbor tour, narrated by ourselves and agencies charged with the engineering of these landscapes.



### 1. FILLING JAMAICA BAY

John F. Kennedy Airport was once a marshy wetland. Likewise, thousands of additional acres encircling Jamaica Bay were also of a similar quality before being filled in with tons upon tons of earthen and non-earthen materials, as recently categorized in the New York City Soil Survey.

### 2. CIRCULARITY and FEEDBACK

In contrast to the relatively new terra-firma surrounding Jamaica Bay are the disappearing marsh islands within it. Due to a yet-undefined combination of influences that include channel dredging, filling, stream channelization, and treated wastewater and stormwater outflows, the islands are eroding at an ever-accelerating rate. The bay's marsh islands provide a suite of ecological services, including wildlife habitat, water purification and storm attenuation. Without additional anthropogenic agency, such as the creative application of dredged materials to rebuild the islands, they may completely disappear as soon as 2020.

### 3. CLIMATE CHANGE

As hurricane Sandy and its effects made clear, the NY/NJ coastline is increasingly vulnerable to flooding and damage. The loss of storm attenuating wetlands combined with rising sea levels and other climate change effects pose challenging design questions for the future of the urban littoral zone. Under such conditions the manufactured nourishing of beaches becomes ever more Sisyphean and unsustainable, reinvigorating investigations into soft infrastructure adaptations for shifting coastlines.

### 4. ACCELERATED SEDIMENTS

The sediments that are dredged in the NY/NJ Estuary originate upstream, in one of the watersheds that drains to the Estuary, the largest being the Passaic, Raritan, and the Hudson. The drawing to the right maps land uses which are associated with major disturbances of sediment: in orange, agriculture, including both row crops and pasture, and in grayscale, urban land -- low-density development at the urban fringe is associated with particularly severe erosion. In magenta, are the few open pit mines and quarries found in the Estuary's watershed.

### 5. DREDGING the NATION

The diagram to the left shows the relative volumes of sediments dredged in every Army Corps District that recorded a cumulative total of two million or more cubic yards of dredge activity between 2009 and 2011. The bulk of the nation's dredging occurs along the Gulf Coast and in the Mississippi River Valley, culminating in the New Orleans District, which despite its small geographic scope, accounts for a third of the nation's dredging activity due to its location in the Mississippi Delta.

### 6. DREDGING the ESTUARY

Dredging operations in the NY/NJ estuary are classified as maintenance or deepening operations. Deepening operations currently comprise the majority of dredging performed in anticipation of Post-Panamax container ships that will arrive in the harbor once the Panama Canal Expansion is completed. The map below locates and categorizes dredge operations and disposal sites in the NY/NJ harbor. The greatest volume, by far, is applied to the Habitat Area Remediation Site (HARS), which is being created atop a contaminated underwater mountain of twentieth-century sediments and wastes known as the Mud Dump Site.

### 6. DISPOSAL

The diagram above classifies the method, location type and comparative amounts of dredged sediment 'disposal' occurring nationwide between 2009 and 2011.

### 7. RECYCLING and REFINEMENT

With partners from the Brookhaven National Laboratory and The New Jersey Dept. of Transportation, the EPA (Region 2) conducted decontamination technology demonstration programs for NY/NJ Harbor's contaminated sediments from 1994-2008, identifying opportunities and uncertainties and logistical challenges that have yet to be solved. Transportation costs and dealing with the Harbor's contaminated legacy have been identified as the biggest challenges to more widespread reuse of dredged material.

