

**PAUL S. SARBANES ECOSYSTEM RESTORATION  
PROJECT at POPLAR ISLAND  
ANNUAL UPDATE  
January- December 2017**

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**Poplar Island Researchers** - Please send any updates, findings, or occurrences of note that you have gathered from your monitoring project to Claire Ruark at [cruar@menv.com](mailto:cruar@menv.com) or call 410-770-6505 so the information can be shared in the update. Also, due to limited boat capacity, when you schedule a site visit, please call ahead of time with the number of people in your party so transport arrangements can be made.

**Operations Update:**

During the reporting period (2017), earthwork continued in Cell 5AB (Figure 1), the next wetland cell to be developed. Final grading was completed on October 26. The USACE contractor, Coastal Design and Construction, Inc., began constructing two natural tidal inlets on October 5; installation was completed on November 20. Cofferddams were constructed around both tidal inlets in September, to prevent the cell from flooding during inlet construction. The Cell 5A (southern) inlet was opened to tidal flow on November 27, and the Cell 5B (northern) inlet was opened to tidal flow on November 29. Habitat features within Cell 5AB include a large island (3.9 acres) and large pond (4.3 acres). MES placed snags (semi-submerged large driftwood) within the pond under the guidance of USACE and the United States Fish & Wildlife Service (USFWS). Planting of the cell is scheduled for spring 2018.



**Figure 1. Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island**

MES breached the crossdike between Cell 4AB and Cell 5CD on October 20, 2016. The decision to deconstruct the dike road came from the USACE in order to allow inflowed water from the Poplar Island Expansion (PIE) sand material inflow to flow from Cell 4AB into Cell 5CD where water was discharged through Spillway 15. Sand is being used for the PIE dike slopes and the upland bench raisings and eventual dike raisings. MES reconstructed the road in December 2017.

Sand inflow into Cell 1D to be used for PIE construction began February 17 and ended on June 17. Approximately 800,000 cubic yards (CY) of sand material from the Northern Borrow Area and the Northern Access Channel was inflowed by the USACE contractors, Cottrell Contracting Corporation (subcontractor of Precon Marine, Inc.) and Norfolk Dredging Company. In preparation for the large volume of sand and water and the likelihood that Spillway 2 (Cell 1D) discharge would not keep up with the rate of inflow, MES installed pumps in the southwest corner of Cell 1D prior to the start of inflow, in order to pump water up and over the dike into Cell 2C (Spillway 1). Spillway 1 continued to be the point of discharge for sand inflowed into Cell 1D throughout the period.

Dewatering through perimeter trenching and pumping by MES continued in Cell 2 across the Cell 2A/2B and 2B/2C crossdikes in order to move the water to the nearest spillway (Spillway 1) for discharge. MES continued to raise the Cell 2 lower bench to +23 feet as a part of the dike widening efforts in order to accommodate the vertical expansion temporary dike raising to +30 feet.

During the September 19, 2017 meeting, the Upland Development Team (UDT) began planning for the development of an upland cell test plot in Cell 2A. To form the test plot area, MES began constructing a crossdike dissecting Cell 2A; aligning it with the Cell 3A/3B crossdike. MES plans to complete this project in multiple lifts, the first being constructed by January 2018 at +23 feet. The crossdike will eventually be raised to +28 feet. The test plot area will receive multiple concentrated inflows of dredged material to raise it to the target elevation for development.

During the 2016/2017 dredged material inflow, Cell 6 received 1.08 million cubic yards (MCY) of dredged material (Table 1). The USACE contractor, Great Lakes Dredge & Dock, began inflow on March 5, 2017 from the Chesapeake & Delaware (C&D) Canal approach channels and was followed by inflow from the approach channels to the Baltimore Harbor on March 26, 2017; this was completed on April 20, 2017. During the reporting period, MES used sand from the Cell 4C stockpile to raise the lower bench of Cell 6 from +17 feet to +20 feet.

**Table 1. Inflow Dredged Material 2016/2017**

<b>Inflow Point</b>	<b>Location</b>	<b>Project</b>	<b>Total Material Deposited (CY)</b>
1	Cell 6	C&D Canal Approach Channels	416,467
		Baltimore Approach Channels	667,405

**Total Material: 1,083,872 CY**

**Monitoring Update:**

MES continues to follow the Maryland Department of the Environment (MDE) guidance and to implement additional monitoring procedures provided from past meetings between MDE, MES, the Maryland Department of Transportation Maryland Port Administration (MDOT MPA), and USACE. Discharge this reporting period is associated with rainfall accumulation, the 2016/2017 inflow of maintenance dredged material into Cell 6, and the inflow of sand material for the PIE project into Cells 1D, 2, 4ABC, and 6.

MES Environmental staff continued collecting nutrient load data for Poplar Island throughout the reporting period. Nutrient data is collected on a monthly basis from representative spillways and inlets, and daily from all spillways during times of discharge unless discharge is continual, during which times representative samples are collected to calculate a weekly average. The data will serve as a management tool to assist in development of Best Management Practices (BMPs) when Total Maximum Daily Load (TMDL) allocations are assigned for Poplar Island.

Additionally, mass balance nutrient monitoring was introduced during the 2014/2015 inflow season, and continued during the 2016/2017 inflow season. This monitoring will determine whether development of the Poplar Island project sequesters nutrients from the dredged material. A nutrient sample to be analyzed for ammonium will be taken every Monday, Wednesday, and Friday during periods of discharge from a cell that is receiving inflow. Daily composite sampling for analysis of total nitrogen, total phosphorous, dissolved total nitrogen, dissolved total phosphorus, and total suspended solids (TSS) will be conducted at discharging inflow spillways. Gahagan & Bryant Associates (GBA) will collect sediment samples analyzed for grain size, total nitrogen, and total phosphorus after settlement of the inflowed material.

Following review of multiple years of data collected from vegetated wetland cells, it was determined that water quality in restored cells stabilizes quickly and remains below reportable State Water Quality Standards (SWQS) without issue for all monitored water quality parameters. During a meeting in March 2016, MDE approved the plan to discontinue all water quality monitoring at all vegetated wetland cells following three years of biweekly metals monitoring without issue. Monitoring at Cells 1A, 1B, 1C, and 3D was discontinued starting on May 1, 2016. Additionally, during the meeting MDE approved the use of a 4-day rolling average to calculate the monthly average turbidity for discharging spillways. This includes counting non-discharge days as zero. The highest of the 4-day averages is reported as the monthly average.

There were six noncomplying events in 2017. Three events were related to elevated metals and three events were related to sampling.

There was a metals noncompliance event at Spillway 15 (Cell 5CD) in March. The quarterly sample collected upon opening (March 9) showed a dissolved zinc concentration of 224 ppb, which is above the SWQS limit of 90 ppb. A duplicate sample collected at the same time showed a similar result; 211 ppb. The exterior quarterly sample collected at 25 yards off of the spillway showed results were within limits for all metals including zinc; dissolved zinc reported as 13.4 ppb.

A sampling noncompliance occurred at Spillway 1 in April. Due to Inspection error, a biweekly metals sample scheduled to be collected on Saturday, April 1 was not collected during the night shift and was subsequently taken on Monday, April 3. Those results and the previous metals results (March 18) were within SWQS for all metals.

There was a metals noncompliance event at Spillway 15 in April. A biweekly metals sample collected on April 15 showed a dissolved zinc concentration of 206 ppb, which is above the SWQS limit of 90 ppb. A quarterly sample collected on April 3 showed that Spillway 15 metals were within SWQS for all metals including zinc (20.9 ppb). Spillway 15 remained open for 4 days before results were received (April 15 - April 18) with all other water quality parameters met.

A sampling noncompliance occurred at wetland Cells 3A and 3C in May. Due to staff error, a weekly sample was collected on May 30 rather than a biweekly sample (which includes metals samples) as required by the MDE-approved monitoring plan. Biweekly metals samples collected at both inlets on May 16 and June 6 were within SWQS for all metals.

There was a sampling noncompliance at Cell 3C in July. On July 16, a TSS sample was processed wrong resulting in an inaccurate TSS calculation. Therefore, there is no TSS result for Cell 3C on July 16. The associated turbidity of the sample was 12 NTU.

There was a metals noncompliance at wetland Cell 5AB in December. Biweekly metals samples collected on December 22 showed dissolved zinc concentrations of 112 ppb at the 5A inlet and 194 ppb at the 5B inlet, which are above the SWQS limit of 90 ppb. The following biweekly metals results collected on January 11, 2018 at both the 5A inlet and 5B inlet were nondetect for all metals.

**Vegetated Wetland Cells:**

**Table 2. Vegetated Wetland Cells Timeline**

Wetland Cell	Cell 4D	Cell 3D	Cell 1A	Cell 1C	Cell 1B	Cell 3A	Cell 3C
Opened to Tidal Flow (month, year)	Apr. 2003	Mar. 2005	Mar. 2009	Jan. 2011	Feb. 2012	Oct. 2014	Sep. 2015
Finished Planting (month, year)	Aug. 2003	Jun. 2006	Sep. 2009	Jun. 2011	May 2012	Jun. 2015	Jul. 2016
Acreage	24	32	45	40	35	55	57

**Cell 5AB:**

The Cell 5A inlet (southernmost inlet) opened to tidal flow on November 27, 2017. The Cell 5B inlet (northernmost inlet) opened to tidal flow on November 29, 2017. Planting of the 83-acre cell will occur in spring 2018. Currently, water quality monitoring at the Cell 5AB inlets is conducted under the MDE-approved 2017/2018 Discharge Monitoring Plan for Developed Wetland Cells. In this plan, metals are monitored at each inlet on a biweekly schedule.

**Framework Monitoring Update:**

From April through October, algae samples were collected at all spillways with ponded water and were analyzed for species identification by the Maryland Department of Natural Resources/Resource Assessment Service/Monitoring and Non-Tidal Assessment (DNR/RAS/MANTA) lab or the Morgan State Estuarine Research Center. Additionally, as per the monitoring plan, from May through October, MES conducted weekly monitoring for signs of the establishment of a Harmful Algal Bloom (HAB) in Cell 6. A bloom of *Dolichospermum circinalis* (formerly *Anabaena circinalis*) was identified by the DNR/RAS/MANTA lab in Cell 6 on June 1 and it continued into July. Low levels of saxitoxin and microcystin were detected, but were well below thresholds.

This season, the United States Geological Survey (USGS), with the USFWS’s assistance, continued conducting surveys of Poplar Island’s target nesting bird populations. Tern counts were higher this year compared to last year, with 254 Common Tern and 63 Least Tern pairs (compared to 86 and 27 in 2016, respectively). Most of the Common Tern nests were located in the northwest corner of Cell 2C, which was the largest nesting colony in Maryland, per DNR. The USFWS actively deterred nesting activity from Cell 2’s historic nesting site (northeast corner of Cell 2C) and attracted them to the northwest corner, to allow for ongoing construction activity for the PIE. For the fifth year, the USGS conducted a banding and resighting program in order to better document tern fledging success; 318 tern chicks were banded in 2017. The USGS and the USFWS also surveyed nesting populations of Osprey, Snowy and Cattle Egrets, and Double-crested Cormorants on and just offsite. The site’s colonial nesting waterbirds continue to nest successfully on Poplar Island; twelve Osprey pairs nested on Poplar Island and in Poplar Harbor in 2017 (compared to 14 in 2016). American Oystercatchers successfully nested on one of the habitat islands in Cell 1B, producing two chicks.

MES continues bimonthly bird surveys for the entire site and confirmed 26 nesting species onsite for the 2017 season with eight more suspected. Onsite nesting species include Canada Goose, American Black

Duck, Mallard, Blue-winged Teal, Double-crested Cormorant, Snowy Egret, Cattle Egret, Black-crowned Night-Heron, Glossy Ibis, Virginia Rail, American Oystercatcher, Osprey, Killdeer, Black-necked Stilt, Willet, Herring Gull, Great Black-backed Gull, Common Tern, Least Tern, Mourning Dove, Purple Martin, Tree Swallow, Bank Swallow, European Starling, Red-winged Blackbird, and Common Grackle. Outstanding bird occurrences throughout the reporting period included a first site record of White-eyed Vireo and new high counts achieved on various censuses for Common Gallinule (4), Marsh Wren (5), Seaside Sparrow (12), plus the second highest count of Virginia Rail (17). Bird censuses performed at Poplar Island during the reporting period had daily bird counts that ranged from 557 birds utilizing the site during a January survey to 9,091 birds onsite during a July survey.

The USFWS conducted seasonal monitoring of submerged aquatic vegetation (SAV) in Poplar Harbor and reference areas in May, July, and September. Overall, there has been a decrease in SAV at every site compared to 2016; however, Poplar Harbor continues in an increasing trend. SAV in Poplar Harbor continues to consist of mostly Horned Pondweed; however, one sample of Widgeon Grass was observed in July. The USFWS also noted that the Secchi depth readings for 2017 showed good, consistent water clarity.

The University of Maryland Center for Environmental Science (UMCES) continued collecting Surface Elevation Table (SET) data in order to track accretion rates within the marshes. Data collected and analyzed from sediment, porewater, and vegetation samples continues to be used by UMCES to assist in determining the cause of periodic vegetation die-back within the developed wetland cells, as well as monitoring the overall health of the site's restored marshes.

UMCES placed three pairs of SETs each in the highest and lowest elevation zones of the low marsh of Cell 5AB. Each array has both deep and shallow SETs. The combination of deep and shallow SETs and marker horizons will allow the isolation of elevation changes in the deep strata below the dredged material, in the strata between the bottom of the deep and shallow SETs (from the bottom of the SETs to the bottom of the root zone), within the root zone or at the surface, increasing our understanding of the processes influencing elevation change in the marshes and how they might affect resilience to sea level rise.

UMCES also monitored encapsulated seed plots and seedling density plots in the bare areas of Cell 3C, where there was a high occurrence of *Spartina alterniflora* seedling depredation caused by birds in 2016. UMCES reported that seedling density declines with distance from established vegetation, which could be a result of several factors including distance from seed source, substrate differences, elevation, and predation. UMCES reported that the technology for the encapsulated seeds should be further developed, as the experiment on Poplar Island yielded poor results.

The National Oceanic and Atmospheric Administration (NOAA) was onsite in June, July, and October, continuing studies of nekton use of Poplar Island's developed wetland cells. The results show an increase in nektonivorous, non-nektonivorous, and total fish abundances within restored wetland cells that have a large pond close to the inlet (such as Cells 3A and 3C).

In March and April 2017, Ohio University (OU) collected and processed 137 hatchlings from 15 overwintering nests of the 2016 nesting season. Between April and June there were 187 terrapin yearlings released on Poplar Island as part of the Headstart program, where Maryland school children raise hatchlings collected on Poplar Island in the fall and then release them onsite the following spring. The program has added a multi-school temperature differential growth experiment in order to incorporate a science, technology, engineering, and math (STEM) component to the program. As part of the program, the turtles are held in controlled environments with monitored, variable temperatures to evaluate affect on turtle growth. OU reported a total of 182 nests for the 2017 diamondback terrapin nesting season and 724 hatchlings were tagged, measured, and marked, with 187 included in the Headstart program. Fifty-two

nests were left to overwinter to spring 2018. OU also monitors the Eastern Kingsnake population on Poplar Island. The Department of Natural Resources (DNR) is excited about the Poplar Island population since the species is otherwise declining in Maryland. It is possible that Eastern Kingsnake will be listed as State-Endangered in the near future.

#### **Wildlife and Invasive Vegetation Management:**

Under a Federal Fish and Wildlife Depredation Permit, certain species continue to be managed on Poplar Island. Management of wildlife is conducted in order to ensure target species and their habitats are protected. In an effort to protect the site's vital waterbird nesting area, the USFWS controlled for 42 adult gulls throughout the site and removed eggs from 167 nests. Poplar Island's returning Double-crested Cormorant (DCCO) nesting colony has continued to be sizeable through the years with a count of 1,310 nesting pairs surveyed during the 2017 season; up from 885 pairs in 2016. No DCCO adult control or oiling of eggs occurred this season. One fox was removed in December, but USFWS continues their fox trapping efforts, as they suspect one is still onsite.

MES Environmental staff continued annual invasive control of bull and Canada thistle, mile-a-minute, tree-of-heaven, *Phragmites*, and crown vetch located within the developed wetland cells. Invasive vegetation control in Cell 5AB was considered a high priority due to the dense stands of *Phragmites* and the cell's habitat development schedule, which includes wetland planting in spring 2018. MES received the toxic materials permit to use Habitat<sup>®</sup> (imazapyr) on *Phragmites*, which allows for earlier control than Rodeo<sup>®</sup> (glyphosate). An aerial spray for *Phragmites* was conducted on October 14 and controlled approximately 130 acres across the site. Additionally, a controlled burn of standing dead material in Cell 5CD will be scheduled in winter 2018.

During the 2017 season, MES conducted monthly mosquito population monitoring from May through October in order to document the representative species composition on Poplar Island. Additionally, MES Environmental staff monitored mosquitoes on an as needed basis to determine when control was needed. Monitoring included landing and trap counts to ensure that the Maryland Department of Agriculture (MDA) minimum action thresholds were met before requesting aerial mosquito control be conducted. Two mosquito sprays were conducted by the MDA this season on August 17 and September 25, when the mosquito population was found to be above the MDA-established threshold.

#### **Poplar Island Expansion:**

The project Expansion includes a lateral (northeast corner, new construction) and a vertical (Cells 2 and 6 dike raising) component (Figure 2). Construction of the vertical component began in 2016. The USACE contractors, Norfolk Dredging Company and PreCon Marine, Inc. mobilized onsite during the reporting period to begin work on the lateral component. Lateral Expansion Contract 1 has been completed and included the stockpiling of sand and stone, dike construction for wetland cell, Cell 7, removal of unsuitable foundation material, and dredging of the access channel and turning basin at the north end of the project.

Cottrell Contracting Corporation dredged an additional approximately 500,000 CY of sand material from the Northern Borrow Area between September 23, 2017 and November 10, 2017. The material was hydraulically placed directly into newly constructed PIE Cell 7. As shown in the MDE-approved Sediment Erosion Control Plan, a gap was left in the Cell 7 perimeter dike to allow the cell to dewater.

The Wesson Group mobilized onsite in December and began work under Contract 2. Contract 2 includes the construction of the embayment breakwaters and the perimeter and interior dikes of wetland Cells 8, 9, and 10. Under the PIE's Tidal Wetlands License (#15-0131), turbidity and noise monitoring associated with the construction of wetland Cell 7 dikes, the embayment breakwaters, and the removal of unsuitable foundation material was conducted (Figure 2).



**Figure 2. Map of Poplar Island including planned Expansion**

For further information regarding the expansion please contact Justin Callahan at (410) 962-6693 or at [justin.callahan@usace.army.mil](mailto:justin.callahan@usace.army.mil)

**Safety:**

As discussed at the Poplar Island Working Group meetings, to ensure that all activities occurring on the project site are coordinated and everyone is following the appropriate safety procedures, it is required that all guests contact the site to inform staff of a visit at least one day in advance. This would also be the appropriate time to set up any transportation that is needed. Advanced coordination should also be made for those with their own boat transportation. Everyone must sign in when they arrive onsite.

For those researchers who are at the site during off-peak times, please contact the site to let them know when you will be onsite; a sign in sheet and safety vests will be provided for your use during those times. For safety reasons, if you are by yourself, you will need to be accompanied by an MES employee for the time you are on the island. While visitors are welcome, normal operations duties may make it necessary to postpone certain visits if enough notice is not provided.

**Tours:**

During the 2017 tour season, Poplar Island was visited by 1,232 members of the general public, 1,319 students, and 162 birders, for a total of 2,713 visitors. To schedule a tour please send an email to [poplartours@menv.com](mailto:poplartours@menv.com) or call 410-770-6503.

**Meetings, Media, and Noteworthy:**

Site Operations meetings were held approximately every two weeks throughout the period including the USACE, MPA, MES, and GBA.

The annual Habitat Subgroup meeting was held at the MES headquarters main conference room on February 21, 2017. The Poplar Island semiannual Working Group meetings were held onsite on June 28, 2017 and at MES headquarters annex building on November 21, 2017. Please contact Carolyn Blakeney with MES at [cblak@menv.com](mailto:cblak@menv.com) if you would like a copy of the meeting summaries.

The Poplar Island public website is now live; the URL is [www.poplarislandrestoration.com](http://www.poplarislandrestoration.com). Features of the website include project goals, media highlights, photos and maps, current newsletter, wildlife link to Ebird.org, social media links for USACE, MDOT MPA, and MES, all documents, work cited for any articles, papers, or conferences related to Poplar Island, and a contact page that links directly to MES tour staff to schedule a tour. Document files are in the process of being uploaded.

The following articles and presentations relating to Poplar Island were published and conducted throughout the reporting period:

- In February, the USACE, Baltimore District, posted an online article, “No man is an island but an island is this man,” written by Rebecca A. Nappi about former USACE onsite representative Doug Deeter. It was an overview of Doug’s perspective about working on Poplar Island, prior to retiring in fall 2016.
- Diann Prosser (USGS) gave the following presentations to the Wilson Ornithological Society at Florida Gulf Coast University in Fort Myers, Florida on March 10:
  - “Minimal Behavioral Response of Nesting Common Tern (*Sterna hirundo*), Cattle Egret (*Bubulcus ibis*), Snowy Egret (*Egretta thula*), and Glossy Ibis (*Plegadis falcinellus*) to Unmanned Aircraft Systems”
    - Testing of behavioral response of waterbirds to unmanned aircraft system (UAS) being flown over colonies on Poplar Island. Results provide preliminary evidence that UAS have the potential to monitor colonies with minimal disturbance.
  - “Determining the Viability of Tern Eggs via Thermal Differences: An Investigation of Method Suitability”
    - Testing ability of FLIR (forward looking infrared) cameras to detect thermal differences in avian eggs in the field on Poplar Island. Results provide preliminary evidence that FLIR units can provide a viable method to determine egg viability in the field.
  - “Assessing island habitat loss in the Chesapeake Bay from 2011 to 1991 for the Maryland state endangered common tern (*Sterna hirundo*)”
    - Looking at using remote sensing and GIS on Poplar Island to quantify loss of remote island habitat that is crucial to nesting waterbirds such as the Common Tern.
- Lorie Staver (UMCES) presented “Tidal marsh restoration at Poplar Island: Optimizing resilience in the face of eutrophication and sea level rise” during the public lecture series at Salisbury University on March 2 and again at the Virginia Institute of Marine Science (VIMS), as a monthly guest lecture, on April 5.
- In July, the *Star Democrat* published an online article titled, “Army Corps to boaters: steer clear of Poplar Island construction,” urging boaters to be cautious around the Expansion construction marked by cautionary buoys.
- Diann Prosser presented “Using Thermal Infrared Cameras to Detect Avian Chicks at Various Distances and Vegetative Coverages” at the North American Ornithological Conference on August 5. She explained her research on Poplar Island testing the ability of thermal infrared cameras to detect avian chicks hidden in varying types of vegetation.

- Also in August, the *Virginian-Pilot* published an online article titled, “This out-of-the-box idea could save Tangier Island, but it’s a long shot,” using Poplar Island as an example of how Tangier Island could be restored to its 1850’s size by finding a beneficial use for material from the Baltimore Channel’s Virginia portion.
- In September, the *American Journal of Transportation* published an online article announcing that the Helen Delich Bentley Port of Baltimore will be the first North American port to host the Green Port Congress in May 2018. Poplar Island is used as an example of how MDOT MPA has shown a commitment to the environment.
- Also in September, the United States Army published an online article titled, “Army helping restore wetlands habitat on Chesapeake's Poplar Island,” describing Poplar Island’s construction process and benefits of the overall project.
- The China Geological Survey visited Poplar Island on October 26. Diann Prosser presented “Waterbird Monitoring and Research on Poplar Island Restoration Project” to review the role of USGS in monitoring waterbird populations on Poplar Island.
- Diann Prosser presented “Utilizing Aerial Imagery to Digitize Land Cover on Poplar Island” to the Chesapeake Watershed Forum on November 3. She gave an overview of the project to digitize land cover of Poplar Island using multiple years of aerial imagery and ArcGIS to provide insight on how land cover change may have affected avian nesting behavior.
- Lorie Staver presented “Tidal marsh restoration in the mid-Atlantic: designing for resilience in accelerating sea-level rise” at the Coastal and Estuarine Research Federation (CERF) in Providence, RI, November 6. Lorie organized a session to discuss creating more resilient tidal marshes from the latest findings from around the country.