

**PAUL S. SARBANES ECOSYSTEM RESTORATION
PROJECT at POPLAR ISLAND
ANNUAL UPDATE
January-December 2023**

Editor: Seth Keller, United States Army Corps of Engineers (USACE), Baltimore District

Prepared by: Bronwyn Bare, Maryland Environmental Service (MES)

Poplar Island Researchers - Please send any updates, findings, or occurrences of note that you have gathered from your monitoring project to Claire Ruark (MES) at cruark@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 and Expansion Update

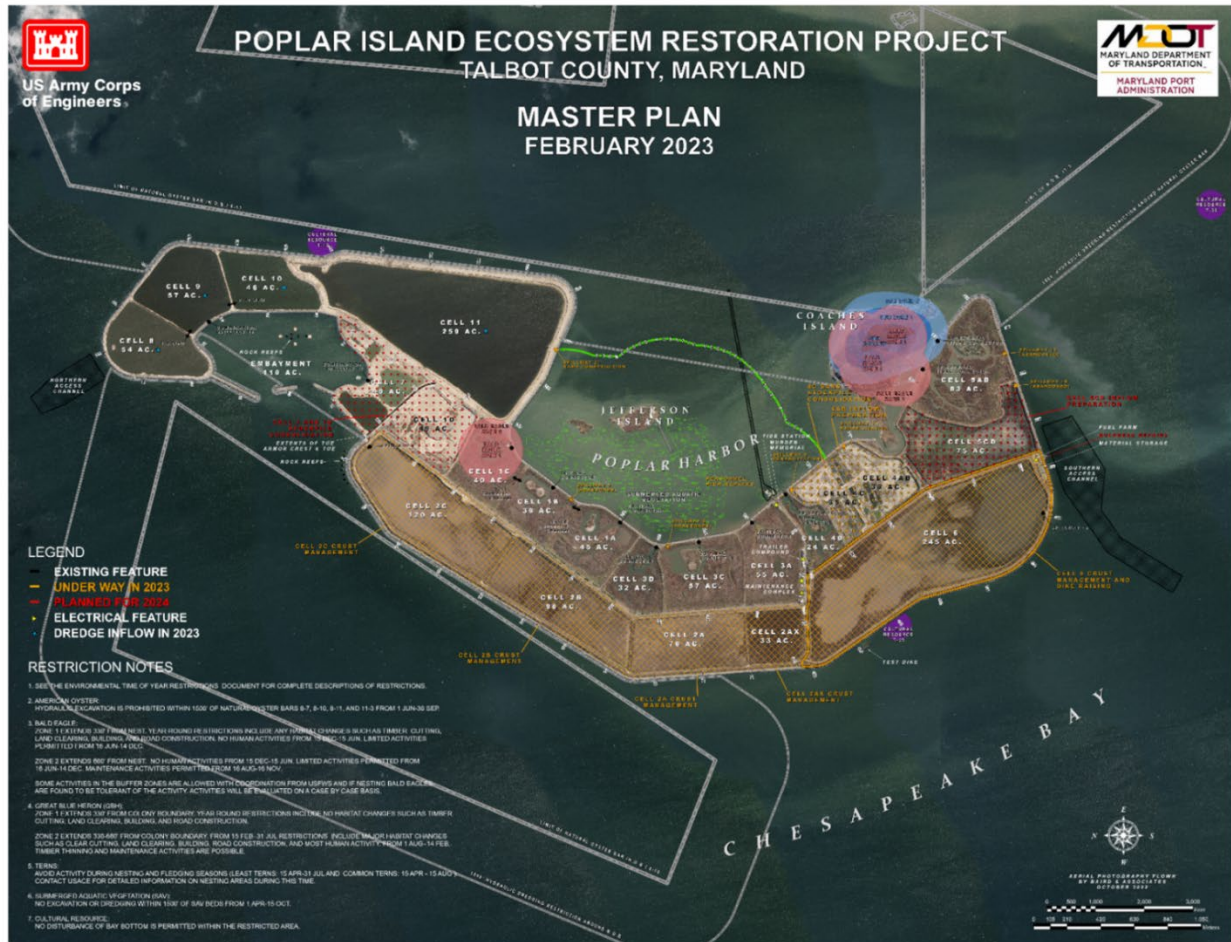


Figure 1. Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island 2023 Master Plan Map

Inflow of maintenance material occurred June 26 through September 22, 2023. The USACE contractor, Cashman Dredging & Marine Contracting Co., LLC (Cashman), placed approximately 2 million cubic yards (mcy) of material into Cells 8, 9, 10, and 11 (Table 1).

Table 1. Inflow Maintenance Dredged Material 2022/2023

Inflow Point	Location	Project	Total Material Deposited (cy)
1	Cell 8	Baltimore Approach Channels	227,509
2	Cell 9		56,590
3	Cell 10		170,357
4	Cell 11		1,544,404

Total Material: ~2 mcy

During the 2023/2024 inflow cycle, Cashman is expected to place approximately 1.5 mcy of material into cells on the southern portion (Cells 4 and 5CD) of the island as well as the expansion (Cells 9 and 11). Inflow of material into Cell 5CD was initiated on December 30, 2023 and is anticipated to continue through February 2024 (Table 2).

Table 2. Maintenance Dredged Material to be Inflow During 2023/2024 Cycle

Inflow Point	Location	Project	Total Material Deposited (CY)
1	Cell 4	Baltimore Approach Channels	350,000
2/3	Cell 5CD		280,000
4	Cell 9		200,000
5	Cell 11		670,000

Total Material: ~1.5 mcy

The USACE contractor, Joint Forces Construction, mobilized onsite in October to perform work for the spillway rehabilitation project. Work includes the sliplining of Spillways 9 and 11 and the abandonment of Spillways 4, 5, 13, and 15. To prepare for the spillway rehabilitation project in Cell 5AB, MES Operations staff installed a temporary cofferdam in the channel leading to Spillway 13 and installed a turbidity mitigation measure (turbidity curtain) in November. MES Environmental staff monitored the inlets of Cell 5AB during the cofferdam construction.

The next wetland cell to be developed is Cell 5CD. In preparation for the 2023/2024 winter inflow, MES Environmental staff treated *Phragmites australis* with glyphosate in early – mid September. MES Operations staff removed vegetation within the cell and filled in perimeter trenches. Approximately 70 cubic yards (cy) of dredged material cleaned from the scows following the summer inflow was manually offloaded into the cell on September 25th.

Throughout the year, MES Operations managed the Cells 1D, 4, and 7 sand stockpiles for use in dike raising. The Cell 4C stockpile, near Spillway 9, continued to be utilized as a long-term sand stockpile. In the spring, MES completed the removal of remaining sand from Cell 4AB to Cell 4C. Sand was removed to a target elevation of -2' to prepare Cell 4 for future material inflow during the 2023/2024 dredging cycle and future cell development. MES Operations staff hauled sand from Cell 4ABC to Cell 11 in order to build a ramp from the current dike (+ 10') up to the platform of Spillway 21 (+25'). The unvegetated areas of the

dike ramp were hydroseeded with a cover crop seed mix. Sand was also hauled to Cell 1D for long-term stockpiling. Additionally, MES hauled sand from Cell 7 to the Cell 1D stockpile. The target elevation for the sand removal in Cell 7 is -8' to prepare the cell for future material inflow and future cell development. Throughout the year, Operations staff conducted trenching and crust management in Cells 1D, 2A, 2AX, 2B, 2C, 4ABC, 5CD, and 6. Additionally, MES Operations continued dike sand slope erosion management along Cells 8, 9, 10, and 11. The crossdikes between Cells 8/9 and 9/10 were also widened and raised according to USACE specifications, with existing eroded material.

Monitoring Update

MES continues to implement the Maryland Department of the Environment (MDE) guidance on discharge monitoring procedures. Discharge during 2023 was associated with rainfall accumulation and the inflow of maintenance dredged material into Cells 5CD, 8, 9, 10, and 11. There were three noncomplying events in 2023. One event was related to missed turbidity readings at Spillways 19 and 21 (July), one event was related to a missed pH reading at Spillway 19 (July), and one event was related to discharge with elevated metals at Spillway 16 (November).

MES Environmental staff continued collecting nutrient load data for Poplar Island throughout the reporting period. Under the existing monitoring plan, nutrient data is collected on a monthly basis from representative spillways and inlets, and daily from spillways located in Phases I (Cells 1, 2, and 3) and II (Cells 4, 5, and 6) during times of discharge. 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 has occurred during subsequent inflow seasons until the 2019/2020 inflow season. This monitoring did not occur during the 2020/2021, 2021/2022, nor 2022/2023 inflow seasons due to the location of the inflow points in the Poplar Island Expansion (PIE, Phase III). This monitoring resumed with the 2023/2024 inflow season at the Phase II inflow locations. TMDL and mass balance sampling is currently conducted in cells with historical discharge data in order to better recognize trends. PIE spillways may be added to the monitoring plan in the future. This monitoring will help determine whether development of the Poplar Island project sequesters nutrients from the dredged material.

Table 3. Vegetated Wetland Cells Development Timeline

Wetland Cell	Cell 4D	Cell 3D	Cell 1A	Cell 1C	Cell 1B	Cell 3A	Cell 3C	Cell 5AB	Total Acres of Wetland
Last Dredged Mat. Inflow (month, year)	NA	Jan. 2003	Mar. 2006	Mar. 2006	Mar. 2006	Apr. 2007	May 2010*	Jan. 2012	
Opened to Tidal Flow (month, year)	Apr. 2003	Mar. 2005	Mar. 2009	Jan. 2011	Feb. 2012	Oct. 2014	Sep. 2015	Nov. 2017	
Completed Planting (month, year)	Aug. 2003	Jun. 2006	Sep. 2009	Jun. 2011	May 2012	Jun. 2015	Jul. 2016**	Jun. 2018	
Date Last Monitored (month, year)	NA	April 2016	April 2016	April 2016	April 2016	April 2018	May 2019	May 2021	
Acreage	24	32	45	40	36	55	57	83	372

*2010 inflow of sand from Poplar Harbor channel dredging.

**12 acres damaged by bird predation replanted in 2018

Framework Monitoring Update

Beginning in June 2021, routine community algae analysis was replaced with Harmful Algal Bloom (HAB) specific monitoring. Algae samples were collected at all spillways with ponded water and were analyzed for the presence of potentially toxigenic (PTOX) cyanobacteria and analyzed for toxin, if necessary, by GreenWater Laboratories. As per the monitoring plan, monitoring for signs of the establishment of a HAB was conducted in Cell 6. MES conducted weekly monitoring at Spillway 16, including the use of a handheld fluorometer to measure the concentration of phycocyanin, a unique pigment found in blue-green algae.

Algae samples collected from Cells 8, 9, and 11 on June 13, 2023 contained *Microcystis sp.*, a potentially harmful algal species, resulting in the suspension of discharge at Spillways 19 and 21. Subsequent toxin analyses revealed a toxin level of 1,245 parts per billion (ppb) in Cell 8, which is above the Environmental Protection Agency's (EPA) recommended threshold for recreation (8 ppb). Samples collected from Cells 8, 9, and 10 on June 20, 2023 again contained *Microcystis sp.* Toxin analysis showed a microcystin toxin concentration of 4.1 ppb in Cell 8 with non-detect toxin levels in Cells 9 and 10. Cell 11 did not contain *Microcystis sp.*; therefore, Spillway 21 was permitted to resume discharge while Spillway 19 remained on hold. *Microcystis sp.* was observed in samples collected from Cells 8, 9, and 10 on June 26, 2023 but subsequent toxin analyses were all non-detect. Through coordination with MDE and the Maryland Department of Natural Resources (DNR), Spillway 19 was permitted to resume discharge. Samples collected on July 17, 2023 showed toxin levels in Cell 9 had increased to 190 ppb. Spillway 19 was again placed on hold. Samples collected on October 9, 2023 from Cells 8, 9, and 10 showed toxin levels that were non-detect or below the EPA threshold and discharge was permitted to resume as long as all other water quality parameters were met. While cyanobacteria was still present, algal monitoring of the discharging water continued every two weeks as per the HAB monitoring plan. *Microcystis sp.* continued to be detected

in follow up samples through December 4, 2023 although toxin levels remained non-detect or well below the threshold.

From July 17 to November 3, MES and the United States Fish and Wildlife Service (USFWS) responded to an avian mortality event that was primarily concentrated around Cells 8, 9, and 10 in the PIE. Several birds were sent to the National Wildlife Health Center (NWHC) for analyses. Botulism could not be confirmed due to lack of blood samples; however, clinical signs, lack of significant gross or histologic findings, and environmental history could suggest botulism toxicity. Microcystins were detected in three birds sent to NWHC, at levels that did not show any clinical issues in birds in experimental studies. The United States Geological Survey (USGS) was onsite, collecting separate samples through the summer for a study looking at effects of HABs on wildlife. Microcystins were detected in 12 of 22 USGS samples for the study. The avian mortality event affected 228 individuals across 20 species. The most affected guilds were waterfowl and shorebirds.

This season, the USGS, with USFWS assistance, continued conducting surveys of Poplar Island's target nesting bird populations (Figure 2). Tern pair counts were less for both Common Tern (366) and Least Tern (288) this year compared to last year (408 and 378 in 2022, respectively). Mixed colonies of Common and Least Terns were located on the north and east side of Cell 11 and the north side of Cell 7. Additional Common Tern colonies were located on the west side of Cell 8, the Cell 9/10 crossdike, and the habitat islands in Cells 1B and 3C. An additional Least Tern colony was located in Cell 4AB. For the eleventh year, the USGS conducted a banding and resighting program in order to better document tern fledging success. In 2023, 174 Common Tern chicks and 133 Least Tern chicks were banded.

In order for Operations staff to continue accessing PIE construction sand, tern and bank swallow nesting activity was carefully managed. USFWS advised MES when managing the sand stockpiles to leave slopes instead of sheer cliffs (in which bank swallows will nest), and to continue activity in certain areas to deter tern nesting. In the spring, MES Operations staff also added a thin layer of sand to approximately 2,000 linear feet on the east dike of Cell 11, worked it into the bench surface, then flattened and drag harrowed to create an area of favorable nesting habitat for terns that would not impact construction activities.

The USGS and the USFWS also surveyed nesting populations of Osprey, Snowy and Cattle Egrets, and Double-Crested Cormorants (DCCO) on and just offsite. The site's colonial nesting waterbirds and target nesting birds continue to nest successfully on Poplar Island. Osprey pairs remained at 21 active pairs on Poplar Island and Poplar Harbor in 2023 when compared to 2022. Successful nesting by the waterbird colony on the Cell 1C habitat island continues to be monitored since they were displaced by DCCO activity on the historic island located in Cell 3D in 2020.



Figure 2. 2023 Poplar Island Bird Nesting Map

MES continues bimonthly bird surveys for the entire site and confirmed 34 nesting species onsite for the 2023 season with 11 more suspected. Onsite nesting species include Canada Goose, Northern Shoveler, Gadwall, Mallard, American Black Duck, Virginia Rail, Black-necked Stilt, American Avocet, Killdeer, Willet, Herring Gull, Great Black-backed Gull, Least Tern, Common Tern, DCCO, Snowy Egret, Little Blue Heron, Tricolored Heron, Cattle Egret, Black-crowned Night Heron, Glossy Ibis, Osprey, Bald Eagle, Barn Owl, Short-eared Owl, Fish Crow, Tree Swallow, Bank Swallow, Barn Swallow, Carolina Wren, Marsh Wren, European Starling, Seaside Sparrow, and Red-winged Blackbird. Outstanding bird occurrences throughout the year included confirmed Gadwall nesting for the third year in a row and new onsite nesting species Bald Eagle, Short-eared Owl, and American Avocet; however, the eagle and avocet nesting attempts were unsuccessful; rarities including Black-bellied Whistling Duck in May and Roseate Spoonbill June through August, both of which were the first confirmed records of either species in Talbot County. Additionally, there were high counts of Black-necked Stilts (160) and Virginia Rails (48) in July, high counts of American Avocets (468) in August, and rarities including Lapland Longspur in October, Sedge Wren in October and November, and Common Teal in November. Bird censuses performed at Poplar Island during the year had daily bird counts that ranged from 1,528 birds utilizing the site during a March survey to 7,182 birds onsite during a December survey.

A pair of Bald Eagles that have attempted to nest on the Cell 1C habitat island continued to be monitored under the November 2021 incidental take (disturbance) permit. In early February 2023, the pair of Bald Eagles were designated as nesting on the Cell 1C habitat island by USFWS, due to the observance of an eagle in incubation pose and the length of time in that pose. In late April 2023, USFWS determined that the nest was abandoned and that any permit restrictions within the Time-of-Year buffer could be lifted.

On November 15, 2023, a nesting attempt was discovered at Spillway 1. The sticks were removed, construction cones were placed on the structure to prevent further attempts, and a take report was submitted in accordance with the incidental take permit. In December 2023, a pair of Bald Eagles was observed loafing and bringing nesting material to a tree on the Cell 1C habitat island, the site of the early 2023 nest. The location will continue to be observed for future activity during monthly eagle monitoring according to the protocol detailed in the permit above.

Poplar Island was registered as a Monarch Waystation in 2016. Since then, USFWS has monitored both butterfly and milkweed presence in each developed wetland cell in the summer and early fall. In 2023, a continued monarch tagging effort was conducted to provide data on sex ratios, migration patterns, weather influence, and mortality rates. During the 2023 season, 442 monarchs were tagged onsite. Naled, the insecticide used to control adult mosquitoes also impacts non-target organisms including butterflies, therefore aerial sprays are restricted during monarch migration (typically September 1 to October 15). Environmental staff continued to monitor mosquitoes on an as needed basis during the 2023 season and no control was necessary.

During May, July, and October, the USFWS conducted seasonal monitoring of submerged aquatic vegetation (SAV) in Poplar Harbor, Cell 5AB pond, and reference areas. USFWS reported 62% cover in Poplar Harbor in May 2023, as compared to 49% in May 2022. In July and September, SAV was detected only in the reference areas.

The Maryland Geological Survey (MGS) conducted the Phase III Expansion post-construction side-scan survey in April 2022 to document changes in the sediment environment due to construction. Surveys included side-scan sonar, acoustic sub-bottom profile, and seabed classification (with sediment sampling to ground-truth). In the period between 2016 and 2022, four stations changed in sediment Shepard class, and approximately 50 acres within the embayment were converted from shelly sand to silty sand. MGS believes the change to be a result of the embayment being sheltered; it is becoming more silty because there is a decreased ability to flush out the silt.

The University of Maryland Center for Environmental Science (UMCES) continued collecting rod-Surface Elevation Table (SET) data in order to track accretion rates within the marshes. The accretion rates vary between wetland cells and within cells; generally, areas closer to the inlets are keeping pace with sea level rise (SLR) better than areas further from the inlets. Most accretion rates at Poplar Island are above the current rate of SLR reported for Annapolis (5.7 millimeters per year). The accretion rates in younger wetland cells are generally higher when compared to older wetland cells, which could be due to higher initial elevations and/or soil processes reaching equilibrium in older cells. UMCES plans to analyze data further to examine drivers of variability, including but not limited to, biomass production, starting elevation, and distance of the SET from the inlet. 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 continued to evaluate the pond in Cell 5AB. The purpose of the study is to evaluate the pond's stability, role in sediment transport, and habitat suitability (specifically in terms of dissolved oxygen content). In April, a series of instruments were deployed including an Acoustic Doppler Current Profiler (ADCP) to analyze water and sediment transport, a wave gauge to collect wave energy data, and a Hydrolab to collect water quality data. Sediment flux cores were also collected to analyze oxygen and nutrient fluxes.

Vegetation studies for UMCES in 2023-2024 include plans to conduct a controlled burning trial in Cells 1A, 1B, and 3A. Pre-burn monitoring occurred in 2023 in the designated plots to document conditions before and after the burn, in both treatment and control (non-burned) areas. The burn will be conducted in

winter of 2024 to better understand how removal of standing dead vegetation may impact stem-boring insect populations and other issues such as fungal infections that may be having an effect on the overall vegetation health within Poplar Island marshes.

The National Oceanic and Atmospheric Administration (NOAA) conducted spring, summer, and fall monitoring in 2023, continuing studies of nekton use of Poplar Island's developed wetland cells and the open-water embayment. NOAA reported that 2022 monitoring results show that species diversity for both resident and transient fish is greater at the reference marshes when compared to the restored marshes. NOAA also reported abundance of fish was only marginally different among treatments. Relative abundance was also greater in both restored marsh cell pond habitats and reference creeks than in the restored marsh cell creek habitats.

As part of a broader partnership with USACE, known as Engineering With Nature, NOAA initiated a three-year fish tracking study by deploying an array of data loggers within Poplar Island's developed wetland cells and embayment in May 2023. Fish were subsequently caught, surgically implanted with transmitters, and released. Data from the array was downloaded and additional tagging was performed in September 2023. In 2023, 151 fish were tagged and the species included American eel, blue crab, gizzard shad, red drum, spot, striped bass, and white perch. This information will be comparatively analyzed with data from many similar studies being conducted simultaneously throughout the Chesapeake Bay to determine how fish use restored wetland habitat on Poplar Island, and throughout local waterways. They will be onsite again in June of 2024 to change the receiver batteries and tag additional fish.

In early spring of 2023, Ohio University (OU) collected and processed 239 overwintering terrapin hatchlings. Along with the 819 hatchlings that were processed in fall 2022, a total of 1,058 hatchlings were tagged, measured, and marked for the 2022 nesting season. Between April and June 2023, there were 149 terrapin yearlings released on Poplar Island as part of the Terrapin Education Research Partnership (TERP) Headstart program, where Maryland school children raise the hatchlings collected on Poplar Island in the fall and then release them onsite the following spring. OU reported a total of 299 nests for the 2023 diamondback terrapin nesting season; 31 nests were left to overwinter until spring 2024. OU collected and processed 448 hatchlings in fall 2023; 175 hatchlings were included in the Headstart program.

In 2023, OU collaborated with NOAA in their telemetry study. Twenty terrapins were tagged with transmitters: 10 females and 10 males (5 adults and 5 juveniles for each). The telemetry study tracks the movement of the terrapins and is confirming some suspected patterns of terrapin behavior differences between sexes and ages. The preliminary data shows that the juvenile females stayed within the same wetland cell that they were found and tagged. Adult females also generally stayed in the same cell, but with a few excursions out of the cell and back, presumably looking for nesting sites. Adult males were more mobile, moving about the island, presumably trying to find and mate with partners. The juvenile males were found to have the most movement around the site, possibly due to higher competition for mates.

Wildlife and Invasive Vegetation Management

Under a USFWS Depredation Permit, certain species continue to be managed on Poplar Island. Management of wildlife is conducted to ensure target species and their habitats are protected. During the 2023 season, gull control occurred, with the removal of 82 individuals and the oiling of eggs in 279 nests. Thirty-six DCCO, four Fish Crows, five Great Blue Herons, one Black-crowned Night Heron, 10 Canada Goose individuals, and eggs from six goose nests were removed throughout the site. Additionally, three Great Horned Owls were removed from Coaches Island. After conducting marsh surveys, USFWS determined that it was not necessary to remove any muskrats in 2023.

During 2023, MES Environmental staff continued annual invasive control of bull thistle, Canada thistle, tree-of-heaven, mile-a-minute vine, and *Phragmites australis* throughout the site. Environmental staff also

conducted maintenance vegetation removal of the sparsely vegetated habitat island in Cells 1B and 3C, which included mechanical and chemical control. This is done in order to promote colonial waterbird nesting. An aerial spray to control *Phragmites australis* was conducted on September 27 and 28, controlling 85 acres throughout the site.

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. Safety procedures include the wearing of high visibility vests at all times while not in a vehicle as well as closed-toed shoes with appropriate soles. 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 2023 tour season, Poplar Island was visited by 1,170 members of the general public, 195 special interest participants, 954 students, and 191 birders, for a total of 2,510 visitors. To schedule a tour please send an email to poplartours@menv.com or call 410-770-6503.

Meetings, Media, and Noteworthy

Site Operations meetings were held approximately every three weeks throughout the year including the USACE, MPA, MES, Moffat & Nichol (M&N), and Gahagan & Bryant Associates, Inc. (GBA).

The Poplar Island public website's URL is www.poplarislandrestoration.com. Features of the website include project goals, media highlights, photos and maps, current newsletter, link to the onsite weather station, wildlife link to Ebird.org, social media links for USACE, 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.

The annual Habitat Subgroup meeting was held in a hybrid format (in person and virtually) on June 14, 2023. The Poplar Island annual Working Group tour and meeting was held in a hybrid format on October 12, 2023. Please check the project website www.poplarislandrestoration.com documents list or contact Bronwyn Bare with MES at bbare@menv.com. If you would like a copy of the meeting summaries, the next Working Group meeting will be held in the fall of 2024.

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

- Throughout the year, Kristina Motley (MES) and Bronwyn Bare (MES) each presented "Poplar Island: an international model of innovative reuse" to multiple groups. All presentations were in person unless stated otherwise.
 - U.S. Environmental Protection Agency on February 13, 2023 (virtual)
 - Allegany/Garrett Counties Birding Club on February 14, 2023 (virtual)
 - Talbot Birding Club on March 14, 2023
 - Kent Narrows Sail and Power Squadron on March 15, 2023

- Chesapeake Forum on March 16 and September 6, 2023 (hybrid)
- Chesapeake Ecosystem Class for Nature Forward on August 10, 2023 (virtual)
- National Aquarium on August 15, 2023
- Environmental Committee of Gibson Island Garden Club on August 17, 2023
- Annapolis Sail and Power Squadron on October 5, 2023
- Institute for Adult Learning on November 8, 2023
- In March, *The Star Democrat* reported that Maryland Port Administration representatives briefed the Eastern Shore delegation on project updates on Chesapeake Bay restoration efforts.
- In April and May, multiple articles were released acknowledging that Cashman was awarded the next dredging contract for the maintenance dredging to restore Poplar Island.
- In May, the *Bay Journal* released an article “Dredged sediment is key for restoring Chesapeake Islands” which explains how sediment is being beneficially used in efforts to restore drowning Bay islands.
- In June, *WBOC* aired a video “Proud to Serve: Poplar Island” that highlighted the project and the many benefits of using dredged material to restore an ecosystem.
- In August, *Dredging Today* published an article “Officials tour Poplar Island and Mid-Chesapeake Bay restoration projects” that explained that the USACE Baltimore District project team hosted staff from the offices of Senator Ben Cardin and Senator Van Hollen for a briefing and aerial tour of the two ecosystem restoration projects.
- On November 17, Michelle Osborn (MES) and Darren Swift (MPA) presented “Maryland Port Administration Focuses on Restoration Through the Beneficial Use and Innovative Reuse Programs” at the Maryland Water Monitoring Council Conference
- In November and December, multiple articles were released acknowledging that Cashman was awarded the contract for the 2023/2024 dredging cycle, which will bring maintenance dredged material to Poplar Island.
- Researchers from UMCES and the University of South Carolina (USC) gave presentations and presented posters on a variety of topics related to their studies from Poplar Island at the Coastal and Estuarine Research Federation (CERF) conference in Portland, OR on November 12 - 16:
 - Jeff Cornwell (UMCES) presented “Development of Denitrification in a Wetland Constructed from Fine-Grained Navigation Channel Sediments”.
 - Jim Morris (USC) presented “The Importance of Marsh Development to the Success of Restored Poplar Island, Chesapeake, MD Marshes”.
 - Carol Kim and Jeff Cornwell (UMCES) presented “Trajectories of Microbial Composition and Function in Newly Constructed Salt Marshes”.
 - Louis Plough (UMCES) presented “Effect of Dieback on Genetic Diversity in Restored *Spartina Alterniflora* Marshes and Comparison to Native Marshes”.

Publications referencing Poplar Island included the following:

USGS

- Sullivan, J.D., O’Donnell, A.W., Lescure, L.M., Rapp, A.J., Callahan, C.R., McGowan, P.C., Carney, T. and Prosser, D.J. (2023). Managing conflict between nesting common terns and herring gulls. *Wildlife Research*, 51.

UMCES

- Kim, C., Staver, L.W., Chen, X., Bulseco, A., Cornwell, J.C. and Malkin, S.Y. (2023). Microbial Community Succession Along a Chronosequence in Constructed Salt Marsh Soils. *Microbial Ecology*, 85, 931–950.

- Staver, L.W., Stevenson, J.C., Cornwell, J.C., Nidzieko, N.J., Staver, K.W., Owens, M.S. and Elmer, W.H. (2023). Silicon pools, fluxes and the potential benefits of a silicon soil amendment in a nitrogen-enriched tidal marsh restoration. *Frontiers in Ecology and Evolution*, 11.
- Windle, A.E., Staver, L.W., Elmore, A.J., Scherer, S., Keller, S., Malmgren, B. and Silsbe, G.M. (2023). Multi-temporal high resolution marsh vegetation mapping using unoccupied aircraft system remote sensing and machine learning. *Frontiers in Remote Sensing*, 4.