Dredged Material Monitoring Programs

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Dredging removes more than four million cubic yards of sediment from the Baltimore Harbor and Chesapeake Bay shipping channels every year—enough to raise the level of a football field approximately 190 stories.

It's an enormous task, with enormous benefits. Dredging ensures clear, deep berths and channels, making the Port of Baltimore a vital part of the state and national economy.

Yet moving tons of sediment from one location to another is a challenging process that affects the floor of the Chesapeake Bay as well as the sites where sediment is placed. Water quality, wildlife habitat, fisheries, and public safety are critical issues. It's a process that requires and deserves the watchful eyes of managers, scientists, and citizens.

At the Port of Baltimore, citizens, agency experts, scientists, and nonprofit organizations have helped select dredged material placement sites and monitor site operations. These groups have also joined in restoration projects to make some sites a welcoming haven for wildlife.

An extensive team of technical experts study the placement sites, including Hart-Miller Island, Poplar Island, Cox Creek, Masonville, and Site 92 (Pooles Island). Through on-going monitoring programs, they look for metals, organic chemicals, nutrients, and acidity and sediment levels that could impact the surrounding aquatic environment. They examine effects on fish and underwater grasses and observe the ways in which terrapin, waterfowl, and other creatures make use of newly created habitat.

So far, the scientists have found no long-term negative impacts on water quality or wildlife. And in some cases the placement of dredged material has created many environmental benefits.

What Comes Up from the Bottom?

The first principle for the safe placement of dredged material is to understand the nature of the material being moved.

Dredged material consists of gravel, sand, silt, and clay removed from the bottom of shipping channels. Water is added to create a slurry that is pumped into a new location.

Dredging is vital to the safe passage of large vessels in the Chesapeake Bay and Baltimore Harbor. The use and impact of dredged material at placement sites is subject to rigorous scientific monitoring.

Unfortunately, centuries of development, agriculture, and industry have polluted the Chesapeake Bay and the Baltimore Harbor. Pollutants like nitrogen and sulfides exist in water and sediment throughout the region. A few areas are contaminated by heavy metals, a legacy of unregulated industrial activity.

The way dredged material is placed, used, and monitored depends on the type and amount of contaminants. In some cases, the material is clean enough for a wide range of uses, including wildlife habitat. When contaminants are more prevalent, the material may require special handling.

Monitoring for Metals & Other Pollutants

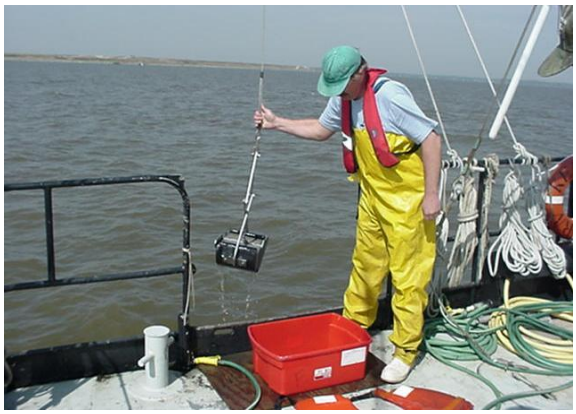
Most of the dredged material generated by Baltimore shipping channels is placed inside a settling basin that has been constructed along a shoreline or in the Bay. The basin is surrounded by dikes—thick walls that prevent the material from mixing directly with the surrounding water.

Inside the dikes, water drains from the dredged material while it dries in the wind and sunlight. Over time, the dried earth compacts, making room for more material to be placed at the site in years to come.

Some material requires special handling. Metals in the sediment may cause chemical reactions that lower the pH and make both water and soil acidic. This can be corrected by adding lime, which neutralizes the acid. Often, natural processes will decrease acidity of the water just by holding the material in a settling area for a longer period of time.

Drainage channels direct excess water away from the dredged material toward spillways. Spillways are exit gates that release water into the Bay or adjacent river. This makes spillways important monitoring points.

Hart-Miller Island spillways are tested daily for pH and suspended solids. Monthly tests track copper, zinc, and ammonia levels,



A small dredge collects samples of sediment and organisms from the floor of the Bay.

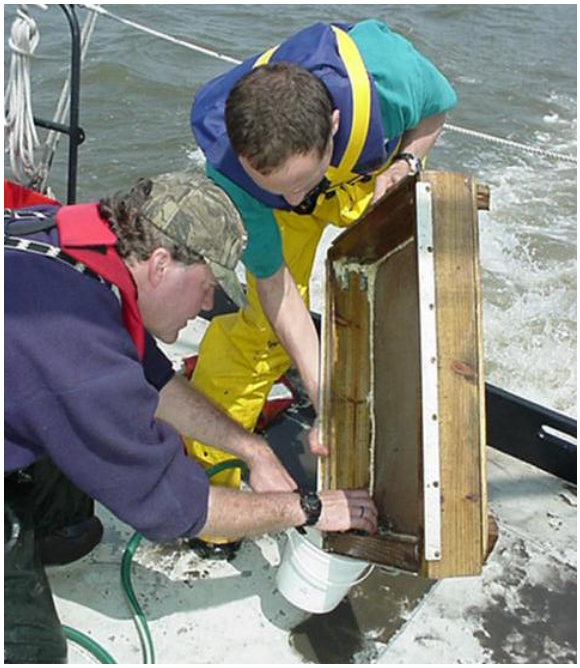
while quarterly tests measure nitrogen, arsenic, cadmium, chromium, lead, and silver. Annual and semi-annual tests occur both at the spillways and a quarter-mile into the Bay to monitor the levels of cyanide, iron, mercury, nickel, oil and grease, pesticides, and other pollutants.

State discharge permits set water quality standards for the spillways at the Hart-Miller Island and Cox Creek placement sites, which were designed to handle material from the Baltimore Harbor, as well as local, state and private dredging projects. The Poplar Island site, which uses uncontaminated material from Bay shipping channels to restore wildlife habitat, is governed by the water quality requirements in state and federal wetlands permits.

Habitat Monitoring

Dredged material is handled carefully to avoid unwanted effects on the wildlife that live on or near the placement sites.

Habitat factors gained special attention in 2001, when environmental restoration became by law one of the preferred uses for dredged material in Maryland. This means that, whenever possible, placement practices should not only be sensitive to existing habitat but help to increase and improve it.



Scientists prepare benthic samples for transportation to the laboratory.

Monitoring programs are critical for tracking this process. The comprehensive programs at Hart-Miller Island and Poplar Island have become national models.

Scientists studied the Hart-Miller Island site from 1972 to 1978, before construction began. This provided valuable insight on existing sediment quality and aquatic life. They have continually watched for changes outside of the dikes after construction and placement began in the early 1980s.

The Maryland Geological Survey and University of Maryland's Center for Environmental Science (UMCES) study whether trace metals have increased in nearby sediment. No long-term physical or chemical changes have been found.

The Maryland Department of the Environment and UMCES examine bottom-dwelling creatures like clams and worms, collected from the area surrounding Hart-Miller Island. They have found no significant changes associated with operations at the island.

On the island itself, tests have shown that most of the dredged material is relatively clean and similar to uncontaminated material from the approach channels.

Approximately 300 acres have already been successfully developed and shaped into wildlife habitat. The remaining 800 acres are in progress. Songbirds, owls, heron, deer, foxes, and muskrat now frequent the island, which at times hosts the largest concentration of waterfowl in the mid-Atlantic region. Wildlife monitoring has documented more than 200 species of birds on the island.

The Monitoring of Poplar Island

Like Hart-Miller Island, the Poplar Island placement site has been monitored closely since its inception. Poplar Island is unique because it was specifically designed to restore the small remnants of an eroding island to its former 1,100-acre footprint and create a much needed refuge for Bay wildlife by using uncontaminated dredged material.

As a large-scale, cutting-edge project, Poplar Island is guided by a twenty-year plan for monitoring both water quality and habitat.

Water quality monitoring on Hart-Miller Island supports the creation of healthy wildlife habitat.

The site was examined in detail before the dikes were constructed. Scientists studied the physical conditions of the Bay floor, chemical composition of sediment and water, turbidity of the water, and aquatic life near the remaining island fragments. They continue to track these elements and compare them to the baseline conditions.

The dikes have created a series of settling basins, or cells, with spillways that discharge water into the Bay. The spillways are closely monitored. Daily tests, conducted by the Maryland Environmental Service, test for pH, turbidity, and total suspended solids. Additional weekly, biweekly, and quarterly testing is conducted for metal and nutrient levels. Conditions are also monitored in open water 100 yards from the spillways.

Inspectors conduct hourly tests to ensure that the discharge meets water quality requirements; they remain on-site 24 hours a day, seven days a week during the arrival of new material. If inspectors are not on-site, the spillways are closed. Spillways are also closed if the water within the cells does not yet meet the standards for wetlands.

The restoration of Poplar Island changed the Bay bottom to some extent, as expected. As the area within the dikes becomes land, some aquatic habitat is lost, but new aquatic habitat is created through wetland development. Habitat for bottom-dwelling organisms was created when the dikes and fishing reefs were constructed.

To date, no long-term negative impacts have been observed on the surrounding environment. At the same time, restored wetlands and some small upland areas are providing healthy habitat for wildlife. More habitat will be created over time.

Wetland plants are surviving well. Osprey, terns, and snowy egrets make it a busy breeding ground. In 2004, the threatened diamondback terrapin produced more than 1,300 hatchlings on its shores—a 284% increase from 2003. Fish populations have increased in restored salt marshes and around the exterior of the island.

A 20-year plan was created to track the quality and use of wildlife habitat on Poplar Island.

Partners tracking restoration progress include the U.S. Army Corps of Engineers, U.S. Geological Survey, U.S. Fish and Wildlife Service, Maryland Geological Survey, National Oceanographic and Atmospheric Administration, University of Maryland, Maryland Environmental Service, and Ohio University.

Monitoring for the Long-Term

Partners at the Port of Baltimore are committed to monitoring dredged material placement operations in order to protect water quality, public safety, and wildlife habitat. So far, these programs have found that dredged material can be placed safely and provide environmental benefits.

Monitoring programs will remain vigilant as existing sites expand or close and new sites are created. ■