Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island, Talbot County, Maryland
Limited Reevaluation Report

September
2013

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of Engineers
Baltimore District

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EXECUTIVE SUMMARY

The Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (Poplar Island) is located in Talbot County, Maryland in the Chesapeake Bay. Poplar Island is approximately 30 miles south of Baltimore and is comprised of the existing island, 1140 acres, originally authorized by the Water Resources Development Act (WRDA) of 1996 at a cost of $307 million (FY 1996 price level), which is currently under construction, and a modification for Poplar Island expansion, 575 acres, authorized by WRDA 2007 at an additional cost of $260 million (FY 2007 price level). The Maryland Port Administration (MPA) is the non-Federal project sponsor.

Chesapeake Bay Protection and Restoration

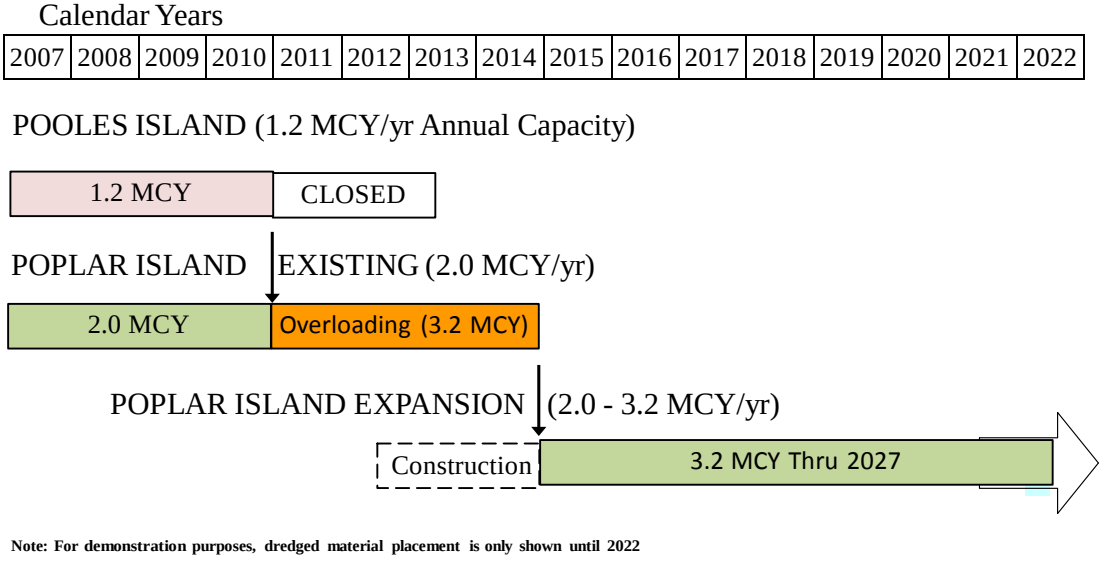
The Poplar Island project is focused on restoring and expanding remote island habitat to provide hundreds of acres of wetland and terrestrial habitat for fish, shellfish, reptiles, amphibians, birds, and mammals through the beneficial use of approximately 68 million cubic yards (MCY) of clean dredged material. This material is from the Chesapeake Bay Maryland Approach Channels of the Baltimore Harbor and Channels project as well as the southern Chesapeake and Delaware (C&D) Lower Approach Channels of the C&D Canal project. Figure ES-3 shows a map of the Baltimore Harbor and Channels. The project provides a long-term strategy for providing placement alternatives to the dredging needs of the Port of Baltimore, while maximizing the use of dredged material as a beneficial resource. The dredged material will be used to restore approximately 1,715 acres of remote island habitat consisting of 840 acres of upland habitat at an elevation of approximately 25 feet above mean lower low water (MLLW), 735 acres of wetland habitat that will be further divided into low marsh and high marsh, and approximately 130 acres of open water embayment leading into the wetlands as well as 10 acres of a tidal gut. Offshore remote islands are a unique ecosystem component in the Chesapeake Bay watershed and are preferentially selected by many migratory water birds as resting and nesting locations. Although similar vegetative communities may occur on the mainland, the isolation, relative lack of human disturbance and reduced number of predators make remote islands more desirable as nesting sites for a variety of birds, mammals, and reptiles such as the diamondback terrapins. As a result, the Poplar Island project will provide direct benefits of improved health, richness, and sustainability to aquatic and wildlife species including the American black duck to support the U.S. Army Corps of Engineers (USACE) commitment of restoring and recovering remote island habitats under the Chesapeake Bay Protection and Restoration Executive Order (E.O. 13508). The American black duck is not only a species of great conservation need for the state of Maryland, but it is also one of the key species that was named in the Executive Order**.** As of 2012, American black duck nesting success on Poplar Island has increased from zero broods in early 2000, to 3-5 broods annually since 2006, to more than 40 broods estimated in 2012.

Since the placement of dredged material began in 2001 on Poplar Island, it has been the primary placement site for the Chesapeake Bay Maryland Approach Channels. It has been determined that the Maryland Approach Channels produce an average of 2 MCY per year in maintenance material. The Poplar Island project is designed to efficiently handle this rate of material inflow. The expansion of the Poplar Island project is greatly needed due to the urgency for additional placement capacity. The expansion has a design capacity of 28 MCY and, in conjunction with the existing Poplar Island, can accept 3.2 MCY per year.

This means that Poplar Island, once expanded, will be able to accommodate the annual maintenance material from the Maryland Approach Channels as well as the material from the Chesapeake and Delaware (C&D) Lower Approach Channels. In the 2005 Federal Dredged Material Management Plan (DMMP) it was assumed that when the Pooles Island open water placement site, which received dredged material from the C&D Lower Approach Channels, was closed at the end of 2010, the material would be placed at Poplar Island (approximately 1.2 MCY/year). Figure ES-1 shows a dredged material placement timeline for the various dredged material placement sites as presented in the 2005 DMMP.

FIGURE ES-1: 2005 DREDGED MATERIAL PLACEMENT PROJECTION

3.2 MCY/YEAR PLACEMENT REQUIREMENT



Note: For demonstration purposes, dredged material placement is only shown until 2022

Stimulus funding from the 2009 American Recovery and Reinvestment Act (ARRA) allowed for increased maintenance and advanced maintenance dredging of the Baltimore Harbor and Channels project. However, this material was placed at the Hart-Miller Island confined disposal facility in an effort to maximize placement prior to the facility's state mandated closure in December 2009. The increase in advanced maintenance dredging in 2009 reduced the need for dredging in subsequent years, resulting in no dredged material placement at Poplar Island in fiscal years (FY) 2010 and 2011. Similarly, the Pooles Island open water placement site, which was closed in December 2010 under state mandate, was also used more heavily because of ARRA-funded dredging, and this increased placement from the C&D Lower Approach Channels resulted in a reduced need for maintenance dredging over the next two years. The Philadelphia District USACE now plans to transport the material from the C&D Lower Approach Channels to the Courthouse Point dredged material containment site located in Cecil County, Maryland, which is a less costly alternative to transporting the material to Poplar Island. As a result of these changes, an updated dredged material placement capacity timeline was created in 2011 (Figure ES-2). Figure ES-2 also shows cumulative acres of wetland habitat that will be restored on both existing Poplar Island and Poplar Island expansion over time. It is important to note that the excess material placed at Hart-Miller Island and

Pooles Island in conjunction with the ARRA funding has had the effect of postponing the time when Poplar Island could potentially be overloaded from 2011 to 2016. Therefore, even though the construction of the expansion is behind schedule, the existing project would only be subject to potential overloading for a three-year period (as opposed to the four-year period shown in Figure ES-1). However, the overall result is that the operational life of the combined facility will be extended, which will cause the overall cost of the project to increase.

FIGURE ES-2: CURRENT DREDGED MATERIAL PLACEMENT AND REMOTE ISLAND WETLAND ACRE RESTORATION PROJECTIONS

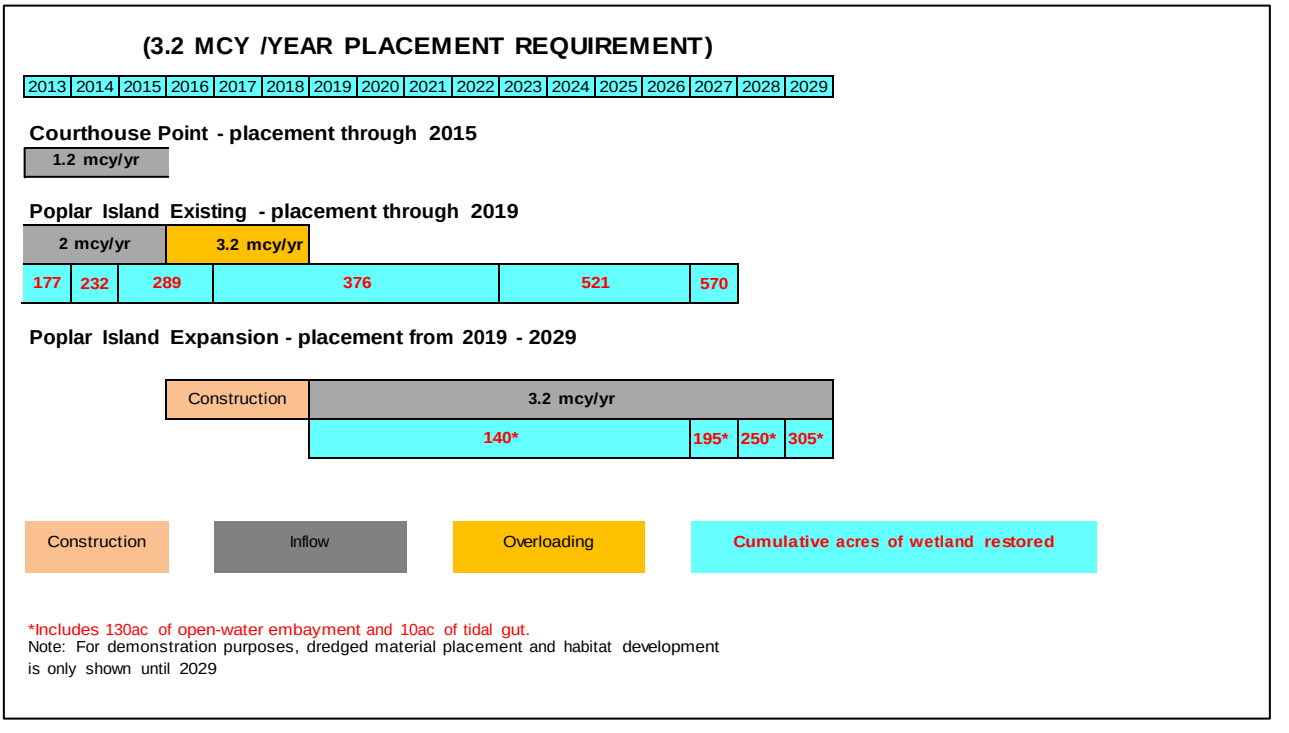
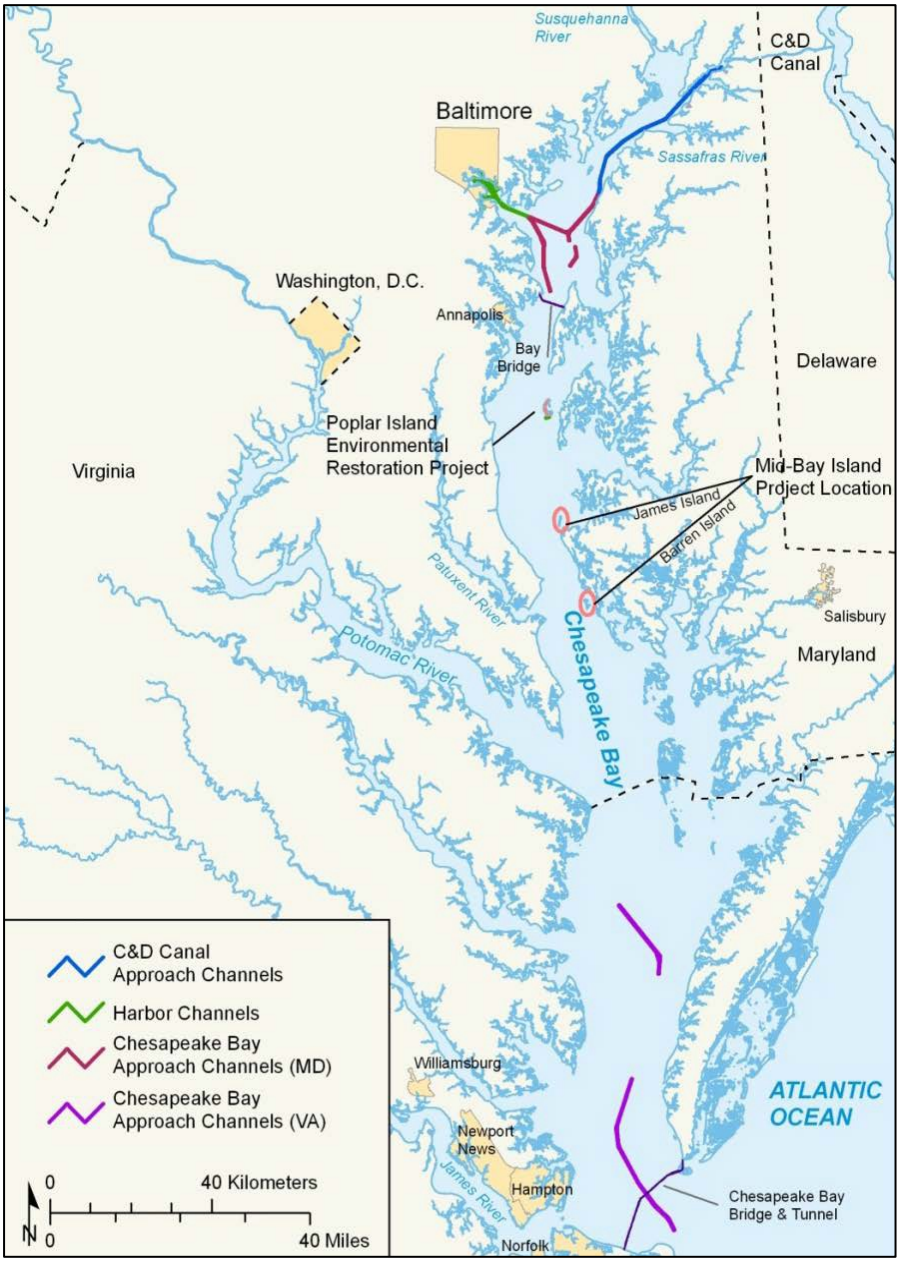


FIGURE ES-3: MAP OF THE BALTIMORE HARBOR AND CHANNELS



The Poplar Island project is subject to Section 902 of WRDA 1986, which provides that the total project cost set forth in law is the maximum cost of the project except that the total project cost may be increased by not more than 20 percent.

> *"In order to insure against cost overruns, each total cost set forth with respect to a project for water resources development and conservation and related purposes authorized to be carried out by the Secretary in this Act or in a law enacted after the date of the enactment of this Act, including the Water Resources Development Act of 1988, or in an amendment made by this Act or*

any later law with respect to such a project shall be the maximum cost of that project, except that such maximum amount may be increased by the Secretary for modifications which do not materially alter the scope or functions of the project as authorized, but not by more than 20 percent of the total cost stated for the project in this Act, in any later law, or in an amendment made by this Act or any later law."

If the estimated cost of a project exceeds the Section 902 limit as calculated each year, it may become necessary for USACE to obtain a modification of the authorization for the project from Congress at a higher cost to continue or complete the project. Furthermore, USACE has determined, applying its regulation implementing Section 902, that initiation of construction of a project feature cannot occur if it is known beforehand that the Section 902 limit will be exceeded prior to completion. The fiscal year (FY) 2013 Section 902 analysis indicated that for existing Poplar Island, the maximum project cost is $606,360,000 while for Poplar Island expansion, the maximum project cost is $432,800,000. Table ES-1 shows that based on the most recent cost update, the Poplar Island project cost exceeds the allowable limits under Section 902.

TABLE ES-1: POPLAR ISLAND PROJECT COSTS

Project	Authorized Cost (Price Level)	2005 Fully-funded Cost from GRR (Price Level)	FY 2013 Section 902 Project Cost Limit (Price Level)	FY 2013 Fully-funded Cost (Price level)
Existing	$307,000,000 (FY 1996)	$401,500,000 (FY 2005)	$606,360,000 (FY 2013)	$729,084,000 (FY 2013)
Expansion	$260,000,000 (FY 2007)	$314,200,000 (FY 2005)	$432,800,000 (FY 2013)	$701,123,000 (FY 2013)
Total		**$715,700,000 (FY 2005)**	**$1,039,160,000 (FY 2013)**	**$1,430,207,000 (FY 2013)**

Cost Update

Benchmark cost estimates for the Poplar Island project were completed in 1995, 2005, and 2010. The 1995 estimate, prepared for the authorization of the existing project, was very limited in detail and contained a very simplified cost breakdown structure. The 2005 estimate, included in the general re-evaluation report (GRR) used for authorization of the expansion of Poplar Island, presented the overall cost for the entire project and significantly expanded the cost breakdown structure when compared to the 1995 estimate. In 2010, the cost estimate for the entire project (including both the existing and expansion components) was fully updated and included a risk analysis. It was the 2010 estimate that first identified the significant increase in the overall cost estimate of the project. The 2010 estimate has been updated annually over the past three years to (1) account for sunk cost information, (2) make minor adjustments related to anticipated project duration, and (3) adjust costs to current price levels.

This limited reevaluation report (LRR) documents the increase in project costs and explains the factors that account for the increase. In order to complete the authorized project, provide placement capacity for the safe and efficient navigation in the Port of Baltimore, and to realize the benefits described above, the Poplar Island authorization must be modified to reflect the FY 2013 cost estimate. In order to complete the

existing Poplar Island project, the cost estimate at FY 2013 prices is approximately $669 million (which includes $308 million that has been expended on the project through October 2012) while the cost in FY 2013 dollars to complete the Poplar Island expansion is approximately $565 million, for a total first cost of $1,234 million. The fully-funded costs, which include estimates for future inflation, (Table ES-1) are $729 million, including sunk costs, for the existing Poplar Island and $701 million for the expansion component for a total cost of about $1,430 million. The LRR does not re-evaluate the ecosystem justification of the project; however, monitoring data was used to confirm that the project is yielding the environmental benefits anticipated. The purpose of the LRR is to verify the updated project cost estimate based on experience and actual costs realized during approximately 14 years of project construction. The updated cost must be defined so that the Poplar Island authorization can be modified to raise the total project cost. If the project authorization is not modified, construction of the Poplar Island expansion cannot be initiated, and the original project component cannot be completed. This will have serious impacts and repercussions to the maintenance dredging for the Baltimore Harbor and Channels project and in turn, to the Port of Baltimore. According to the 2010 State of the Port report, the Port of Baltimore is a key economic engine in the region that provides approximately 50,700 direct jobs and 34,000 indirect jobs, making proper operations and maintenance of the navigation channels a critical need. Table ES-2 shows the impacts to the project "with" and "without authorization" modification, along with the various dredging and environmental impacts of each.

When comparing the 2005 GRR estimate and the current certified estimate there is a 59-perecent increase in estimated project first cost. This can be attributable to three major factors: (1) 34-percent of the increase is due to dredged material transportation and placement costs; (2) 36-percent of the increase is due to site operations costs; and (3) 23-percent of the increase is due to project contingency. The main drivers behind these increases can be traced to the increase in project duration (20 and 30 years in the 2005 and 2013 estimates, respectively), increasing fuel costs, and the inclusion of risk analysis in the cost engineering process.

Civil Works Strategic Plan

One of the most important goals and objectives in the current Civil Works Strategic Plan for USACE, which covers 2011 through 2015, is to focus on the Army's aquatic ecosystem restoration mission area, which seeks to restore aquatic habitat to a more natural condition in those ecosystems whose structures, functions, and dynamic processes have become degraded. This effort often includes the restoration of nationally or regionally-significant saltwater and freshwater wetlands.

Another important goal and objective for USACE as stated in the strategic plan, is to "help facilitate commercial navigation by providing safe, reliable, highly cost-effective, and environmentally sustainable waterborne transportation systems." Properly operating and maintaining the Federal shipping channels is necessary to accomplish this goal and to protect the Federal investment that has been made in this system. Dredging is an important part of that maintenance, but if there is insufficient capacity for the placement of that material, then maintaining safe and efficient navigation will be jeopardized.

The Poplar Island Ecosystem Restoration project addresses both of these goals. It is equally important that all authorized components of the Poplar Island Ecosystem Restoration Project are constructed to deliver the promised environmental restoration benefits, and demonstrate USACE's commitment to the goals of the Chesapeake Bay Protection and Restoration Executive Order (E.O. 13508).

TABLE ES-2: POPLAR ISLAND WITH AND WITHOUT AUTHORIZATION MODIFICATION

Scenario	Description	Dredging and Economic Impacts	Environmental Impacts
With Modification of Poplar Island Authorization	Poplar Island is positioned to receive funding to complete both existing and expansion components of the project.	The Maryland Port Administration and USACE continue to maintain federal channels providing safe navigation in and out of the Port of Baltimore. The Poplar Island existing and expansion components provide a placement site for the Port of Baltimore approach channels until approximately 2029.	All aspects of the project would be completed, providing 840 acres of upland habitat, 735 acres of wetland habitat, and approximately 130 acres of open water embayment and 10 acres of a tidal gut.
Without Modification of Poplar Island Authorization	Existing Poplar Island is positioned to receive funding until the Section 902 limit is estimated to be exceeded in 2021. At this point, construction and development of the project would cease. Poplar Island expansion would also not receive funding for construction.	Without the construction of the expansion component, Poplar Island would be overloaded[1] with dredged material and ultimate capacity and authorized habitat development (ecosystem benefits) would be lost. Inflow for FY17, FY18, and FY19 would diminish from 3.2 MCY per year to approximately 2 MCY, 1.3 MCY, and 0.8 MCY respectively and would be impractical thereafter. Therefore, approximately 3.5 to 4 MCY (10 to 15%) of upland capacity would be lost, and the shipping channels would not be properly maintained after FY17. Without modification of the Poplar Island project, the Port of Baltimore and the USACE would have to look at alterative options and places to put the dredged material. This analysis will be completed during the update of the Dredged Material Management Plan. If the Port of Baltimore cannot dredge sufficiently to keep the navigation shipping channels open and safe for passage, thousands of jobs and millions of dollars of business that result from the Port of Baltimore being open for commerce will be lost.	Approximately 140 acres of wetlands at existing Poplar Island would not be developed, and only about 17% of the uplands would be developed before funding ceased. Also, approximately 575 acres of valuable upland and wetland habitat associated with the expansion would not be developed. If both the uplands and wetlands are not developed as anticipated, there would be concerns with invasive species taking over the unfinished upland and wetland cells, and also concerns with ponded, stagnant water breeding diseases such as avian botulism and microcystin, both very toxic to various wildlife species. Authorized project would not be completed and E.O 13508 goals would not be met.

[1] See discussion on overloading on Page 7.

With Modification to Complete Existing Poplar Island but Without Modification to Allow Construction of Poplar Island Expansion	Poplar Island would be in position to receive the adequate amount of funding needed to complete the construction and habitat development of the existing project but additional funding to construct and complete the expansion component of the project would be significantly delayed.	Without the construction of the expansion component, Poplar Island would be overloaded with dredged material and ultimate capacity and authorized habitat development (ecosystem benefits) would be lost. Inflow for FY17, FY18, and FY19 would diminish from 3.2 MCY per year to approximately 2 MCY, 1.3 MCY, and 0.8 MCY respectively and would be impractical thereafter. Therefore, approximately 3.5 to 4 MCY (10 to 15%) of upland capacity would be lost, and the shipping channels would not be properly maintained after FY17. Without modification to allow the construction of Poplar Island Expansion, the Port of Baltimore and the USACE would have to look at alterative options and places to put the dredged material. This analysis will be completed during the update of the Dredged Material Management Plan. If the Port of Baltimore cannot dredge sufficiently to keep the navigation shipping channels open and safe for passage, thousands of jobs and millions of dollars of business that result from the Port of Baltimore being open for commerce will be lost.	1140 acres of habitat would be completed: 570 acres of upland habitat and 570 acres of wetland versus the target amount of 840 acres of upland habitat, 735 acres of wetland habitat, approximately 130 acres of open water embayment 10 acres of a tidal gut. As a result of Poplar Island being overloaded with dredged material, the cell development process will take longer as a result of longer consolidation periods, and therefore the project would take longer to complete the remaining upland and wetland cells. Given that placement becomes impractical after FY19, properly developing the various habitats will become very challenging knowing that in some cases, we may not hit our proper elevations. Added time would add significant cost, without providing more ecosystem benefit for that additional cost. Also, if the project receives funding to construct the expansion after the existing project is completed, then there are concerns that the newly established upland habitat will have to be destroyed to build the 5- foot upland raising that is part of the expansion. Further, the last wetland cell on the north side that is proposed to be the staging area for expansion construction would also be destroyed.

Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island, Talbot County, Maryland

Limited Reevaluation Report

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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1.0 PURPOSE

The purpose of this limited reevaluation report (LRR) is to document the change in cost (Table 1) of the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (Poplar Island) that has occurred since its original authorization in 1996 and modification in 2007. The authorized Poplar Island project includes the original design that is currently under construction and a modification that both expands the original project's footprint and raises the upland dikes on the existing island 5 feet to increase remote island habitat from 1140 acres to 1715 acres and increase dredged material capacity for the project. A general reevaluation report (GRR) and supplemental environmental impact statement (SEIS), titled "Final GRR and SEIS for Poplar Island Environmental Restoration Project" (Poplar Island expansion), was completed in September 2005 to incorporate the expansion component to the project. The expansion was authorized by Section 3087 of the Water Resources Development Act (WRDA) of 2007 and is an integrally related modification of the Poplar Island project. Poplar Island expansion is critical to achieving the Chesapeake Bay habitat commitments per Executive Order (E.O.) 13508, contributes to the North Atlantic flyway as a watershed of national significance, and is an essential component of a threatened and diminishing network of remote islands along the eastern shore of the Chesapeake Bay. This LRR presents information on all components of the authorized project, its critical link to the ongoing function of the Baltimore Harbor and Channels navigation project, and recommends a modification to the authorization of the Poplar Island project to comply with Section 902 of the WRDA 1986. In general, Section 902 of WRDA 1986 provides that the total cost set forth in law is the maximum cost of the project except that the total project cost may be increased by not more than 20 percent. Section 902 analysis and its impact on the Poplar Island project is discussed in more detail in Section 5 of this report. This report also addresses the ecosystem benefits of the project, and uses monitoring data collected as part of the ongoing project to document the ecosystem benefits realized thus far and verify the anticipated future benefits. Table 2 shows the impacts to the project "with" and "without authorization" modification, along with the various dredging and environmental impacts of each.

TABLE 1: POPLAR ISLAND PROJECT COSTS

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Without Modification	Existing Poplar Island is positioned to receive funding until the Section 902 limit is estimated to be exceeded in 2021. At this point, construction and development of the project would cease. Poplar Island expansion would also not receive funding for construction.	Without the construction of the expansion component, Poplar Island would be overloaded[1] with dredged material and ultimate capacity and authorized habitat development (ecosystem benefits) would be lost. Inflow for FY17, FY18, and FY19 would diminish from 3.2 MCY per year to approximately 2 MCY, 1.3 MCY, and 0.8 MCY respectively and would be impractical thereafter. Therefore, approximately 3.5 to 4 MCY (10 to 15%) of upland capacity would be lost, and the shipping channels would not be properly maintained after FY17. Without modification of the Poplar Island project, the Port of Baltimore and the USACE would have to look at alterative options and places to put the dredged material. This analysis will be completed during the update of the Dredged Material Management Plan. If the Port of Baltimore cannot dredge sufficiently to keep the navigation shipping channels open and safe for passage, thousands of jobs and millions of dollars of business that result from the Port of Baltimore being open for commerce will be lost	Approximately 140 acres of wetlands at existing Poplar Island would not be developed, and only about 17% of the uplands would be developed before funding ceased. Also, approximately 575 acres of valuable upland and wetland habitat associated with the expansion would not be developed. If both the uplands and wetlands are not developed as anticipated, there would be concerns with invasive species taking over the unfinished upland and wetland cells, and also concerns with ponded, stagnant water breeding diseases such as avian botulism and microcystin, both very toxic to various wildlife species. Authorized project would not be completed and E.O 13508 goals would not be met.

[2] See discussion on overloading on Page 7.

With Modification to Complete Existing Poplar Island but Without Modification to Allow Construction of Poplar Island Expansion	Poplar Island would be in position to receive the adequate amount of funding needed to complete the construction and habitat development of the existing project but additional funding to construct and complete the expansion component of the project would be significantly delayed.	Without the construction of the expansion component, Poplar Island would be overloaded with dredged material and ultimate capacity and authorized habitat development (ecosystem benefits) would be lost. Inflow for FY17, FY18, and FY19 would diminish from 3.2 MCY per year to approximately 2 MCY, 1.3 MCY, and 0.8 MCY respectively and would be impractical thereafter. Therefore, approximately 3.5 to 4 MCY (10 to 15%) of upland capacity would be lost, and the shipping channels would not be properly maintained after FY17. Without modification to allow the construction of Poplar Island Expansion, the Port of Baltimore and the USACE would have to look at alterative options and places to put the dredged material. This analysis will be completed during the update of the Dredged Material Management Plan. If the Port of Baltimore cannot dredge sufficiently to keep the navigation shipping channels open and safe for passage, thousands of jobs and millions of dollars of business that result from the Port of Baltimore being open for commerce will be lost.	1140 acres of habitat would be completed: 570 acres of upland habitat and 570 acres of wetland versus the target amount of 840 acres of upland habitat, 735 acres of wetland habitat, approximately 130 acres of open water embayment 10 acres of a tidal gut. As a result of Poplar Island being overloaded with dredged material, the cell development process will take longer as a result of longer consolidation periods, and therefore the project would take longer to complete the remaining upland and wetland cells. Given that placement becomes impractical after FY19, properly developing the various habitats will become very challenging knowing that in some cases, we may not hit our proper elevations. Added time would add significant cost, without providing more ecosystem benefit for that additional cost. Also, if the project receives funding to construct the expansion after the existing project is completed, then there are concerns that the newly established upland habitat will have to be destroyed to build the 5- foot upland raising that is part of the expansion. Further, the last wetland cell on the north side that is proposed to be the staging area for expansion construction would also be destroyed.

2.0 AUTHORITY

The authority for the project is the Water Resources Development Act (WRDA) 1996 for the existing Poplar Island and WRDA 2007 for the expansion of the project. Section 537 of the WRDA 1996 (P.L. 104-303) states that:

> "*The Secretary shall carry out a project for the beneficial use of dredged material at Poplar Island, Maryland, substantially in accordance with, and subject to the conditions described in, the report of the Secretary dated September 3, 1996, at a total cost of $307,000,000, with an estimated Federal cost of $230,000,000 and an estimated non-Federal cost of $77,000,000. The project shall be carried out under the policies and cooperative agreement requirements of section 204 of the Water Resources Development Act of 1992 (33 U.S.C. 2326), except that subsection (e) of such section shall not apply to the project authorized by this section."*

Section 318 of the WRDA 2000 (P. L. 106-541) modifies the authorization for the Poplar Island project:

> *"(1) to provide that the non-Federal share of the cost of the project may be provided in cash or in the form of in-kind services or materials; and*
> *(2) to direct the Secretary to credit toward the non-Federal share of the cost of design and construction work carried out by the non-Federal interest before the date of execution of a project cooperation agreement for the project if the Secretary determines that the work is integral to the project."*

Section 3087 of the WRDA 2007 (P.L. 110-114) states that:

> *"The project for navigation and environmental restoration through the beneficial use of dredged material, Poplar Island, Maryland, authorized by section 537 of the Water Resources Development Act of 1996 (110 Stat. 3776) and modified by section 318 of the Water Resources Development Act of 2000 (114 Stat. 2604), is modified to authorize the Secretary to construct the expansion of the project in accordance with the report of the Chief of Engineers dated March 31, 2006, at an additional total cost of 260,000,000,with an estimated Federal cost of $195,000,000 and an estimated non-Federal cost of $65,000,000."*

Section 204 of WRDA 1992[3] is an authority for regional sediment management. The existing Poplar Island project, per the Section 537 of WRDA 1996 authorization, follows Section 204 cost sharing, which, at the time of authorization, was 75-percent Federal and 25-percent non-Federal. However, the USACE has determined that the expansion components of Poplar Island must follow a different cost sharing. WRDA 2007 not only contains the authorization for expansion (Section 3087), it also changed the required cost sharing for regional sediment management projects (Section 2037, WRDA 2007).

The Section 2037 cost sharing, 65-percent Federal and 35-percent non-Federal, applies to the expansion components since the project cooperation agreement was not modified prior to the date the law was enacted. This does not change the cost sharing for the existing Poplar Island project component. Therefore, this LRR uses the 75/25 cost share for project elements attributable to the originally authorized Poplar Island Project, and 65/35 for expansion project component elements. The project non-Federal cost-sharing partner for Poplar Island is the Maryland Port Administration (MPA). Table 3 provides a summary

[3] Codified at 33 USC 2326.

of the Federal and non-Federal contribution to the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island at 2013 price levels.

TABLE 3: POPLAR ISLAND COST APPROPRIATION BREAKDOWN

Component	Federal ($1000)	Non-Federal ($1000)	Total First Cost ($1000)	Fully Funded ($1000)
Existing Poplar Island				
75% Federal /25% non-Federal	$501,875	$167,292	$669,167	$729,084
Poplar Island Expansion				
65% Federal/ 35% non-Federal	$366,982	$197,605	$564,587	$701,123
Total Project Cost	**$868,857**	**$364,897**	**$1,233,754**	**$1,430,207**

3.0 DESCRIPTION OF THE AUTHORIZED PROJECT

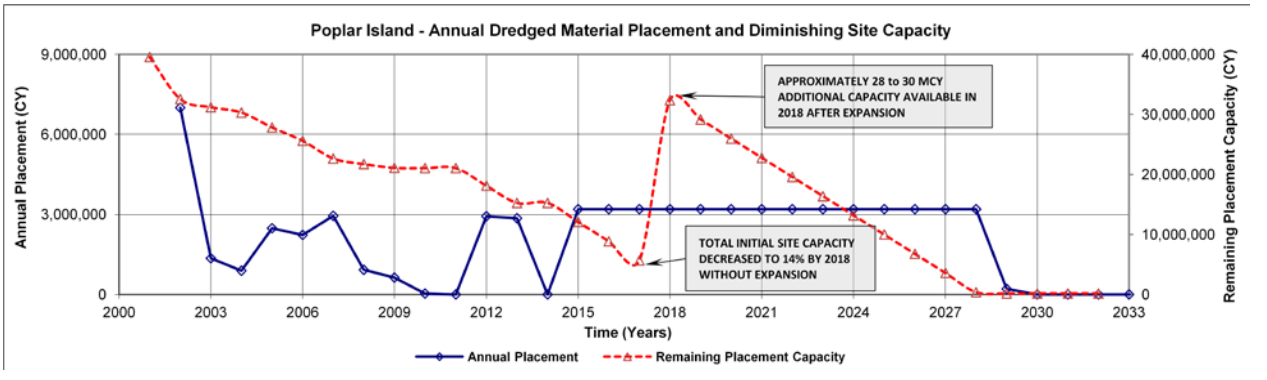
The Poplar Island project will restore and expand remote island habitat to provide hundreds of acres of wetland and terrestrial habitat for fish, shellfish, reptiles, amphibians, birds, and mammals through the beneficial use of approximately 68 million cubic yards (MCY) of clean dredged material from the Baltimore Harbor and Channels navigation project. The project is a long-term strategy for providing placement capacity that meets the dredging needs of the Port of Baltimore while maximizing the use of dredged materials as a beneficial resource. Clean dredged material from specifically designated channels is being used to restore 1,715 acres of remote island habitat. This consists of 840 acres of upland habitat at an elevation of 25 feet above mean lower low water (MLLW), 737 acres of wetland habitat that will be further divided into low marsh and high marsh, and approximately 130 acres of an open water embayment and 10 acres of tidal gut leading into the wetlands. This will provide direct benefits of improved health, richness, and sustainability to aquatic and wildlife species in support of the USACE commitment to restoring and recovering remote island habitats under Executive Order 13508, Chesapeake Bay Protection and Restoration. Ecosystem benefits were determined to be nationally significant and justified, and resulted in Chief of Engineers reports dated September 3, 1996 and March 31, 2006, which led to congressional authorization for construction in both WRDA 1996 (existing) and WRDA 2007 (expansion).

The Baltimore Harbor and Channels Federal navigation project was adopted by the River and Harbor Act of August 8, 1917, and modified by the River and Harbor Acts of January 21, 1927; July 3, 1930; October 7, 1940; March 2, 1945; July 3, 1958; and December 31, 1970. The 2005 Dredged Material Management Plan (DMMP) divided the project further into four discrete sections for detailed analysis: (1) the Chesapeake Bay Approach Channels in Virginia, (2) the Chesapeake Bay Approach Channels in Maryland (Maryland Bay Channels), (3) the Chesapeake and Delaware (C&D) Lower Approach Channels and (4) the Harbor Channels (Figure 4).

The Poplar Island GRR was also completed in 2005 and specified the size and layout of the proposed expansion. Raising the dikes of the existing project and expanding the footprint of the island exceeded the

cost and/or project limitations and as a result required congressional authorization. With increased inflow from the C&D Lower Approach Channels, the existing project will have reached its theoretical capacity in 2018 or early 2019. The "theoretical capacity" is based on the volume occupied by dredged material after it has reached a fully settled or stabilized condition where all excess water has been removed. To allow time for full consolidation of dredged material, it is necessary to reduce placement to a quantity less than the full average annual placement quantity of 3.2 MCY during the last several years of the project life. During preparation of the GRR in 2005, it was estimated that a reduction in placement quantity below 3.2 MCY would be necessary beginning in FY 2017. Therefore, additional placement capacity beyond the existing project capacity will be needed to fully accommodate the anticipated inflow for FY 2017 (i.e. 2016/17) dredged material placement. The expansion (both lateral and vertical components) will provide approximately 28 MCY of additional capacity. At an average annual inflow of 3.2 MCY per year (O&M dredging only), the expansion will provide capacity for approximately 8 additional years as a self containment placement site but used together with existing Poplar Island, the expansion provides approximately 11 years of placement capacity as depicted Figure 1

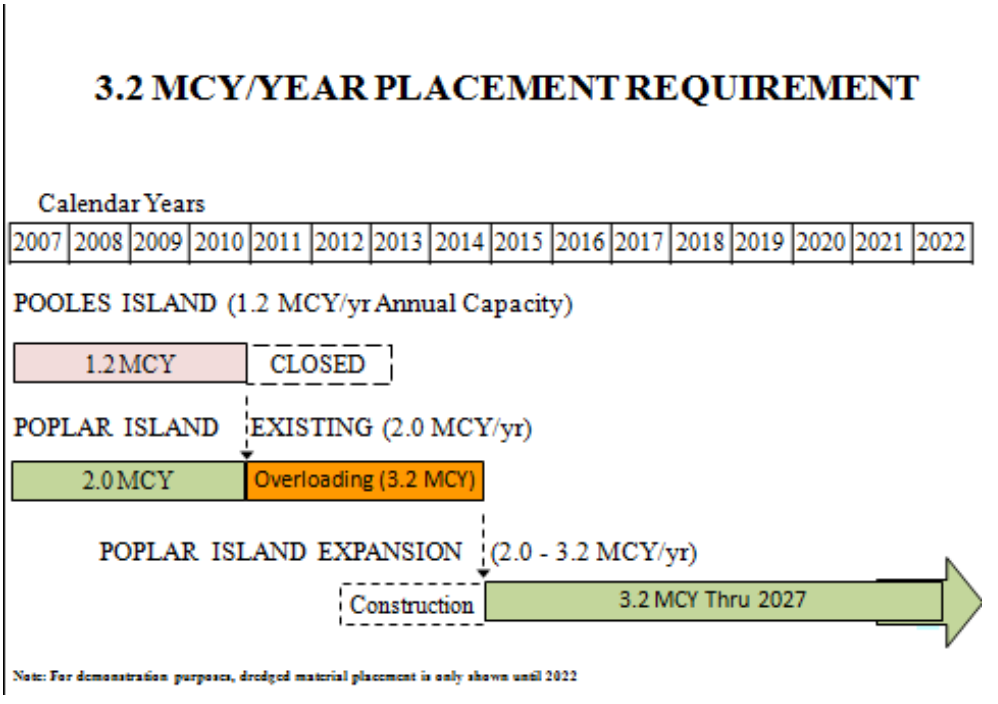
FIGURE 1: ANNUAL DREDGED MATERIAL CAPACITY FOR POPLAR ISLAND



Poplar Island currently receives material from the Maryland Approach Channels. The Maryland Approach Channels are located north of the Bay Bridge at Kent Island, and just south of Hart-Miller Island Dredged Material Containment Facility, and lead into the Patapsco River (Figure 5). The Maryland Approach Channels that service the Port of Baltimore include the following: Craighill Entrance, Craighill Channel, Craighill Angle, Craighill Upper Range, Cutoff Angle, Brewerton Eastern Extension, Swan Point Channel, and Tolchester Channel. The 2005 GRR and Section 3087 of WRDA 2007 provided the authorization for the acceptance of material from the C&D Canal Lower Approach Channels (Figure 6).

The U.S. Army Corps of Engineers (USACE) Engineering Regulation (ER) 1105-2-100 (22 April 2000) mandates that the USACE Districts develop a DMMP for all Federal harbor projects where there is an indication of insufficient placement capacity to accommodate maintenance dredging for the next 20 years. The DMMP is a planning document that ensures maintenance-dredging activities are performed in an environmentally acceptable manner, uses sound engineering techniques, and is economically warranted. The plan addresses a full range of placement alternatives to ensure that sufficient placement capacity is identified for the next 20 years. The USACE-Baltimore District's goal was to develop a comprehensive, regionally supported DMMP that produced a long-term strategy for providing viable placement alternatives for the dredging of the Port of Baltimore Federal Channels based on the currently approved DMMP. Figure 2 shows an idealized dredged material placement schedule for the Poplar Island and Poplar Island Expansion dredged material placement sites as presented in the 2005 DMMP document.

FIGURE 2: 2005 DREDGED MATERIAL PLACEMENT PROJECTION



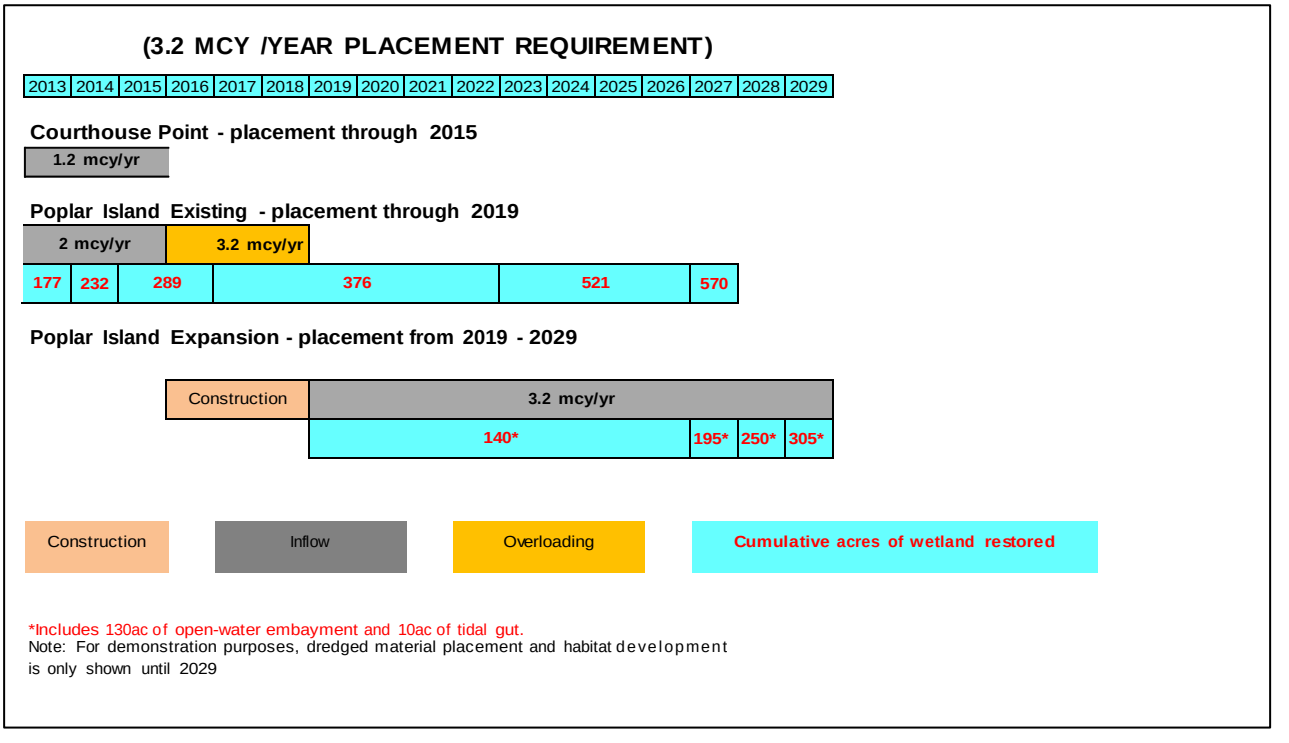
The Baltimore District's DMMP, which was completed in 2005, is currently being updated for completion in 2014, pending availability of funds. The DMMP covers the dredging of the Maryland Approach Channels leading to the Port of Baltimore as well as the southern approach channels to the C&D Canal as far north as the Sassafras River. Preliminary data compiled thus far for the DMMP update have indicated that Poplar Island Expansion is the most cost-effective alternative for dredged material placement since open water placement, including the Deep Trough, was prohibited by the Maryland Dredged Material Management Act of 2001 (Maryland General Assembly House Bill 1317). This legislation mandated the closure of Pooles Island in 2010, and was enacted in response to general public, state and Federal agency opposition to open water placement in Chesapeake Bay. The expansion of Poplar Island is necessary to meet the projected capacity needs of the material to be dredged from the C&D Canal Lower Approach Channels and the Maryland Chesapeake Bay Approach Channels. According to the 2005 DMMP, the expanded sections of Poplar Island should have been available to accept material in 2011 to avoid excessively overloading the existing cells. The existing Poplar Island project will exhaust its capacity by 2019. Most of the remaining capacity resides in Upland Cell 6, which will be subject to overloading every year starting in 2016. When operated efficiently, new dredged material lifts placed into upland cells are limited to approximately 3 feet in thickness to facilitate effective dewatering prior to inflow the following year. Current projections indicate that remaining annual placement lift thicknesses within Cell 6 will range from 180 percent (5.4 feet) to 260 percent (7.8 feet) of the optimum lift thickness thereby trapping excess water within the deposit, and significantly extending the time required to achieve a stable surface, and decreasing the placement capacity of the project. The extended time of approximately 2 to 3 additional years to achieve stabilization will increase project operational costs and may result in increased risk and uncertainty in the development of the upland cell, and the continued viability of the wetland cell(s) through which the excess water is drained. The increased risk and uncertainty is to the success of upland habitat development and the functionality of wetland cells

Dredged material enters a containment site with a very high proportion of water. Over a period of years, excess water is removed from the dredged material, the initial volume decreases, and the surface settles until it reaches a stable condition where no further settlement is anticipated. Overloading occurs when dredged material is placed into a cell with an initial thickness exceeding approximately 3 to 4 feet preventing effective removal of excess water prior to the next inflow into that particular containment cell. The excess water becomes "trapped" within the dredged material mass extending the time required to reach

a fully stabilized condition. If overloading is repeated within a cell, the adverse time impacts delaying dredged material placement and cell development are cumulative. The existing Poplar Island project component was designed to place an in-flow of 2 MCY/year from the Maryland Approach Channels. The expansion is designed to handle 3.2 MCY in conjunction with the existing island to accommodate the C&D Canal Lower Approach Channels as well.

Stimulus funding from the 2009 American Recovery and Reinvestment Act (ARRA) allowed for increased maintenance and advanced maintenance dredging of the Baltimore Harbor and Channels project. However, this material was placed at the Hart-Miller Island confined disposal facility in an effort to maximize placement prior to the facility's State-mandated closure in December 2009. The increase in advanced maintenance dredging in 2009 reduced the need for dredging in subsequent years, resulting in no dredged material placement at Poplar Island in fiscal years (FY) 2010 and 2011. Similarly, the Pooles Island open water placement site was also used more heavily as a result of ARRA-funded dredging, and this increased placement from the C&D Lower Approach Channels prior to its State-mandated closing in December 2010 resulted in a reduced need for maintenance dredging over the next two years. The Philadelphia District now plans to transport the material from the C&D Lower Approach Channels to the Courthouse Point dredged material containment site located in Cecil County, Maryland, which is a less costly alternative to transporting the material to Poplar Island. As a result of these changes, an updated dredged material placement capacity timeline was created in 2011 (Figure 3). Figure 3 also shows cumulative acres of wetland habitat that will be restored on both existing Poplar Island and Poplar Island expansion over time. It is important to note that the excess material placed at Hart-Miller Island and Pooles Island in conjunction with the ARRA funding has had the effect of postponing the time when Poplar Island could potentially be overloaded from 2011 to 2016. Therefore, even though the construction of the expansion is behind schedule, the existing project would only be subject to potential overloading for a three-year period (as opposed to the four-year period shown in Figure 2). However, the overall result is that the operational life of the combined facility will be extended, which will cause the overall cost of the project to increase.

FIGURE 3: CURRENT DREDGED MATERIAL PLACEMENT AND REMOTE ISLAND WETLAND ACRE RESTORATION PROJECTIONS



It must be noted that as a result of permitting problems related to Courthouse Point, material from the C&D Lower Approach Channels was placed at Poplar Island in early 2013. If these permitting concerns continue, and the Philadelphia District cannot find an approved placement site, it is anticipated that this material will continue to be placed at Poplar Island. This is in agreement with the 2005 DMMP, as well as the projections from the 2005 GRR. The Philadelphia District also intends to reactivate the Pearce Creek Dredged Material Containment Facility, which is located in Cecil County, Maryland. There are groundwater issues that are associated with this facility that thus far have prevented the site from being permitted by the State of Maryland to accept dredged material. The Philadelphia District is working through the issues, but it is not anticipated that the site will be ready to accept dredged material for several years. Therefore, having use of all authorized components of the Poplar Island Ecosystem Restoration Project is critical to ensure that there is sufficient placement capacity for the Baltimore Harbor and Channels Project without overloading the existing project and to maintain safe navigational shipping channels for the Port of Baltimore.

Restoration of remote island habitat is necessary and valuable to the Chesapeake Bay ecosystem and the North Atlantic Flyway. In the last 150 years, it has been estimated that over 10,000 acres of remote island habitat have been lost in the middle-eastern portion of the Chesapeake Bay. Shoreline erosion of the major islands of the Chesapeake Bay has proceeded in recent years at alarming rates ranging from 1.5 feet to over 31 feet per year (Donham 1992). The worst-case scenarios for some islands such as James, Barren, and Poplar Islands predicted their disappearance within 10 to 50 years if restoration actions are not taken. Eroding shoreline bluffs account for island loss in the northern portion of the Bay above the Choptank River, whereas erosion of marsh edges, land subsidence, and interior erosion occurs in the southerly, seaward islands. Losses are due to sea level rise, wind, and wave action. In addition to their natural functions as refuges and rookeries for water birds, these islands protect expanses of submerged aquatic grasses and productive shallow waters. Their demise would be a serious loss of natural resources in the Bay.

Justification of the ecosystem restoration was documented in the Integrated Feasibility Report and Environmental Impact Statement (EIS) for Poplar Island in February 1996 and in the 2005 GRR. Following the final EIS and the GRR, the USACE prepared Records of Decision (ROD), which were signed on September 4, 1998, and on October 11, 2006 respectively by the Assistant Secretary of the Army for Civil Works. The existing and expansion Poplar Island projects were fully authorized by WRDA 1996 and WRDA 2007. Ecosystem justification has been verified as part of this LRR, but neither reformulation nor re-justification is required at this time.

FIGURE 4: MAP OF THE BALTIMORE HARBOR AND CHANNELS

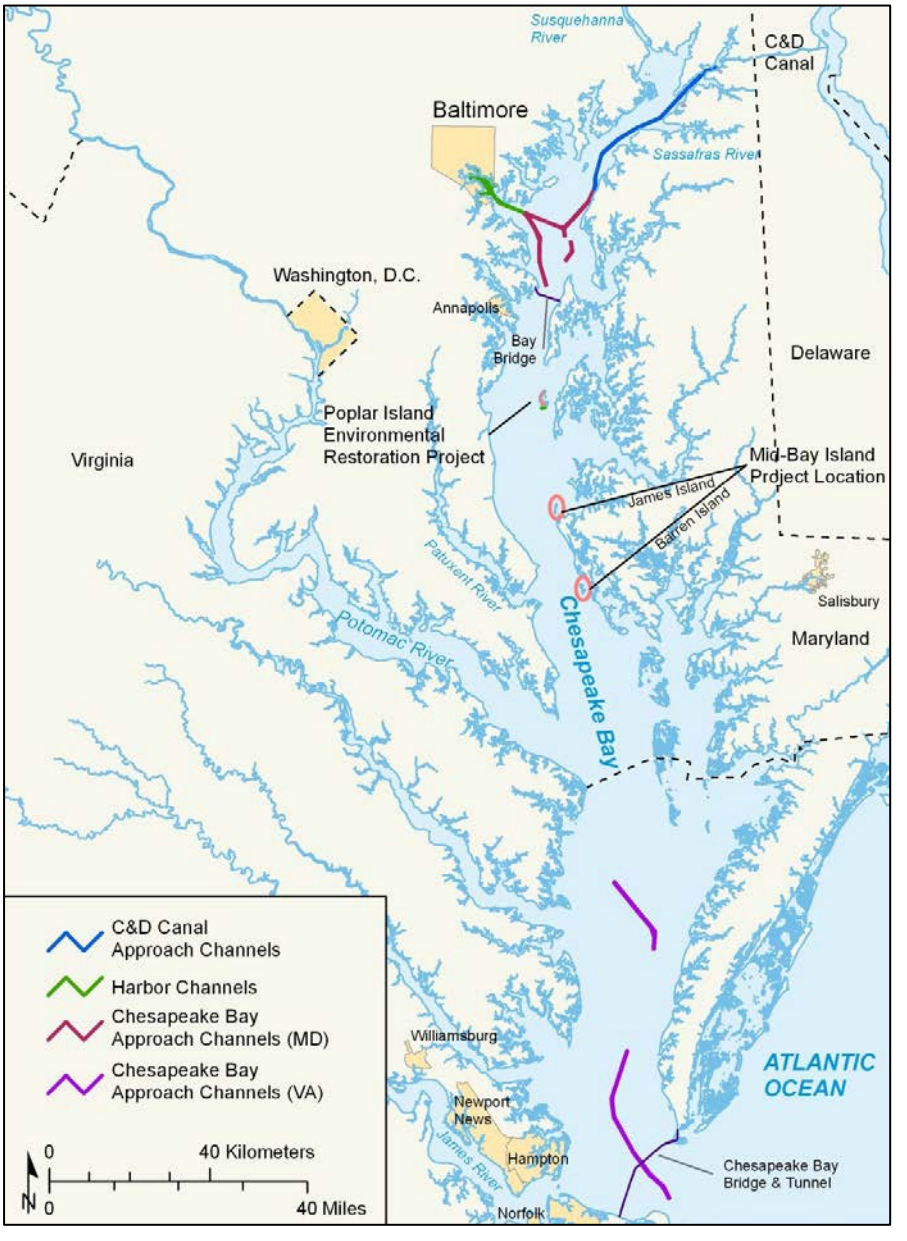


FIGURE 5: MAP OF THE CHESAPEAKE BAY APPROACH CHANNELS (MARYLAND)

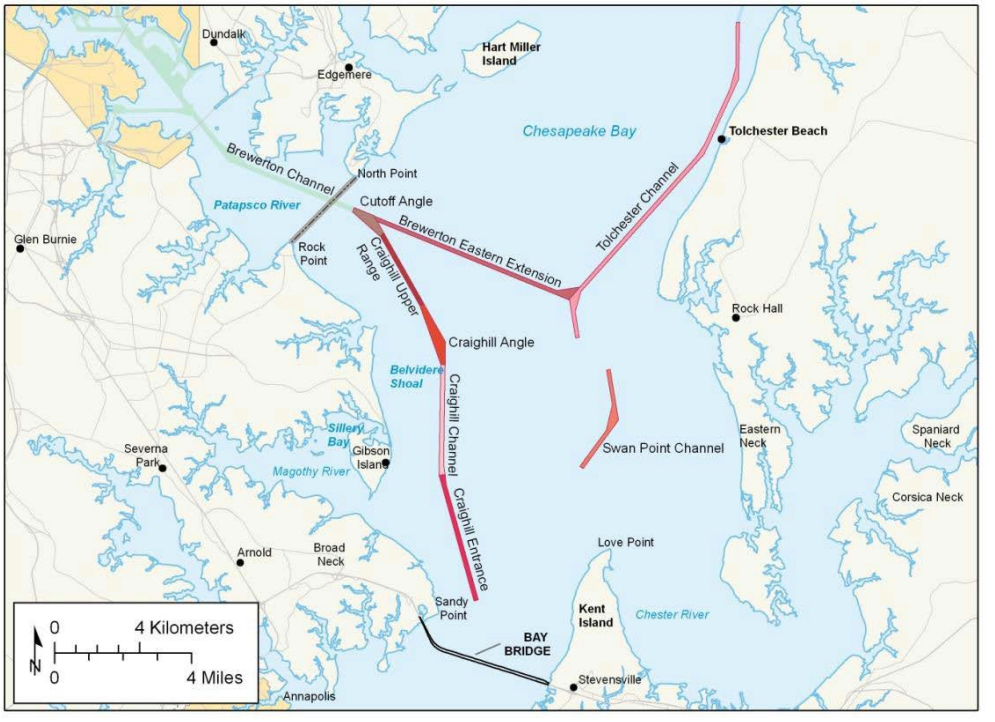
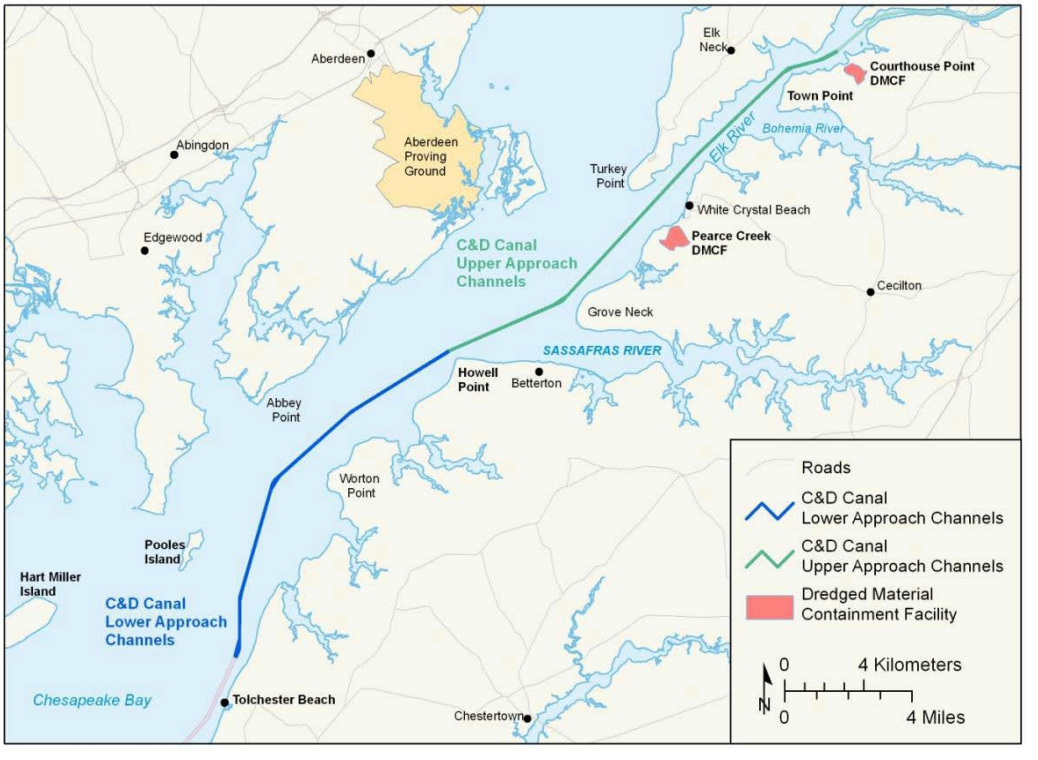


FIGURE 6: MAP OF THE C&D APPROACH CHANNELS



4.0 ANALYSIS OF COST CHANGE

The primary purpose of the LRR is to document the changes in the project costs since the 2005 GRR. The following sections describe annual project funding, changes to actual project costs compared to previous cost estimates, and assumptions.

4.1 FUNDING SINCE AUTHORIZATION

The Poplar Island project has received Federal funding each year since fiscal year (FY) 1997 in the Construction General (CG) program. The project received study funding prior to FY 1997 under Section 204 of the Continuing Authorities Program. Not only are CG funds needed annually to complete the project, but so are Baltimore Harbor and Channels Operations and Maintenance (O&M) funding. Since O&M funds cover the cost of dredging the channels and transport of the material to the Federal Standard, or base plan option. CG funding allocations by fiscal year for the project are shown in Table 4.

TABLE 4: FUNDING SINCE AUTHORIZATION

Fiscal Year (FY)	Federal Funding	Activity
1994	$10,000	Study Phase
1995	$1,341,100	Study Phase
1996	$444,000	Study Phase
1997	$757,000	Design
1998	$13,542,000	Design/Dike Construction
1999	$20,518,000	Phase 1 Dike Construction
2000	$14,606,000	Phase 1 Dike Construction
2001	$36,482,000	Inflow/ Phase II Construction
2002	$18,243,000	Inflow/ Phase II Construction
2003	$8,215,000	Inflow/Grade Cell 4D
2004	$11,606,000	Inflow/Planting Cell 4D
2005	$10,221,000	Inflow/Grade and install tidal inlet in Cell 3D
2006	$13,102,000	Inflow/Planting Cell 3D
2007	$13,786,014	Inflow
2008	$13,387,000	Inflow/Grade and install tidal inlet in Cell 1A
2009	$10,322,746	Inflow/Planting Cell 1A
2010	$7,078,000	Grade and install tidal inlet in Cell 1C
2011	$3,649,756	Grade and install tidal inlet in Cell 1B/Plant Cell 1B
2012	$14,200,000	Inflow/ Planting Cell 1B
2013 (President's budget)	$12,825,000	Inflow, Construction of tidal inlets for Cells 3A and 3C, Grade Cells 3A and 3C
Total	**$224,335,616**	Currently, approximately 176 acres of tidal marsh have been restored using 24.3 MCY of dredged material

4.2 CHANGES IN PROJECT COSTS

4.2.1 Introduction

Benchmark cost estimates for the Poplar Island project were completed in 1995, 2005, and 2010. The 1995 estimate, prepared for the authorization of the existing project, was very limited in detail and contained a very simplified cost breakdown structure. The 2005 estimate, included in the GRR used for authorization of the expansion of Poplar Island, presented the overall cost for the entire project and significantly expanded the cost breakdown structure when compared to the 1995 estimate. In 2010, the cost estimate for the entire project (including both the existing and expansion components) was fully updated and included a risk analysis. It was the 2010 estimate that first identified the significant increase in the overall cost estimate of the project. The 2010 estimate has been updated annually over the past three years to (1) account for sunk cost information, (2) make minor adjustments related to anticipated project duration, and (3) adjust costs to current price levels. The current certified 2013 cost estimate, identical in structure to the 2010 estimate, is presented in Appendix A, and summarized in Table 5, along with the 2005 GRR estimate (updated to the current price level).

TABLE 5: SUMMARY OF COST CHANGES FROM 2005 COST ESTIMATE TO 2013 COST ESTIMATE

COST CATEGORY	2005 Estimate FY05 to FY31 ($K) (2013 price level)	2013 Estimate FY13 to FY43 ($K) (2013 price level)[6]	Change ($K)	% of Total Change in Estimated Project First Cost
Containment Facility Construction	$103,047	$117,679	$14,632	3.2%
Transportation & Placement of Dredged Material[1]	$236,200	$391,541	$155,341	33.8%
Site Development	$138,653	$321,367	$182,714	39.8%
Crust Management	$20,807	$14,483	($6,324)	-1.4%
Habitat Development[2]	$68,585	$54,103	($14,482)	-3.2%
Water Quality Monitoring	$8,942	$27,566	$18,624	4.1%
Environmental Monitoring by Other Federal Agencies	$11,756	$14,212	$2,456	0.5%
Grading[3]	$5,398	$21,988	$16,591	3.6%
Site Operations	$23,165	$189,014	$165,849	36.1%
Planning, Engineering & Design	$29,892	$38,595	$8,703	1.9%
Construction Management	$11,126	$13,619	$2,493	0.5%
Other[4]	$18,546	$6,749	($11,797)	-2.6%
Pre-FY05 Sunk Costs	$183,597	$183,597	$0	0.0%
Contingency[5]	$53,746	$160,607	$106,861	23.3%
Total	$774,808	$1,233,754	$458,946	100%

1. Includes dredge mobilization/demobilization.
2. Includes tidal inlet construction and planting.
3. Includes wetland and upland cell grading.
4. Includes Cell 6 closure and Hurricane Isabel repairs.
5. Contingency amounts were taken from the 2005 and 2013 estimates.
6. Includes sunk costs from FY05 through FY12.

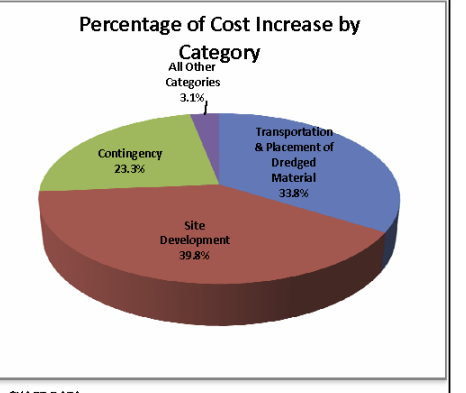


CHART DATA:		
Transportation & Placement of Dredged Material	$155,341	33.8%
Site Development	$182,714	39.8%
Contingency	$106,861	23.3%
All Other Categories	$14,030	3.1%
Total	$458,946	100.0%

The major components associated with the construction of the Poplar Island project include: (1) construction of the initial armored containment dikes, (2) transportation of dredged material to Poplar Island and placement within the containment cells, and (3) site development to transform the dredged material surfaces into the final upland and wetland habitat specified by the original feasibility study and the 2005 GRR. As reflected in Table 4, the major changes in the cost estimate are not evenly distributed among all of the project features or activities. The table shows that there are three major areas of significant cost increase including: (1) transportation and placement of dredged material, (2) site operations, and (3) project contingencies. These three major areas of cost change will be discussed in detail in subsequent sections.

4.2.2 Construction Experience

This type of large-scale island habitat restoration using dredged material was largely unprecedented, especially considering the environmentally sensitive setting of the Chesapeake Bay. Island habitat creations have been accomplished at several Gulf coast locations but with much less restrictive placement, development, and planting methods. The initial 1995 Poplar Island cost estimate was completed without the benefit of significant site development and site operation experience. This estimate was prepared by the non-Federal sponsor and adopted by the USACE. It did not contain any detailed breakout of costs and the site development costs and site operations costs were not developed. By 2005, there had been approximately 7 years of construction experience that included the completion of approximately 8 miles of armored dike construction, inflow of nearly 12 MCY of dredged material over a period of approximately 4 years, and the grading and planting of Cells 3D and 4D. The experience gained in construction of the original armored containment dikes has provided a sound basis for estimating the cost of expansion containment features as reflected in the relatively small increase in estimated costs shown in Table 4. Cell 4D provided experiences in channel construction and wetland planting, while Cell 3D added the important additional experience of using dredged material to develop approximately 26 acres of wetland habitat.

By 2005, when the GRR cost estimate was in preparation, limited experience was available to identify the operational costs associated with the complexities of grading and developing the dredged material into prime wetland habitat, and no experience had been gained in the development of upland habitat. The site operations costs were not fully understood by the estimator when the 2005 estimate was prepared and not only were they lower that what was actually being realized but they were showing a decline in the future years of the project. As more of the island is developed, there is more to maintain and the site operations will actually go up for a time before they are expected to taper off. These higher site operation costs (as depicted in Table 5) are represented in the 2013 cost estimate.

By 2010, when the total project cost estimate was being updated to include mandated risk analysis, construction experience included the completion of the original armored dike construction, and 10-year performance history for the containment dikes, inflow of over 18 MCY of dredged material in 9 placement events, and the grading and planting of 141 acres of wetlands in 4 cells. As of 2013, dredged material placement has exceeded 24 MCY. Completed wetland acreage has increased to 176 acres, with 102 additional wetland acres currently being graded. Upland cell development has been initiated with the construction of temporary cross dikes to facilitate development of surface topography leading to final grading and planting. Costs associated with construction of containment facilities and many components of wetland development are now well established. Costs associated with dredged material transportation and placement, while they have increased significantly since the 2005 estimate, are also well understood. The primary area of uncertainty lies in the construction of upland habitat where very little experience has been gained to date. As will be addressed in greater detail hereafter, it is very difficult to accurately estimate the time frame required before the extremely thick upland dredged material deposit will be stable enough to allow final grading and planting. That uncertainty has been captured in the two large cost change components of Site Operations and Contingency as will be explained in the following sections.

4.2.3 Transportation and Placement of Dredged Material

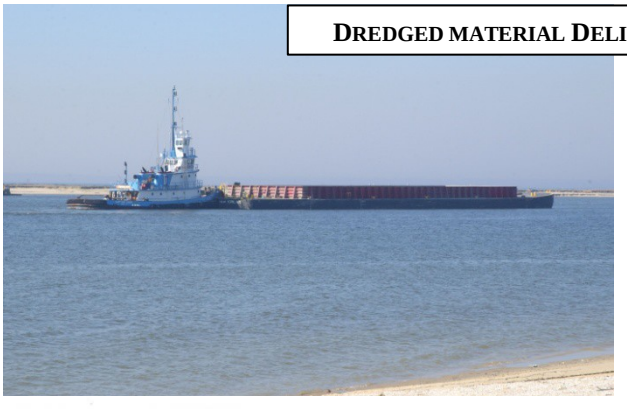
For the 2005 cost estimate and the current 2013 estimate, transportation and placement of dredged material account for approximately 34-percent of the total project cost change. It should be noted that the costs associated with the Poplar Island project do not include the cost to dredge the channels, but do include the cost to transport the material from the Deep Trough (just south of the Bay Bridge) to Poplar Island and return the barges to that point, and the cost to pump the dredged material from the barges to containment cells on Poplar Island. Higher fuel costs were the largest single factor in raising the dredging costs

accompanied by a significant increase in the cost of hauling insurance. Diesel fuel costs increased more than 40% between 2005 and 2012 when adjusted for inflation (www.eia.gov).

The Deep Trough is part of a deep-water trench, about 20 miles long and up to 160 ft in depth. The trough is generally aligned along a north-south axis in the eastern center of the main stem of the Chesapeake Bay and is a remnant of the ancient Susquehanna River channel when this portion of the Bay was a riverine environment. Previous studies conducted by the USACE have concluded that open water placement in this area would meet the applicable Federal standards. Therefore, the Federal standard, or base plan, for the dredged material from the Chesapeake Bay Maryland Approach Channels was defined as the Deep Trough site. Placement of material in open waters of the Bay is not permitted under Maryland state law as explained in Section 3.0, Description of the Authorized Project; nevertheless, the Deep Trough remains the Federal standard for cost sharing purposes.

The 2005 GRR cost estimate inadvertently omitted the cost of transporting dredged material from the Pooles Island open water placement site (the base plan for the C&D Canal Lower Approach Channels) to Poplar Island. This oversight was corrected in the 2010 cost estimate and is the second largest factor contributing to the increased dredging cost reflected in the current 2013 estimate. Approximately 1.2 MCY/year of dredged material from the C&D Canal Lower Approach Channels is planned to be placed at Poplar Island. The expansion has been designed to accommodate this additional material in accordance with the 2005 DMMP.

DREDGED MATERIAL DELIVERY & OFF-LOADING



DREDGED MATERIAL PLACEMENT

4.2.4 Site Development and Project Duration

4.2.4.1 General Information Site development includes most activities that occur on Poplar Island from the time dredged material is initially placed into a containment cell until the final dredged material surface

has been graded and plants are considered fully established. The primary activities included in site development are:

a. management of dredged material placement into each cell
b. dredged material crust management (i.e. dewatering of dredged material)
c. final grading of stabilized dredged material surfaces
d. construction of channel, moat, and pond systems for wetland cells
e. planting of completed cells
f. environmental monitoring throughout site development activities
g. overall operation, maintenance, and management of the project site

Site development activities began when the first dredged material was placed in 2001 and will continue through the completion of the last upland habitat cell scheduled to be completed in 2041. To achieve the very precise final surface elevations that assure appropriate tidal inundation, the quantity of dredged materials placed in wetland cells is carefully managed. Placement into upland cells is managed to maximize cell capacity and reach the targeted final surface elevations designated in the original feasibility study as closely as practicable. Ideally, dredged material placement is limited to lifts not exceeding approximately 3 to 4 feet in initial thickness so that excess water can be effectively removed through crust management practices. When placement lifts exceed 3 to 4 feet, excess water is "trapped" within the dredged material mass slowing the rate of settlement and extending the time required to reach a stable condition suitable for final grading and planting. Final upland surfaces will be graded to conduct surface runoff into adjacent wetland areas without causing damage during extreme precipitation events.

Based on projected future rates of dredged material placement, it is estimated that by 2041 all placed dredged material will have reached a fully stabilized condition with no significant additional settlement anticipated. All cells will have been graded establishing the required surface topography, runoff control (upland cells), channel systems and tidal exchange (wetland cells). All planting contracts will have been completed and additional time will be allowed for plants to become fully established and cells fully functional. Based on current projections of dredged material inflow, the last upland planting for the existing Poplar Island project is scheduled for completion in 2034, while the last upland planting for the Poplar Island expansion area is expected to be completed in 2038. Approximately three additional years (2041) have been allotted to verify that all cells are fully functional before complete demobilization of site development capabilities.

As shown in Table 4, increased site development costs are estimated to account for approximately 40-percent of the total project cost increase. The largest portion of that increase is associated with the cost of site operations activities of which a major contributing factor is the increase in the project's duration as discussed below.

4.2.4.2 Placement and Stabilization of Dredged Material During placement activities, dredged material

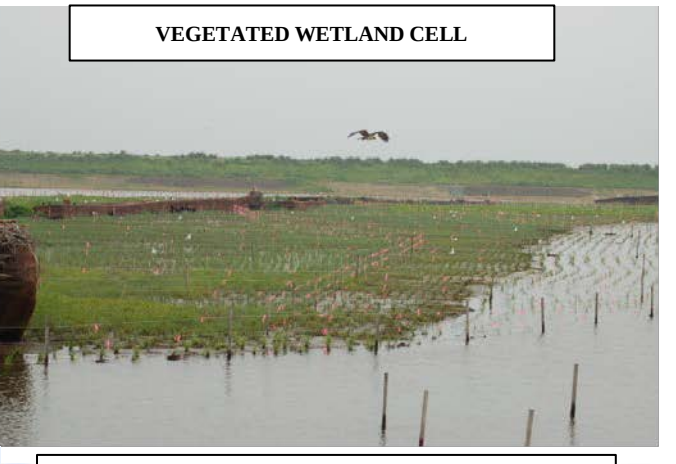
is pumped into each containment cell as slurry composed of approximately 90-percent water and 10-percent dredged material. Stabilization of the dredged material is a lengthy process of removing excess water to create a stable soil mass that will not settle significantly after planting with a variety of grasses, shrubs, and trees suitable for the particular targeted habitat. Before planting, wetland surfaces require a

stable marsh plane at an elevation within approximately 0.5 feet of the mean daily high tide elevation. Such a surface is not achieved by hydraulic placement of dredged material alone, but by a process of decanting free water, dewatering the dredged material mass, establishing a working surface that can support construction equipment, grading, channel excavation, and planting after the dredged material has been stabilized. The lack of experience performing wetland and upland cell development was reflected in a significant underestimate of the time and cost to perform habitat development in the 1995 cost estimate.

By 2005, wetland development had been completed in Cell 4D and was nearing completion in Cell 3D. It is important to note that Cell 4D was the first wetland cell completed on Poplar Island (2003), but it was constructed out of imported sand, not dredged material. The purpose of this test cell was to determine construction methods and elevations for a functioning marsh. Therefore, by 2005, one wetland test cell constructed partly with imported material was completed, and another one using dredged material was near completion. Therefore, at the time the 2005 GRR cost estimate was being developed, actual dredged material cell development experience was very limited. Grading was just under way on the first dredged material wetland cell, planting had not yet been completed, costs had not been analyzed, and there was no performance record to judge success or failure. Furthermore, development of uplands for the expanded site was not anticipated for approximately 15 years, and the details of upland development had not been worked out beyond a conceptual level.

INTERCONNECTION OF COMPLETED WETLAND CELLS

VEGETATED WETLAND CELL



WETLAND CHANNEL & MOAT EXCAVATION

CONSTRUCTION OF TIDAL INLET STRUCTURE

4.2.4.3 Increased Project Duration. There are several factors that contributed to the increased project duration. One factor is the increased time required to develop upland habitat, and a second factor is the decrease in the average rate of dredged material placement that has occurred during the first 13 years of site operation. The combined effect of these two factors has added approximately 10 years to the projected project life which includes the placement of all dredged material and the establishment of fully functional wetland and upland habitat. While the extended project life increases the project operation and maintenance costs, it also defers the need for, and cost of, alternative placement sites.

The current project consists of 50-percent upland and 50-percent wetlands by area. However, approximately 80-percent of the placement capacity lies within the upland cells and 20-percent within the wetland cells. The time required to develop upland habitat was significantly underestimated and is a major factor in the increased duration of the project from a 2031 end date assumption in the 2005 cost estimate to a 2041 end date assumption in the current 2013 cost estimate update. In contrast to the wetland cells, where the typical dredged material thicknesses ranges from 5 to 10 feet, dredged material contained within upland cells will ultimately have a thickness of 45 to 60 feet (this includes areas under the upland cells that were mined for sand used for initial dike construction). Where the time to reach a stable condition in the wetland cells is 4 to 6 years, the time required to reach a sufficiently stable condition in the upland cells may require decades and is significantly longer than allowed for in the 2005 GRR cost estimate. Increased project life means there are more years of site operations and therefore increased costs associated with this cost category.

In the 2005 GRR estimate, the average dredged material placement rates were assumed to be 2 MCY/year through FY 2009 (with all 2 MCY coming from the Chesapeake Bay Maryland Approach Channels) and 3.2 MCY beginning in FY 2010 (with 2 MCY coming from the Maryland Chesapeake Bay Approach Channels and 1.2 MCY from the C&D Lower Approach Channels). Although the actual average placement rate for material from the Chesapeake Bay Maryland Approach Channels from FY01 to FY13 is approximately 1.8 MCY, the project has experienced significant periods of placement far below the estimated rates. For example, the project only received a total of 1.5 MCY over the four-year period from FY08 through FY11, with no placement occurring in either FY10 or FY11. Stimulus funding from the 2009 ARRA allowed for increased maintenance and advanced maintenance dredging of the Baltimore Harbor and Channels project. However, this material was placed at the Hart-Miller Island confined disposal facility in an effort to maximize placement prior to the facility's state mandated closure in December 2009. The increase in advanced maintenance dredging in 2009 reduced the need for dredging in subsequent years, resulting in no dredged material placement at Poplar Island in FY10 and FY11. It was not until early FY13 that the first placement of C&D Lower Approach Channels dredged material (approximately 700,000 CY) occurred at Poplar Island, and this was primarily a result of permitting issues related to Philadelphia District's placement sites in the upper Chesapeake Bay. In summary, Poplar Island has received significantly less dredged material to date than was originally estimated in the 2005 GRR. Had dredged material been placed at the rate projected in the 2005 GRR, the site would currently contain approximately 32.8 MCY of dredged material. The actual placement quantity at this time is 24.3 MCY so that an additional 8.5 MCY of capacity is available that will extend the project life by nearly 3 additional years.

4.2.4.4 Site Operations. Site operations is a complex item including facilities, utilities, staff labor, vehicles (construction, transportation, boats), vehicle operation and maintenance, maintenance of the site (roads, piers, dike slopes, etc.), and general overhead. The annual site operations costs were significantly underestimated in the 1995 cost estimate, and similar assumptions about the level of effort and manpower needed appear to have been carried into the 2005 cost estimate for the project. There also appears to have been several significant shifts in the method of accounting for costs during the first several years of site operation that may have introduced some confusion in identifying actual costs. The annual costs were underestimated based on the assumption that operational costs would diminish by approximately 30-

percent during the second decade of operation, and diminish again by approximately 70-percent during the final seven years of operation. These assumptions are no longer valid considering the fact that the expanded project will increase in size by approximately 50-percent and will increase in capacity by approximately 75-percent starting approximately half way through the 30-year operational life (per the GRR time estimate) of the project.

Experience to date indicates that site operations costs will tend to increase with the increasing size of the project, and that they will not diminish significantly until all dredged material placement and most cell development activity has been completed. As a result, site development costs included in the current 2013 estimate are significantly higher than those shown in the 2005 estimate, with most of the increase occurring in the site operations line item. Site operations costs went from approximately 3-percent of the total project cost in the 2005 estimate to approximately 15-percent of the total project cost in the current 2013 estimate. As shown in Table 4, these changes account for approximately 36-percent of the total project cost increase.

It is important to note that by 2010, the project team, with over 10 years of construction experience, could more accurately identify the costs to complete the Poplar Island project (existing and expansion). Additionally, a cost-risk analysis was completed, reviewed, and revised (in 2010 and again in 2013) to assure that project risks are considered and properly factored into the estimate as contingency to prevent project cost growth. Uncertainty associated with upland development is recognized as a significant factor that has been incorporated into the project contingency as addressed below. As a result, future cost estimate updates for Poplar Island are anticipated to be relatively minor adjustments, and large increases in the estimate are not anticipated.

4.2.5 Contingencies

Project costs are updated annually during construction for budgetary purposes, but periodically cost estimates are revised along with a detailed cost-risk analysis. In compliance with ER 1110-2-1302, Civil Works Cost Engineering, dated September 15, 2008, a post-Authorization total project cost estimate (TPCS) update must occur every year. By definition, that update includes the base estimate, risk and contingencies and escalation. The risk analysis study identifies and measures the cost and schedule impacts of project uncertainties with respect to the estimated total project cost. A cost-risk analysis was completed for Poplar Island project in 2010. The cost risk register was revisited in late 2012 as part of the Poplar Island LRR process to ensure that the risks identified in the 2010 analysis were still valid. The project delivery team (including the project sponsor) conducted a brainstorming session to identify any new risks associated with the project. Using a risk matrix, it was determined which of the cost risk factors identified could potentially affect the project cost estimate. It was determined that the risks identified in 2010 were adequate. They are listed in Table 6.

The Walla Walla Cost Engineering Center of Expertise performed the 2010 risk analysis using a *Monte Carlo* technique, producing a new cost contingency for the project of 21-percent, significantly higher than the 10-percent cost contingency used in the 2005 estimate. The increase in contingency accounts for 23-percent of the total increase in the estimated project cost. See Table 5.

TABLE 6: MAJOR COST RISKS IDENTIFIED FOR THE POPLAR ISLAND PROJECT

Project Risk	Risk Level to Project Cost	Risk level to Project Schedule	Discussion
Market conditions and bidding competition	High	Low	There is concern over the low number of potential bidders, and that the project is going to be dependent on contract acquisition and availability of contractors.
Adequacy of project funding (incremental or full funding)	High	Low	Project cost and schedule is dependent on full funding on a yearly basis.
Risk to project schedule	High	High	Project is dependent on quantities delivered to the site. The lack of quantities will lengthen the schedule as well as cause an increase in cost. Increased quantities could accelerate some construction placement, but potential for acceleration is limited.
Priorities change on existing program	High	High	There will be competition between ports on Federal O&M funding. If funding was limited, the project may not receive adequate volumes of material to stay on schedule and as a result, the project would be extended, increasing both the length of the project as well as increasing the cost of the project.
Communication breakdown with the project team	Moderate	Moderate	There have been prior examples of communication issues, which have caused increases to the project's cost and/or schedule. Overall, this is a minimal potential impact.
Fuel prices	High	Low	The price of diesel fuel could change between when the quote was obtained and the work performed. This is important because the work on the project involves heavy equipment that is dependent on fuel.
Overall confidence in the estimate and schedule	High	Low	Development of the upland habitat for this project is untested. There are risks in the development of required cost and schedule.
Historic estimates for unit prices adequate for critical items	High	Low	For site work, adjustments to historical information were used. There is some concern if the adjustment factor will be accurate over the life of project.

4.2.6 Cost Reduction Measures

The Poplar Island project last underwent a value engineering study in July 2006. Value engineering is an analysis of the functions of a program, project, system, product, item of equipment, building, facility, service, or supply performed by qualified contractor personnel, directed at improving performance, reliability, quality, safety, and life cycle costs. Value engineering can be defined as an organized approach to providing the necessary functions of a project at the lowest cost as well as an organized approach to the identification and elimination of unnecessary cost. For the Poplar Island project, the value engineering study was a success in identifying areas of functional improvement, identifying some areas in which essential functions could be accomplished at a cost savings, as well as substantiating many aspects of the design approach taken. Examples of cost savings identified as part of the value engineering meeting included the decision to remove the unloading basin from the design of the expansion, and the concept to design the breakwaters in the embayment feature to function as bird islands as well. Other examples included reducing dike/breakwater lengths, and minimizing the stone size and cover for the dikes.

The Poplar Island project team also has the benefit of having an adaptive management plan to help in the design and construction of the project. Adaptive management is a decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties, as outcomes from management actions become better understood. Adaptive management involves developing a management plan that includes goals, periodically reviewing progress toward executing that plan, and revising the plan, if necessary, to reflect actual experience, including corrective actions gained during implementation. In addition, specific components of the plan may be reviewed on a more frequent basis, as necessitated by emergency situations or to meet project needs for design, construction, or operation. This adaptive management practice helps the team review past experiences to identify areas where things can be done faster and in a more cost effective manner. Some examples of adaptive management at Poplar Island include the team's decision to no longer use fertilizer when planting in the wetland cells, plant on 3-foot centers, and learning after construction of 3 wetland cells that seeding is not as cost-effective as originally thought. The team also uses adaptive management to determine what environmental monitoring activities are no longer deemed necessary or determine ways to reduce monitoring efforts to save on cost. Adjustment of grading procedures used to complete Cell 3D has decreased grading costs by approximately 50-percent for subsequent wetland cell grading. After approximately 14 years of construction experience, and after completing five wetland cells, the team is continuing to optimize its processes, and cost reduction measures are considered.

4.3 COST CHANGE SUMMARY

Three major factors have contributed to the change in estimated project cost when comparing the 2005 and 2013 cost estimates: dredged material transportation and placement costs; site operations costs; and project contingency. The main drivers behind these increases can be traced to the increase in project duration (20 and 30 years in the 2005 and 2013 estimates, respectively), increasing fuel costs, and the inclusion of risk analysis in the cost engineering process as discussed in detail in Section 4.2. Table 7 shows a four-column comparison of the estimated cost for the project being recommended, the project as authorized by Congress, the authorized project updated to current price levels, and the project last presented to Congress.

TABLE 7: CHANGES IN PROJECT COST

Project Component	Authorized Cost (Year)	Cost Last Presented to Congress	Authorized Cost at Current FY 2013 Price Level	FY 2013 Cost (First Cost)
Existing Island Component	$307,000,000 (FY 1996)	$407,000,000	$544,960,000	$669,167,000
Expansion Component	$260,000,000 (FY 2007)	$260,000,000	$380,380,000	$ 564,587,000
Total Project			$925,340,000	$1,233,754,000

5.0 SECTION 902 LIMITS

Section 902 of WRDA 1986 defines the maximum project cost of an authorized project, commonly referred to as the 902 Limit or Project Cost Cap. The USACE Planning Guidance Notebook (ER 1105-2-100) is the regulation that contains the USACE policy regarding 902 calculations, as well as an action matrix for decision makers when confronting Section 902 issues. ER 1105-2-100 Appendix G, §G-15(a)(3), 30 June 2004, reads as follows.

> *"The maximum project cost includes the authorized cost (adjusted for inflation), the current cost of any studies, modifications, and action authorized by WRDA '86 or any later law, and 20 percent of the authorized cost (without adjustment for inflation). The cost of modifications required by law is to be kept separate and added to other allowable costs. These three components equal the maximum project cost allowed by section 902"*

The Section 902 calculation is based on actual costs of the project to date and recent estimates of costs into the future. This is then compared to the authorized costs as previously discussed. The authorized costs are inflated to match the recent estimate and then increased by 20-percent as called for by Section 902.

As shown in Table 8, the most recent Section 902 calculations completed for FY 2013, show that the current cost for both the existing Poplar Island and the Poplar Island expansion exceeds the 902 limit. The Section 902 Analysis indicated that for existing Poplar Island, the maximum project cost limited by Section 902 is $606 million, while the current project cost including inflation through construction and contingency, was calculated to be approximately $729 million in FY 2013. For Poplar Island expansion, the maximum project cost is about $433 million while the current project cost including inflation through construction and contingency for Poplar Island Expansion was calculated to be approximately $701 million in FY 2013. For more information about the 902 calculations, see Appendix C.

TABLE 8: 2013 SECTION 902 CALCULATIONS

Existing Project

Section 902 Limit on Project Cost:	
a. Authorized project cost: (w/Price level)	$307,000,000 (FY 1996)
b. Authorized cost at Current Price Levels	$544,960,000 (FY 2013)
c. Current Fully Funded Cost Estimate	$729,084,000 (FY 2013)
d. Maximum cost limited by Section 902	$606,360,000 (FY 2013)
e. Exceedence (20.2%)	**$122,724,000 (FY 2013)**

Expansion

Section 902 Limit on Project Cost:	
a. Authorized project cost: (w/Price level)	$260,000,000 (FY 2007)
b. Authorized cost at Current Price Levels	$380,380,000 (FY 2013)
c. Current Fully Funded Cost Estimate	$701,123,000 (FY 2013)
d. Maximum cost limited by Section 902	$432,800,000(FY 2013)
e. Exceedence (62%)	**$268,323,000 (FY 2013)**

6.0 UPDATED NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) INFORMATION

The USACE has reviewed all previous NEPA documentation for the Poplar Island project. The majority of the NEPA-evaluated impacts and requirements (such as EFH, Coastal Zone Management Act, Critical Areas, etc) have not changed since the 2005 GRR. However, issues such as air quality, cultural resources, water quality (Total Maximum Daily Load [TMDL] requirements), and rare, threatened and endangered species were revisited to ensure that the project's impacts in these areas did not change since that time.

6.1 RARE, THREATENED, AND ENDANGERED SPECIES

The 2005 GRR stated that since avian monitoring at the project was initiated in 2001, 18 listed avian species had been observed utilizing the interim habitats available at the Poplar Island. It was noted that the most notable avian species, the State and Federally listed threatened bald eagle, could potentially be impacted by constructing the lateral expansion, as well as other state listed species such as least terns, American oystercatchers, spotted sandpipers, and double-crested cormorants. In 2005, common and least terns, both species of high priority in Maryland, were identified as being potentially impacted by the conversion of open water foraging areas to the upland and wetland habitats that will be created by the lateral expansion. However, open water habitat is not a limiting resource near Poplar Island, as adjacent open water is available in the immediate vicinity. Therefore, terns could be forced to seek foraging areas elsewhere and will likely follow the forage fish stocks. Common and least terns have used the created islands at Poplar Island for nesting, and there is adjacent tern nesting habitat located along shoreline areas on Jefferson Island and other interim habitats associated with Poplar Island. Terns were expected to populate these areas during construction activities associated with the lateral expansion. In addition, additional nesting island sites will be created within the lateral expansion to support these birds, which should result in a net beneficial impact to terns.

Since 2005, while the design of the lateral expansion has not changed, the status of some of the birds has changed. Effective on August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (USFWS) removed (delisted) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle is still protected by the Bald and Golden Eagle Protection Act, Lacey Act, and the Migratory Bird Treaty Act. In respect to the Bald and Golden Eagle Protection Act, Lacy Act, and the Migratory Bird Treaty Act, the Poplar Island project strictly enforces time of year restrictions on construction activities to minimize the impact to the bald eagles nesting on the adjacent islands. The American oystercatcher has also been removed from the State's list but has been added to the State's Wildlife Diversity Conservation list, which means it is now a species of high priority for Maryland. Least terns are still State listed as threatened and common terns are still species of high priority for Maryland and are on the Maryland Wildlife Diversity Conservation list. Spotted sandpipers are no longer a State listed species and neither are double-crested cormorants.

In 2012, updated coordination was completed with USFWS for the Poplar Island project. Except for the occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project impact area. Therefore, according to USFWS, no biological assessment or further Section 7 Consultation with USFWS is required. Please see Appendix D3 for updated correspondence with USFWS.

As far as aquatic species are concerned, in 2005, the only identified species of concern was the shortnose sturgeon. Because shortnose sturgeon are only expected to be transient to the area, no impacts to this species are anticipated from the lateral expansion. During agency coordination in 2005, National Marine Fisheries Service (NMFS) stated that no sea turtles and/or shortnose sturgeon have been encountered in

previous dredging operations at Poplar Island and that no direct effects to shortnose sturgeon and/or sea turtles are likely to result from the required dredging operations for the project. As a result of the agency correspondence, USACE determined, and NMFS concurred, that the proposed northern lateral expansion is not likely to adversely affect any threatened or endangered species within the jurisdiction of National Oceanic and Atmospheric Administration and that no further consultation pursuant to Section 7 of the Endangered Species Act was required.

After updated discussions with the NMFS, a new species of concern was added to the proposed project area, the Atlantic sturgeon. There is similarity in the life histories of the Atlantic sturgeon and the shortnose sturgeon. As part of the 2005 SEIS preparation, USACE noted that the Poplar island project would not have an adverse effect on the shortnose sturgeon. After further consultation with NMFS in 2012, USACE maintains that the Poplar Island project will not have an adverse effect on the shortnose or Atlantic sturgeon. Please see Appendix D3 for updated correspondence with the NMFS.

6.2 CULTURAL RESOURCES

Coordination with the State Historic Preservation Office (SHPO) occurred and was complete in 2005 as part of the SEIS accompanying the GRR. Following all surveys and agency coordination, the Maryland Historical Trust concurred with the USACE determination that the northern lateral expansion of the Poplar Island Project would have no effect on historic properties or features. After recent consultation with the Baltimore District's archeologist in 2012, it was determined that since the proposed design for the project did not change from 2005, no new cultural updates are required.

6.3 WATER QUALITY

Significant reductions in sediment and nutrient loadings are required in Maryland's water quality standards for the Chesapeake Bay. Water quality monitoring has been performed as part of the Poplar Island project since 2001 to monitor the quality of discharge water and determine the project's impact on the surrounding environment. Following development of the Chesapeake Bay TMDL in 2009, water quality monitoring at Poplar Island took on additional purpose. In coordination with the Environmental Protection Agency (EPA) and the Chesapeake Bay Program, the State of Maryland has developed and is implementing Maryland's Chesapeake Bay tributary strategy and TMDL Watershed Implementation Plan to achieve reductions from point and nonpoint sources necessary to meet Maryland's TMDL sediment and nutrient allocations. TMDLs have been developed for the Chesapeake Bay, which will have an effect on existing dredged material containment facilities and may have an effect on restoration sites and other dredged material containment facilities proposed for future beneficial use.

Currently at Poplar Island, monitoring is being performed to determine if nutrient fluctuations exist within the dredged material containment facility based on time of day and the time of year. The data is analyzed to evaluate the nitrogen and phosphorus loadings to the receiving waters from Poplar Island. The discharge data, along with inflow water, bulk sediment measures, and atmospheric inputs (rainfall) will provide for the assessments used to evaluate the sequestration of TMDL contaminants of concern. The data will serve as a management tool to assist in development of Best Management Practices (BMPs) and aid in the planning for the discharge of ponded water based on nutrient fluctuations. This topic was not examined in the 2005 GRR, but nonetheless is important to include as an update to the projects progress.

6.4 AIR QUALITY

Air quality assessments for the Poplar Island project were updated for this LRR to incorporate the information on tugboat emissions to bring armor stone to Poplar Island for the construction of the expansion. The total direct and indirect emissions from non-road land-based and marine sources associated with the proposed expansion of Poplar Island, in any given year under the worst-case scenario presented, are less than the *de minimis* levels established under the General Conformity Rule. For more information on the updated air quality analysis, please see Appendix D4. The Air Quality update, completed by EA Engineering, is intended to supplement sections of the 2005 GRR to incorporate any changes that might have occurred since the original document. As a result, the numbering scheme seen in Appendix D4 reflect those that were in the 2005 GRR.

6.5 NEPA UPDATE SUMMARY

Agency coordination for rare, threatened and endangered species, TMDL monitoring, and air quality emissions were revisited in 2012, and as a result, it was determined that no additional environmental assessments or environmental impact statements are necessary or required. These updates are included in Appendix D3 and in D4.

7.0 ECOSYSTEM BENEFITS

In accordance with the requirements of NEPA, USACE prepared an Integrated Feasibility Report and EIS for Poplar Island in February 1996. Following the final 1996 EIS, USACE prepared a ROD, which was signed on September 4, 1998 by the Assistant Secretary of the Army for Civil Works. In 2005, the Baltimore District prepared a GRR and SEIS for the Poplar Island project. The purpose of the GRR was to evaluate the vertical and/or lateral expansion of the Poplar Island project, design modifications to the existing project, and the potential to accept dredged material from additional channels not specified for the existing project. Additional material from the C&D Canal Lower Approach Channels was incorporated in the 2005 GRR to account for the impending closure of the Pooles Island dredged material containment facility managed by the Philadelphia District. Following the final GRR/SEIS, USACE prepared a ROD, which was signed on October 11, 2006 by the Assistant Secretary of the Army for Civil Works. The ROD for both the EIS completed in 1996 and the GRR completed in 2005 are included in Appendix D1 and D2 respectively.

The following sections present validated information on the Island Community Unit (ICU) analysis for the existing Poplar Island project, an evaluation of the project goals, and discussion of the annual monitoring results. The ICU process was developed for use in the Mid-Chesapeake Bay Island Ecosystem Restoration Feasibility Study and EIS analysis and was approved by the USACE Ecosystem Restoration Planning Center of Expertise (Eco-PCX).

7.1 OVERVIEW OF CURRENT HABITAT

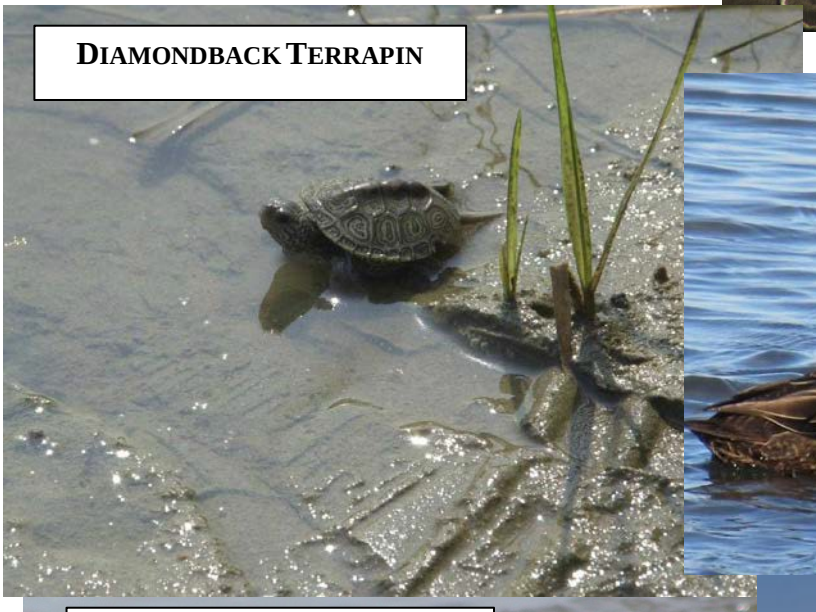
The Poplar Island project is the collaborative effort of many state and Federal agencies to provide habitat for fish and wildlife species. This remote island habitat is providing critical and unique habitat that is and will be used for nesting, foraging, resting, and reproduction. Table 7 summarizes the habitat restored at Poplar Island compared to the targets for the project used in the 2005 GRR which includes both Poplar Island existing and Poplar Island expansion components.

TABLE 9: SUMMARY OF UNIQUE AND SIGNIFICANT REMOTE ISLAND HABITAT RESTORED COMPARED TO TARGETS- POPLAR ISLAND

Habitat type	Project Target (ac)	Restored through 2012 (ac)	Percent Target Achieved by 2012
Wetlands	737	176	24%
Bird islands	8	4.4	55%
Mudflats	43	2.29	5%
Open water embayment	138	0	0% (Part of the expansion project)
Upland	840	0	0% (Part of the expansion project)

While the construction so far has only created a portion of the targeted habitat, Poplar Island is realizing significant wildlife usage. Even before construction of the riprap outer perimeter and gravel roads was completed, bird nests started to appear. The first bird species documented on Poplar Island included gulls, double-crested cormorants, and ospreys. The 1996 EIS, in Section 4, page 4.8, identified some key indicator species for Poplar Island and the Chesapeake Bay. These species are:

- Least tern (Maryland State threatened)
- Common tern (Maryland Species of Greatest Conservation Need)
- Snowy egret (Maryland Species of Greatest Conservation Need)
- American black duck (Key species named in 2009 E.O. 13508
- Diamondback terrapin (Species of Greatest Conservation Need)



The least and common terns are listed in the 2012-2015 Audubon Strategic Plan as priority species for the Atlantic Flyway.

The least and common tern are listed in the 2012-2015 Audubon Strategic Plan as priority species for the Atlantic Flyway. The least tern is listed by the State of Maryland as threatened and the common tern is being proposed to be listed as threatened by the State in the near future. In addition, Poplar Island is the only common tern nesting site in the Maryland portion of the Chesapeake Bay. Both tern species have been documented using various areas of Poplar Island for nesting, those areas include: dike roads, sand piles and flats, and several habitat islands located within certain wetland cells.

The habitat islands were specifically designed for attracting nesting terns and other priority species such as snowy egret, American black duck, and diamondback terrapin. Efforts to attract nesting terns to certain locales within Poplar Island via the use of decoys and sound recordings have been successful. The use of decoys to relocate snowy egrets from areas of poor nesting quality to other areas with high quality nesting habitat has also been successful. In addition, the placement of debris piles in marshes and habitat islands using used Christmas trees has been successful in attracting nesting American black duck, snowy egrets and a number of other species. From an initial number of 5 to 6 species of birds nesting in 2001-2002, the project now has a recorded 24 nesting species (possibly 30), including four of Poplar Island's priority and target species.

No habitat exists that is directly comparable to Poplar Island. Remote island habitat in the Chesapeake Bay has been largely degraded by erosion or inhabited by human development. Further, a comparison to wetlands along the mainland such as Blackwater National Wildlife Refuge is inappropriate due to not only scale and its diversity of habitats, but also because of its connection to the mainland. That being said, restoration achievements at Poplar can be discussed relative to the conditions on nearby Barren Island. It is one of the largest, uninhabited islands remaining in the Chesapeake Bay. Barren Island, south of Poplar Island off the coast of Dorchester County is a 180-acre U.S. Fish and Wildlife Refuge. A significant difference between Poplar Island and Barren Island is that Barren supports substantial forest habitat that does not yet exist on Poplar Island. During 2002 and 2003, extensive avian and wildlife surveys conducted on Barren Island documented 107 species of birds utilizing the island and only 3 nesting species. The highest densities of aquatic and upland birds were correlated to Barren Island's shelter, foraging, and breeding habitat, including forest habitat for various rare and colonial nesting species. Much of this habitat and therefore, the species use, can be attributed to the forested habitat on Barren Island. Therefore, the number of aquatic birds benefiting from the habitat provided by Barren Island can be expected to shrink, as the upland areas are lost.

The monitoring at Poplar and Barren identify many of the same bird species. There is a greater diversity of species at Poplar Island and Poplar Island supports a greater number of nesting species than Barren. Where Barren supports a small number (3) of bird species that nest in forested habitats, Poplar Island provides nesting habitat for 25 species that nest in a variety of locations including the completed wetland cells. Conversely, Poplar Island's main attraction is its expansive mudflats that provide valuable habitat for a variety of shorebirds. Poplar Island is the only known nesting site of common terns within the Maryland portion of the Chesapeake Bay. It is anticipated that within the next year or so, common terns will be state listed as threatened in Maryland. This is a prime example of the importance of the Poplar Island Ecosystem Restoration Project. Similar habitats surrounding Poplar Island are slowly shrinking in size and as a result, providing fewer benefits to various wildlife species.

Personal observations by USFWS personnel familiar with nearby islands such as Bodkin Island, Parsons Island, and James Island, indicate that Poplar Island not only provides greater habitat and species diversity than theses islands, but also supports overall greater numbers of migratory birds on a year round basis. One of the distinguishing features of Poplar Island is that unlike most of the other islands, mammalian predators are absent on the island and are actively removed if present, resulting in higher reproductive success for many nesting species utilizing the project site. Without Poplar Island, many of the species that do nest on

Poplar Island would have to seek new high quality areas for nesting, which in the Eastern Bay is almost non-existent.

As the marshes continue to expand and mature, rare species such as rails, bitterns and marsh sparrows are routinely observed foraging and resting. Indirect evidence (i.e., adults with young), strongly suggests that these species may also nest at Poplar Island. Once upland cells are filled to capacity (last stages of the project) and the shrub and tree communities mature, the island will serve as a refuge for a variety of species of migratory birds, mammals, reptiles, amphibians, and insects (such as monarch butterflies) that are dependent of upland habitats.

As of 2012, greater than 170 bird species have been documented using the island, approximately 54 of these species are birds that are in great need of conservation and protection in the Maryland portion of the Chesapeake Bay. The project team has also observed various species of insects, amphibians, reptiles, including the diamondback terrapin, and mammals at Poplar Island. For a complete list of species documented on Poplar Island, see Appendix D5.

7.2 ECOSYSTEM ISLAND COMMUNITY UNITS ANALYSIS

As part of the analysis completed to assess the outputs of the proposed expansion project in the 2005 Poplar Island GRR, it was necessary to re-evaluate and redesign the methods used in the 1996 EIS to quantify ecosystem benefits (outputs). Poplar Island is an ecosystem restoration project using dredged material as a beneficial resource. The ecosystem benefits of both the existing island and the expansion component were the justifications for project authorization and construction. The 1996 evaluation focused on the benefits to a small group of individual species. At the start of the 2005 GRR investigation, it was decided that individual species would not be used to quantify ecosystem benefits, but rather the fish and wildlife communities that would inhabit the island ecosystems. (For purposes of this analysis, 'community' and 'guild' are used interchangeably to describe a group of interacting animals that utilize the resources of a given habitat in a similar way.) The 2005 method, developed by USACE Baltimore District with input from a working group involving resource agency representatives, calculates ICUs to quantify ecosystem benefits (with a focus on animal communities) over the life of the restoration project. This approach underwent Independent External Peer Review, was reviewed and approved by the State of Maryland's Bay Enhancement Working Group, and was also approved for use for the Mid-Chesapeake Bay Island Ecosystem Restoration Feasibility Study and EIS (USACE 2008) by the Eco-PCX. The ICU approach was developed for Mid-Bay and Poplar Island Expansion and used for both projects, but the 2005 GRR report (Poplar Expansion) predated model certification requirements. Ecosystem benefits of fully developed (graded and planted) cells, in addition to interim ecosystem benefits realized during dredged material placement, were included in the analysis. This ICU analysis is very similar to the Strategic Habitat Conservation evaluation procedure USFWS uses when determining what types of habitats are in need of conservation and/or restoration.

For the LRR, the ecosystem benefits for Poplar Island were updated using the existing monitoring data and construction schedule of inflow to determine an accurate representation of benefits realized to date. The 2005 GRR ICU analysis was applied to the LRR analysis by replacing previously projected inputs with actual inputs from monitoring data and the volume of inflow received. The purpose of this application was to demonstrate the ecosystem habitat results to date as well as to re-project outputs based on the changes in the dredged material inflow schedule. Three applications of this analysis are included in this evaluation:

1. *2005 ICUs*- the ecosystem benefits calculated in 2005 GRR.

2. *2012 ICUs*- the ecosystem benefits of the current (2012) Poplar Island were updated incorporating the actual construction schedule between 2005 and 2012, and existing monitoring data indicating species use of various habitats. This scenario captures the quantification of benefits achieved between 2000 and 2012 as well as those projected to accrue through the end of the project.

3. *2005 ICUs on 2012 schedule*- the ecosystem benefits calculated in 2005 corrected for construction schedule and design changes between 2005 and 2012. This included updating the 2005 projections based on the actual progression of cell development and the amount of dredged material received each year.

Figure 7 presents the annual ICU tabulations from the three applications and are plotted together along with the annual placement of dredged material.

Analysis of monitoring data and construction history of Poplar Island, thus far, has identified three clear alterations from the 2005 projections that have led to changes in the projected ICUs:

1) *Reduced dredged material placement*

The 2012 data shows that the amount of dredged material placed annually on Poplar Island varied from what was predicted in 2005, as discussed previously in Section 4.2.4.3. For example, in 2005, it was projected that 297 acres of wetlands would be planted by 2012-2013, using approximately 32.8 MCY of dredged material. However, after examining the actual 2012 data, it was determined that only 176-wetland acres have been planted to date, using approximately 24.3 MCY of dredged material. In 2005, it was projected that Poplar Island would receive 2 MCY of dredged material annually and that starting in FY 2009, an additional 1.2 MCY of dredged material from the C&D Lower Approach Channels would be placed. However, as the current project schedule shows, the project not only did not start receiving that additional 1.2 MCY a year, but there were actually 2 years where the project did not receive any dredged material as discussed in Section 4.2.4.3 of this report. For this reason, the total habitat constructed to date is less than was projected.

Reduced dredged material placement resulted in slightly reduced ICU values because fewer wetland acres were planted. Cells are valued as mudflats, which have some ecosystem value, prior to wetland planting. As a result, the reduced wetland ICUs are somewhat offset by mudflat ICU values.

2) *Evolving approaches to habitat development*

The benefits for Poplar Island can be seen in all of its habitats including uplands, high marsh, low marsh, intertidal zones, mudflats, etc. Whether it is a completed wetland cell or an unfinished cell waiting for additional material, the island provides various unique and interrelated fish and wildlife species nesting and foraging habitat throughout the year. For instance after 9 inches of precipitation from Hurricane Sandy in October 2012 flooded the cells, over 9,000 transient waterfowl utilized the Poplar Island site.

The 2012 ICU analysis indicated that the features within the completed wetland cells such as intertidal pools in the high marsh were factors that affected the community index values in a variety of the guilds studied. While the project defined in 2005 incorporated intertidal pools in both the high marsh and low marsh areas of the wetland cells, after much discussion, the interagency workgroup team decided against engineering the pools in the high marsh areas. While many of the guilds studied in the ICU analysis would benefit from these intertidal pools in the high marsh initially, real life experience demonstrated to the team that these intertidal pools in the high marsh also present challenges such as the potential development of disease due to a lack of flushing. After completing the first five wetland cells (2003-2012), USACE determined that goals to establish intertidal pools in the low marsh areas of each of the completed wetland cells had not been completed, so the team decided to incorporate these features in the remaining cells.

According to the 1996 EIS, there would be constructed one low marsh pond in each of the wetland cells. According to the current Adaptive Management Plan, the target is to create 8 acres of low marsh ponds. These features can be added later to meet the defined goal. Additionally, the varying geotechnical conditions of the individual wetland cells also influences which features to construct in each cell at which time. Once the project is completed, the target acreage of approximately 8 acres will be met. The intertidal pools in the low marsh areas of the wetlands are inundated much more frequently with the normal tidal exchange, and carry lower risk of disease, such as avian botulism. The decision to not construct intertidal high marsh pools resulted in reduced ICUs because high marsh pool value was not realized. After development of the uplands and storm water flow from the uplands through the high marsh is established, high marsh ponds may be added to the habitat.

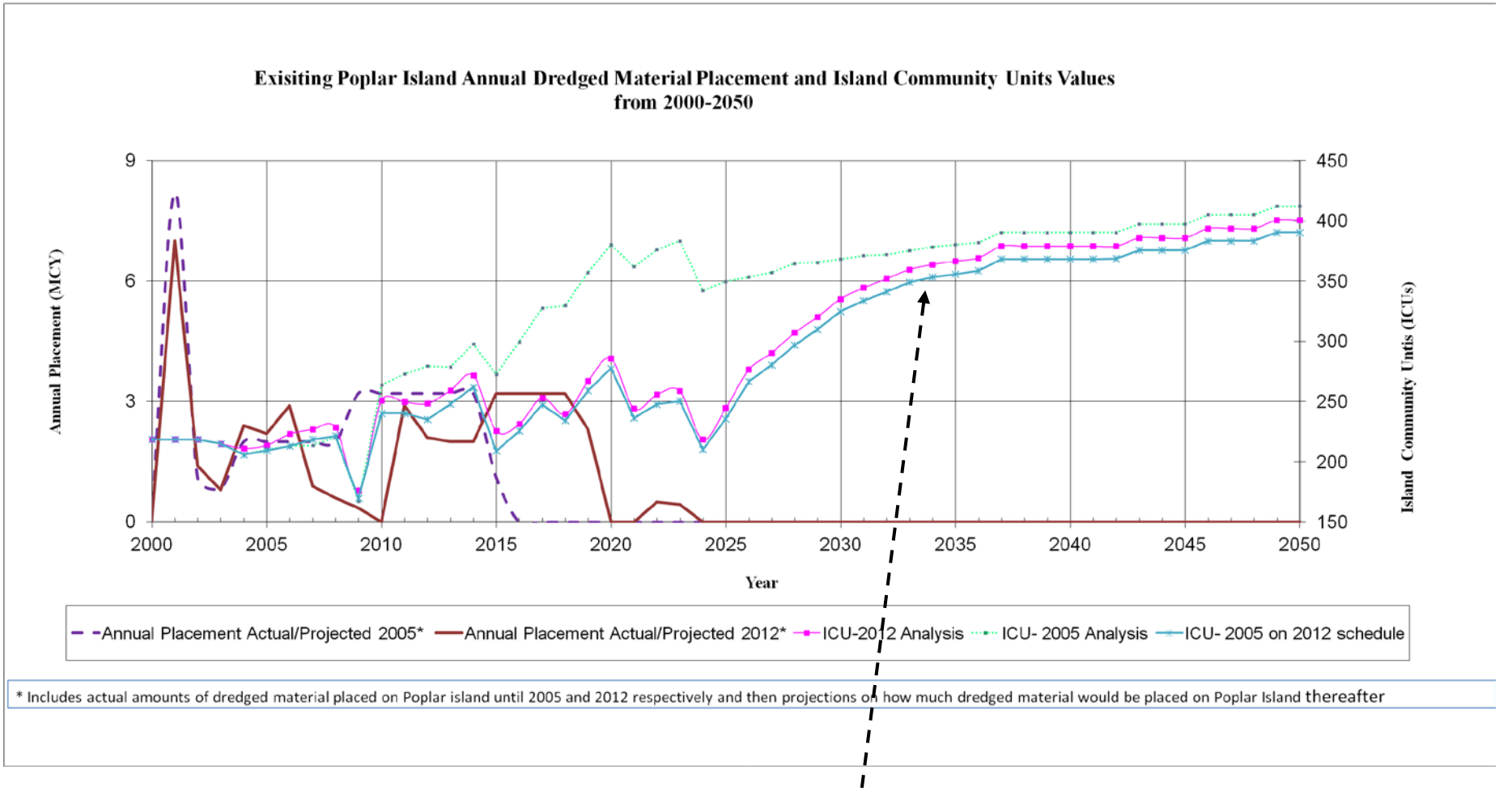
3) *Alterations to assumed species use of habitats as indicated by monitoring data*

After reviewing over 10 years of monitoring data, it has become evident that many fish species have increased their use around Poplar Island and within the wetland and tidal guts of the restored marsh areas. Table 4 in Appendix D9 shows the numerous fish species they have been observed at Poplar Island and identifies the year they first made their appearance. It is clear that before any of the wetlands were completed, there were no fish species present in any of the cells. After the first wetland cell was completed in 2003, 10 fish species were found within the completed wetland cell, and then after the second wetland cell was completed, 12 species were observed within the footprint of the island. As of 2011, over 28 fish species have been observed within the completed wetland cells on Poplar Island, including several predator fish species such as white perch and striped bass. This has occurred much sooner than was anticipated and included in the 2005 ICU model. The immediate use of the wetlands by fish guilds resulted in an increased ICU determination from original 2005 projections. That is, when updating the ICU analysis with the updated monitoring information for both resident/forage fish as well as the commercial/predatory/higher trophic fish usage out on Poplar Island for Cell 3D, it was determined that the ICUs increased. Specifically, ICU values went from a projected 0.00 units in Year 1 for both these guilds/communities to 0.75 units for low marsh and 0.25 units for intertidal. Cumulatively, this resulted in a substantial impact. For example, when applied to calculate the benefits of Cell 3D, this increase resulted in an increase in ICUs from 0.49 units to 6.70 units in Year 1.

In conclusion, once corrected for the exclusion of high marsh intertidal pools, the updated project schedule timeline, and the increased habitat use indicated by the monitoring data, the existing Poplar Island project ecosystem benefits exceeded the expected outputs as presented in the 2005 GRR (Figure 7). The difference between 2012 ICUs (pink line) and the 2005 ICUs utilizing the actual placement seen through 2012 (blue line) demonstrates that there is more wildlife usage of the habitat created than what was predicted in 2005. The difference between 2012 (the pink line) and 2005 (the green line) shows that fewer cells were completed as a result of not receiving as much dredged material as originally projected. Even though the project did not receive as much dredged material as originally predicted in 2005 and not as many cells were completed as result, the wildlife usage of the cells that were completed was more than what the team had predicted.

In order to highlight the ICU value of an individual cell, wetland cell 3D was used as an example (Figure 8). Figure 8 better illustrates that the actual benefits seen in 2012 exceeded what was predicted in 2005. The graph was limited to just show the 2012 ICU information (pink line) and the 2005 on the 2012 schedule ICU information to better capture a fair comparison.

FIGURE 7: ISLAND COMMUNITY UNITS FOR EXISTING POPLAR ISLAND



Once correcting for the exclusion of the high marsh intertidal pools and the updated project schedule timeline, the existing Poplar Island project ecosystem benefits exceeded the expected outputs as presented in the 2005 GRR

FIGURE 8: ISLAND COMMUNITY UNITS FOR CELL 3D ON POPLAR ISLAND

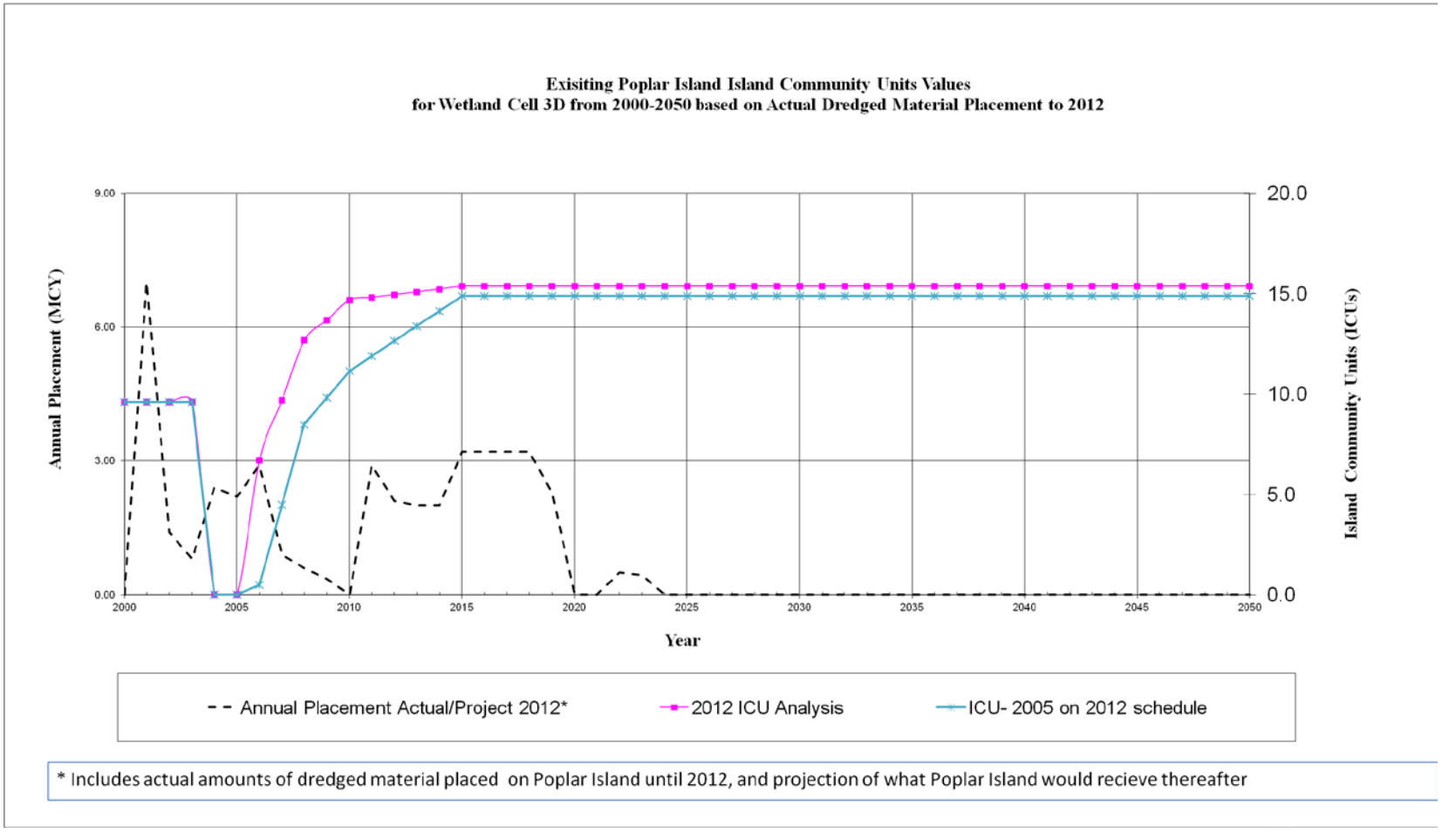


Table 10 below also shows the cost per habitat unit for the Poplar Island project for both the 2005 normalized with 2012 data (construction schedule and design changes between 2005 and 2012), and the 2012 analysis (actual construction schedule between 2005 and 2012, and existing monitoring data indicating species use of various habitats). Using both costs demonstrates a potential range in cost per ICU achieved for the Poplar Island project. The lower cost is based on existing monitoring data which indicates that the project is accruing more benefits than was predicted in 2005 after taking into consideration the actual construction schedule and necessary design changes. It is important to note that construction on the expansion has not started yet, so the ICU values for the expansion were taken from the 2005 GRR. This likely understates the total ICUs that will be realized by the project since the increases seen during development of the existing island have not been applied to the expansion. It is also the intent of the project team to construct the pools in the high marsh areas (Section 7.2) once the uplands have been fully developed. This additional habitat will not only increase the total and average ICUs for the Poplar Island project, but it will also drive down the average annual costs. Therefore, the cost per ICU shown in Table 10 should be considered conservatively high. The latest FY 2013 cost estimate for the Poplar Island project, including sunk cost for the existing component, was used to develop the present value and average annual costs, which were calculated using the current discount rate of 3.75-percent. For more information about the average annual cost completed for this analysis, please see Appendix A.

TABLE 10- POPLAR ISLAND ICU ANALYSIS
(FY 2013 DOLLARS AT 3.75-DISCOUNTED RATE)

	Total	Total	Ave Cost	Present Value	Ave. Annual	Ave Annual
Alternative	**Cost ($000s)**	**ICUs**	**$/ICU**	**Cost ($000s)**	**Cost ($000s)**	**ICUs**
Entire Project 2005 Normalized with Actual Placement Schedule	$1,231,272	25,800	$102,500	$1,008,797	$50,854	496
Entire Project 2012 ICU Analysis (As observed with Monitoring Data)	$1,231,272	26,300	$100,500	$1,008,797	$50,854	506

7.3 RESTORATION GOALS AND OBJECTIVES

The Poplar Island Ecosystem Restoration Project has a variety of goals and objectives listed within the 1996 EIS and the 2005 GRR. As stated in the 1996 EIS, the primary environmental objective for this project is to restore remote island habitat. Not only is this type of habitat scarce and significant, but so is the opportunity to restore and protect this type of habitat. At least thirteen remote islands have been lost in their entirety to erosion and of the seven or so that remain, all are further from the target channels than Poplar Island (which largely drives restoration costs). Opportunities for establishment of remote island habitat in the Bay are rare. The capability of the created upland to interact with the substantial adjacent regional network of wetlands increases the value of this opportunity. Several environmental goals were identified for the restoration:

1. create bare or sparsely vegetated islands as nesting habitat for colonial waterbirds such as terns;
2. create vegetated islands for waterbirds such as egrets and herons;
3. create tidal marsh to provide habitat for fish and wildlife and to provide food web support for the Chesapeake Bay ecosystem;
4. create a diversity of habitats to benefit a wide range of fish and wildlife;
5. create quiescent conditions for SAV recovery, and
6. minimize and offset loss of benthic habitat.

In addition, when the GRR was completed in 2005, several other goals were identified including:

1. restore and enhance marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals;

2. protect existing island ecosystems, including sheltered embayments, and
3. increase wetland acreage in the Chesapeake Bay watershed.

7.4 MONITORING AND ADAPTIVE MANAGEMENT

The existing project operates under an adaptive management plan. The adaptive management plan is the implementation plan for the habitat monitoring framework. Within the habitat monitoring framework, there is discussion about what monitoring is completed for the project, why, and what hypotheses are being evaluated to determine the impacts the project is having on various fish and wildlife species. Metrics for project success are included in the adaptive management plan under which the project operates and are based on the goals established in the decision documents as discussed above. The methods and approaches to reach these success metrics are updated based on annual monitoring data after discussions with the interagency workgroup, monitoring subgroup, and habitat subgroup established for this project. Examples of the metrics included in the adaptive management plan include: percent vegetative coverage, achieving use of habitat islands by ground nesting colonial water birds, creating a ratio of 80% high marsh to 20% low marsh in each of the tidal wetland cells, achieving use of marshes by fish, etc.

Since the completion of the 1996 EIS and the 2005 GRR, environmental monitoring occurs annually to ensure that the project is performing as projected, meeting the objective to restore and enhance marsh, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals, and to guide adaptive management. Each year, numerous agencies and organizations study and monitor the various wildlife that utilizes Poplar Island including fish, reptiles, and birds.

There are several different hypotheses that the Poplar Island team developed for what would occur as the project matures and how the project would affect the various wildlife and aquatic resources that use the Poplar Island project in one way or another. Every year since 2001, Poplar Island monitoring reports have summarized the project's progress with specific emphasis on the status of significant birds, terrapins, and fish use. In each of the monitoring reports, agencies such as USFWS, National Oceanic and Atmospheric Administration, United States Geological Survey, and educational institutions such as Ohio University and University of Maryland, report their findings on how the Poplar Island project is affecting the fish, birds, and terrapins populations. These reports offer a great opportunity to see how the critical wildlife and aquatic resources at Poplar Island are benefiting from the project and whether or not they are responding as predicted. Currently, Poplar Island has monitoring information from 2001 to 2011 that has been reviewed by the project team. For additional background information about the environmental monitoring efforts that take place on Poplar Island, see Appendix D6. Tables 1, 2, and 3 in Appendix D6, provide some examples of some of the hypotheses being investigated for the project.

7.4.1 Annual Monitoring Results

The annual monitoring reports that are prepared include inflow operations, interior and exterior monitoring studies, and habitat development activities completed throughout the year. The framework monitoring studies included in this report are as follows: discharge monitoring, bird utilization, submerged aquatic vegetation (SAV), wetland vegetation, wildlife use, terrapin use, fisheries use of wetlands, sediment quality, and exterior and interior water quality. All of the studies conducted during the monitoring year are based on the 1996 Poplar Island Framework Monitoring Document (FMD), which was developed to provide a multi-disciplinary monitoring framework that meets the regulatory agency, resource agency and construction compliance requirements for Poplar Island.

During the first years of operations, the annual monitoring report focused directly on exterior monitoring conducted at Poplar Island to evaluate any impacts on the surrounding environment. Since individual

wetland cell development began in 2005, monitoring efforts have focused on both the island exterior and interior in order to document the creation of beneficial habitat as development progresses. The information gained through both interior and exterior monitoring efforts is used to determine the influence that Poplar Island has had on the surrounding environment, any mid-course corrective measures that are necessary to lessen impacts to adjacent habitats, and any quality improvements for adjacent habitat, as well as within restored habitats.

The annual monitoring reports compiled every year for the Poplar Island project also helps the project team determine if Poplar Island is meeting the objective of documenting the restoration of beneficial habitat and what impact the project is having on the unique and diverse fish and wildlife species that use it. For example, monitoring has shown that higher trophic level predator fish species, such as striped bass and white perch, have used the wetland cells since their completion. This was not expected to happen as soon as it did. Figures 10, 11, and 12 summarize the quantified observations of the environmental monitoring completed for the birds and terrapins observed at Poplar Island from 2001 or 2002 through 2011. Table 4 and 5 in Appendix D7 and D8 respectively provides additional information on the fish and bird utilization on Poplar Island. Figure 9 is a map of Poplar Island with the designated sections and cells labeled for reference.

7.4.2 Environmental Monitoring Conclusions

The studies and activities that are summarized in the annual monitoring reports document the restoration of beneficial habitat, confirm the expected findings of no negative impacts from project operations, and provide operational input on the success of the habitat restoration. All of the study elements from the Poplar Island Framework Monitoring Document that have been conducted over the last decade (bird utilization, interior water quality/algae analysis, SAV, wetland use by wildlife, terrapin monitoring, fisheries use of wetlands, sediment quality, wetland vegetation, and exterior water quality) have specific sub-goals with hypotheses that monitoring confirms or rejects.

Monitoring will continue at the agreed-upon frequencies to gather data on the habitat creation at Poplar Island and its effects on the surrounding environment. If necessary, this monitoring will identify mid-course corrective measures through adaptive management that will seek to lessen impacts to adjacent habitats and improve quality for adjacent and restored habitats. Adaptive management will cover a wide range of topics including that of sea-level rise. Sea-level rise is addressed during the design and construction of each new wetland cell at various habitat and workgroup meetings in accordance with the sea-level rise guidance, Engineering Circular 1165-2-212, Sea Level Considerations for Civil Works Programs. At these meetings, the project team determines the best way to plan, design, construct and manage the project for the projected future sea-level change that will ultimately affect the completed wetland cells.

Since the post-construction monitoring studies at Poplar Island began, it is evident that the facility is having a positive impact. The upland portions of the dikes, the ponded water in the cells, the completed wetland cells, and exterior beach areas have become high quality avian and terrapin habitat. Many fish species have increased their use around Poplar Island and within the wetland and tidal guts of the restored marsh areas, as discussed in Section 7.2.

FIGURE 9: MAP OF POPLAR ISLAND WITH AUTHORIZED EXPANSION

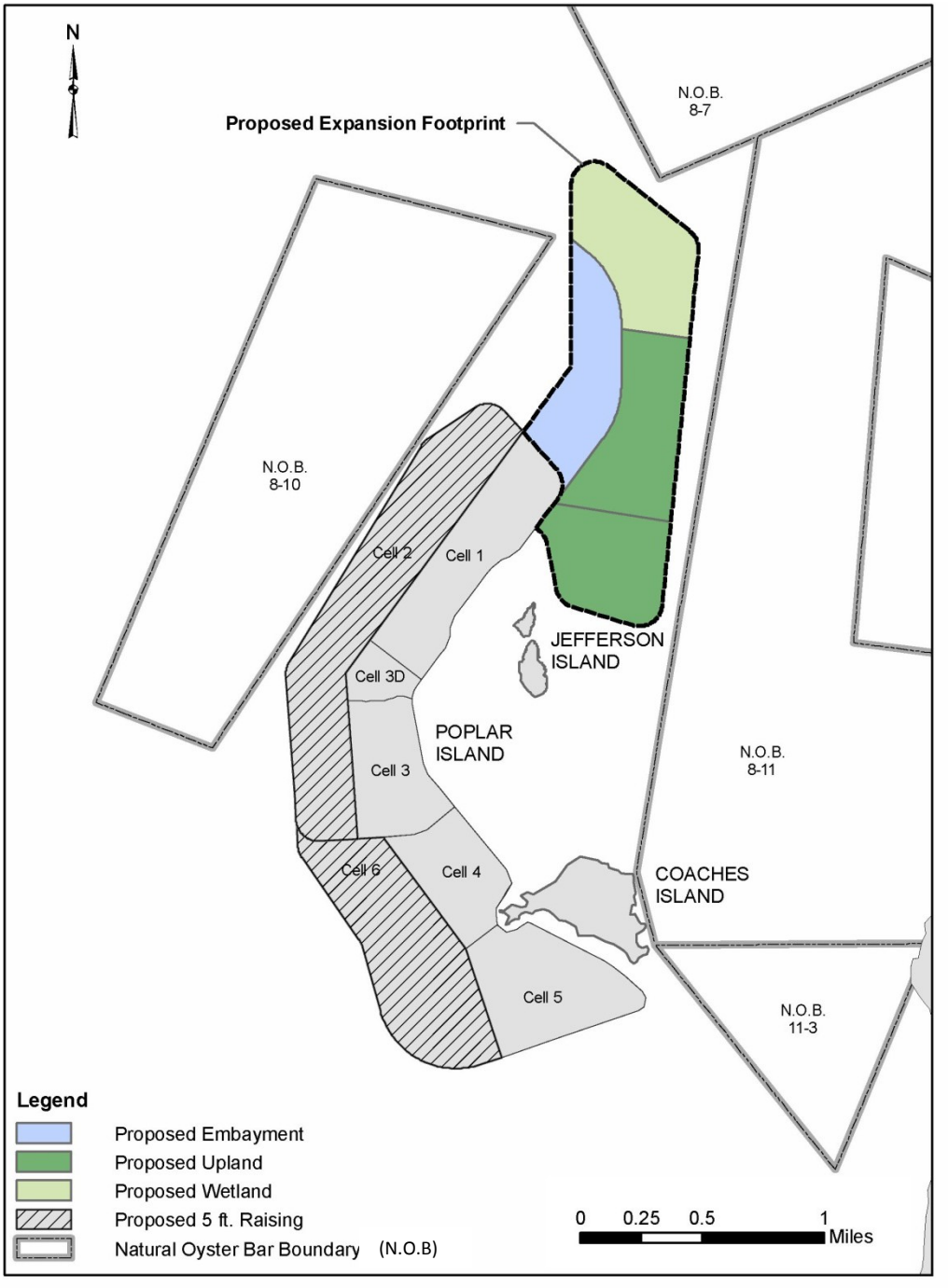


FIGURE 10: NUMBER OF BIRD SPECIES CONFIRMED NESTING ON POPLAR ISLAND

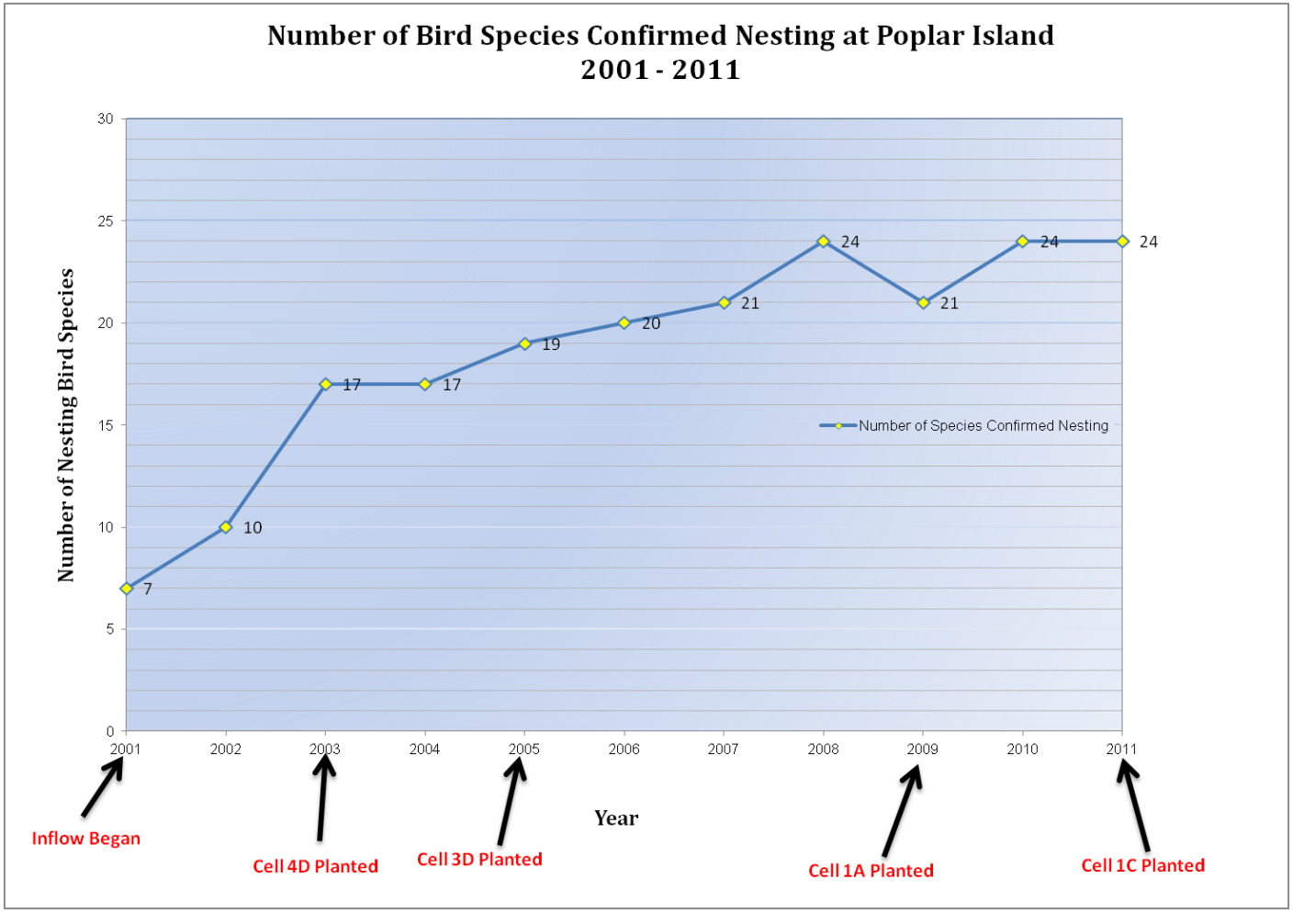


FIGURE 11: NUMBER OF BIRD SPECIES OBSERVED ON POPLAR ISLAND

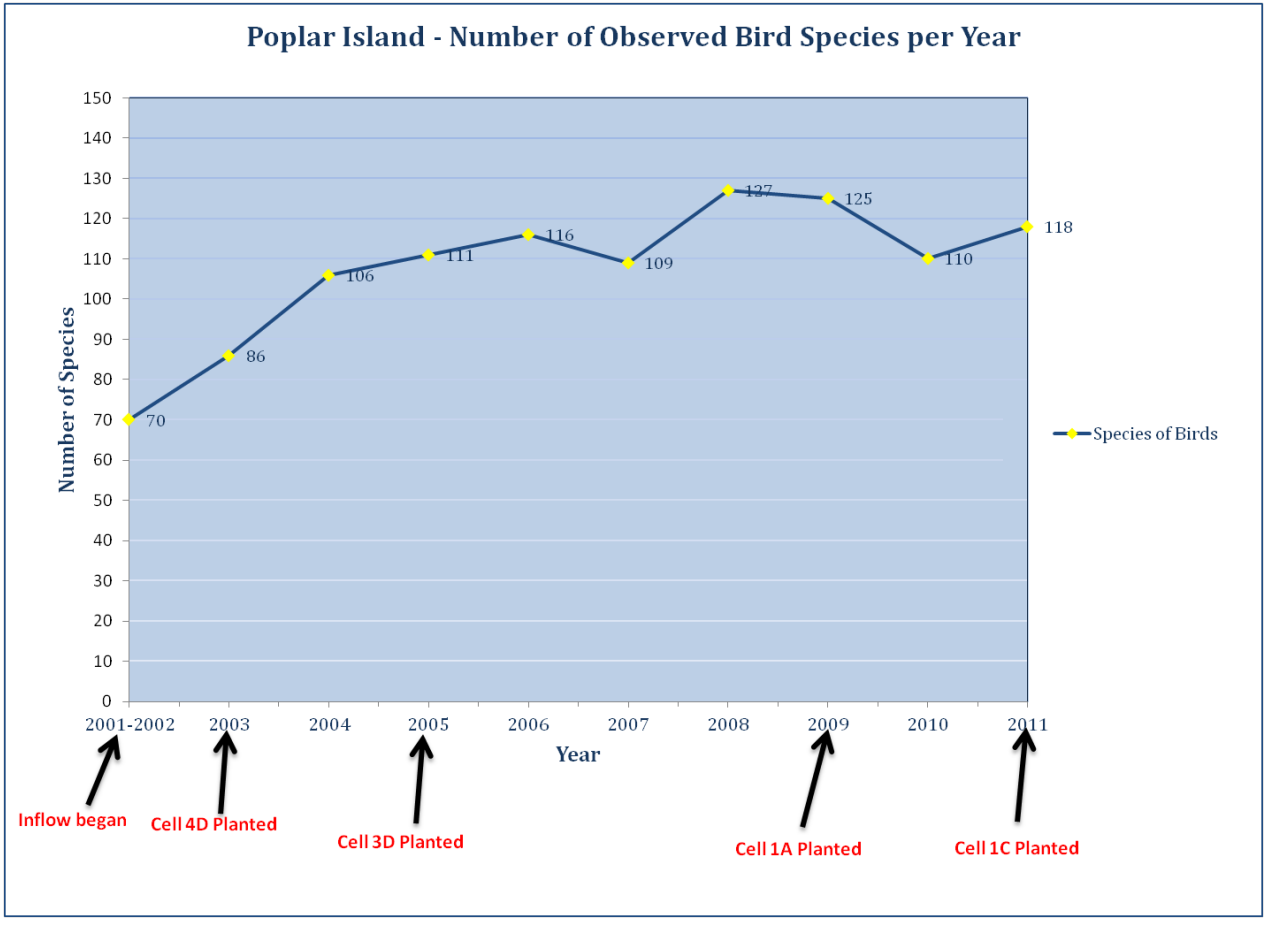
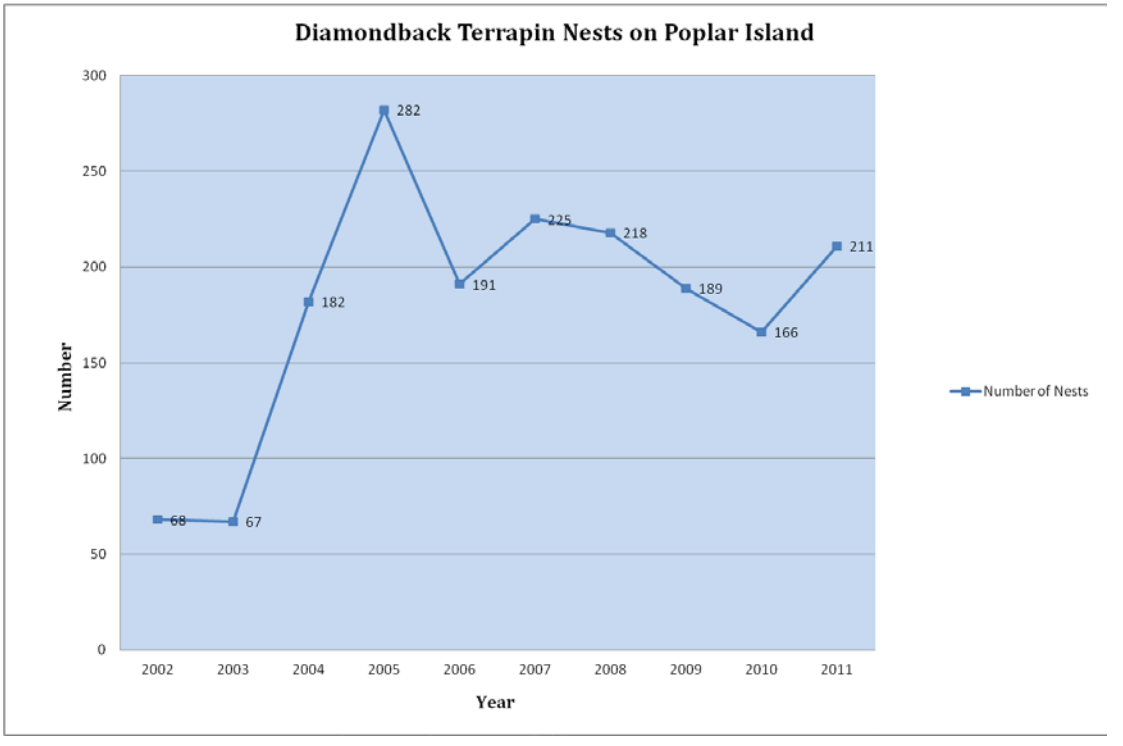
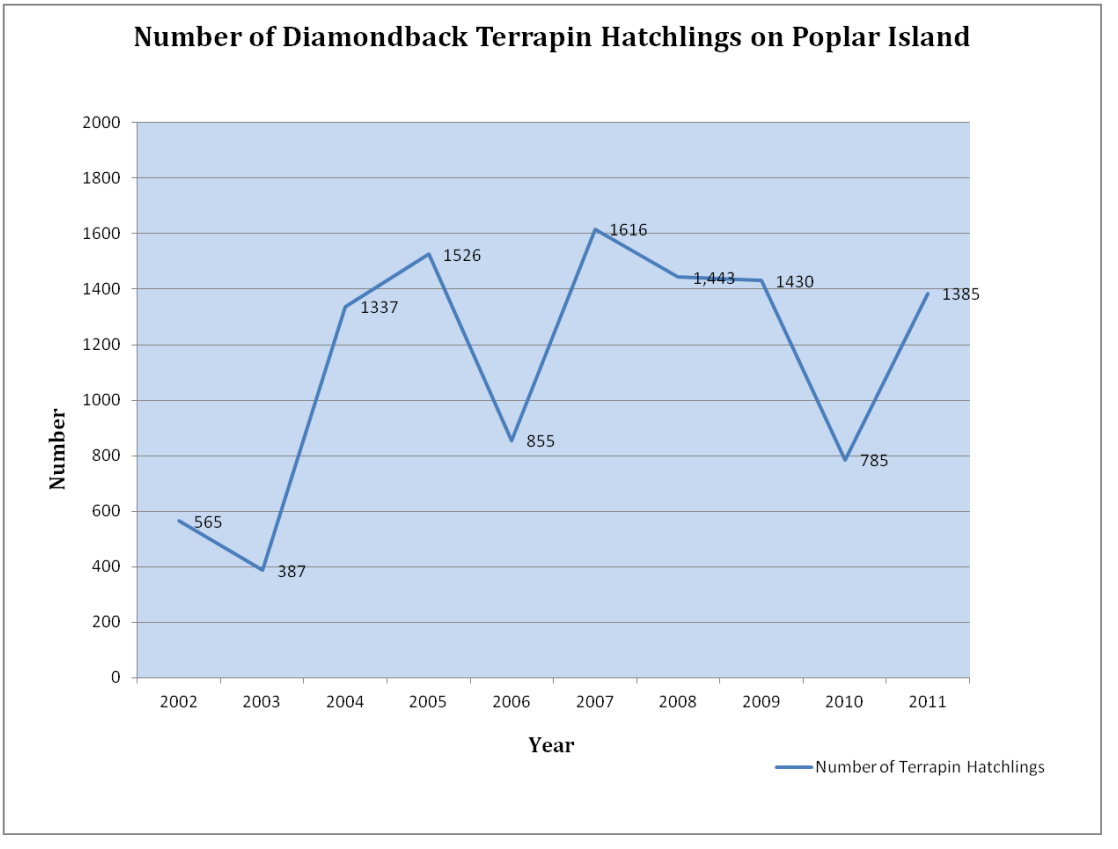


FIGURE 12: DIAMONDBACK TERRAPINS NESTING ON POPLAR ISLAND





7.5 SPECIES OF SIGNIFICANCE

Unique and diverse assemblages of fish and wildlife species have utilized Poplar Island for habitat since the project started. As the project matures, and as more habitat becomes available, more species are being observed and documented on the island. Many of these species are birds that are in great need of conservation and protection in the Maryland portion of the Chesapeake Bay. Bird censuses show that the target species such as the American black duck, common and least terns, and snowy egrets are just some of the species utilizing the island. In the most recent bird census completed for the project, the following Maryland conservation targets species have been confirmed as nesting species on the island: American black duck, American oystercatcher, snowy egret, black-crowed night heron, glossy ibis, common gallinule, common tern, least tern, and seaside sparrow.

In September 2005, the Maryland Department of Natural Resources, along with input from a variety of other environmental resources agencies, put together the Maryland Wildlife Conservation Plan. This plan provided the Department of Natural Resources the opportunity to identify species in greatest need of conservation, as well as the key habitats needed to support them. Rather than focusing on a certain group or category of wildlife, this effort evaluated the status of over 2000 known animal species, and considered the thousands more species yet unnamed and unstudied in Maryland. While it is clear that the rarest (threatened and endangered species) are in need of conservation, it is also clear that other declining or vulnerable species need attention. Using national guidance and the best scientific information available, each species status was assessed to determine those in greatest need of conservation. Poplar Island is providing habitat for 54 of the 410 species of birds that are in the greatest need of conservation in Maryland, 9 of which have been confirmed as nesting on the island. As the project matures, this number is expected to increase. Table 11 shows the listed of Maryland species of birds of greatest need of conservation currently nesting on Poplar Island.

TABLE 11-SPECIES OF GREATEST CONSERVATION NEED NESTING ON POPLAR ISLAND

Common Name	Scientific Name	Status	Presence on Poplar Island
*American black duck	*Anas rubripes*	State Rank: Apparently secure for breeding populations, demonstratively secure for non-breeding populations Global Rank: Secure	Began nesting in 2005 Seen in Cells 3D, 1A, 4D, 1C, and 5CD
American oystercatcher	*Haematopus palliatus*	State Rank: rare to uncommon for breeding populations Global Rank: Secure	Began nesting in 2006 Seen in Cell 6
black-crowned night heron	*Nycticorax nycticorax*	State Rank: Rare to uncommon for breeding populations, state rare for non-breeding populations Global Status: Secure	Began nesting in 2012 Seen in Cell 3D and possibly 1A
common gallinule	*Gallinula chloropus*	State listed as in need of conservation State Rank: State rare for breeding populations Global Status: Secure	Began nesting in 2012 Seen in Cell 3D
*common tern	*Sterna hirundo*	State Rank: Apparently Secure for breeding populations Global Status: Secure	Began nesting in 2001 Seen in Cells 4AB, 4D, 1C, 1B, 3C, 5CD, 6, 2
glossy ibis	*Plegadis falcinellus*	State Rank: Apparently secure for breeding populations Global Status: Secure	Began nesting in 2011 Seen in Cell 3D
*least tern	*Sterna antillarum*	State listed as threatened State Rank: State rare for breeding populations Global Status: Apparently secure	Began nesting in 2001 Seen in Cell 4AB and 6
seaside sparrow	*Ammodramus maritimus*	State Rank: Secure for breeding populations, state rare for non-breeding populations Global status: Secure	Began nesting in 2008 Seen in Cell 1A
*snowy egret	*Egretta thula*	State Rank: Rare to uncommon for breeding populations and secure for non-breeding populations. Global Status: Secure	Began nesting in 2002 Seen in Cell 3D and 1A

American black duck is listed above, but it is important to note that it is also one of the key species that was named in the 2009 Executive Order for the Chesapeake Bay and that Poplar Island is one of the few breeding areas in the Bay for this species. For the common terns, Poplar Island has become the only nesting colony in the Maryland portion of the Chesapeake Bay. Other bird species present, but not currently nesting, on Poplar Island that are also on Maryland's list of birds in greatest need of conservations include:

- great blue heron
- great egret
- ruddy duck
- willet
- short-billed dowitcher
- laughing gull
- forester's tern
- black tern
- bank swallow
- black-bellied plover
- semipalmated plover

Bird species including common and least tern, seaside sparrow, are species that were also specifically mentioned in 2012-2015 Audubon Strategic Plan a key priority species for the Atlantic Flyway.

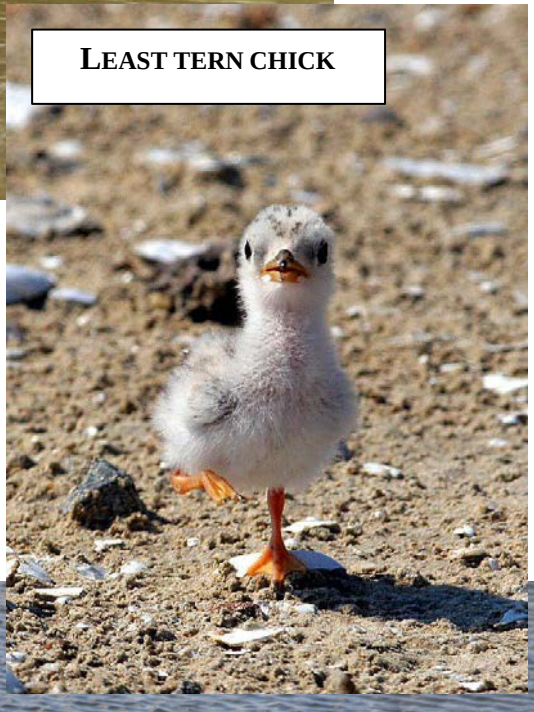
Diamondback terrapins are another species of significance and a species of greatest conservation need for the state of Maryland. The range for the diamondback terrapins is from Cape Cod, Massachusetts to Galveston Bay, Texas. Populations in many areas are depressed or extirpated from areas where they previously occurred. Terrapins are protected in most states and are even considered endangered in others. Even within the Chesapeake Bay, the status of the terrapin population is not entirely known. There are areas in the Chesapeake Bay where terrapins are observed frequently, yet there are other locations within the Chesapeake Bay, such as the Patuxent River, where populations are declining. Habitat loss is one of the primary causes of population decline. Poplar Island has provided suitable habitat for terrapins where there is much less predation than there is on the mainland. According to research from OU, the terrapin population is thriving on Poplar Island. Researchers collected over 500 terrapins within a three-week period in Cells 4D and 3D (the two oldest completed wetland cells) in July 2012, including some terrapins tagged in previous years as juveniles that had come back to Poplar Island to breed. This is indicating that Poplar Island is not only providing a safe environment for hatchlings, but it is also providing a safe place for terrapins to return and nest.

Poplar Island is supporting a diverse assemblage of fish and wildlife species, including a number of significant species within the Chesapeake Bay. Offshore remote islands are a unique ecosystem component in the Chesapeake Bay watershed, and are preferentially selected by many migratory birds and water birds as resting and nesting locations. Although similar vegetative communities may occur on the mainland, the isolation, relative lack of human disturbance and reduced number of predators make remote islands more desirable as nesting sites for a variety of birds, mammals, and reptiles such as the diamondback terrapins.

MARYLAND BIRDS IN GREATEST NEED OF CONSERVATION FOUND ON POPLAR ISLAND

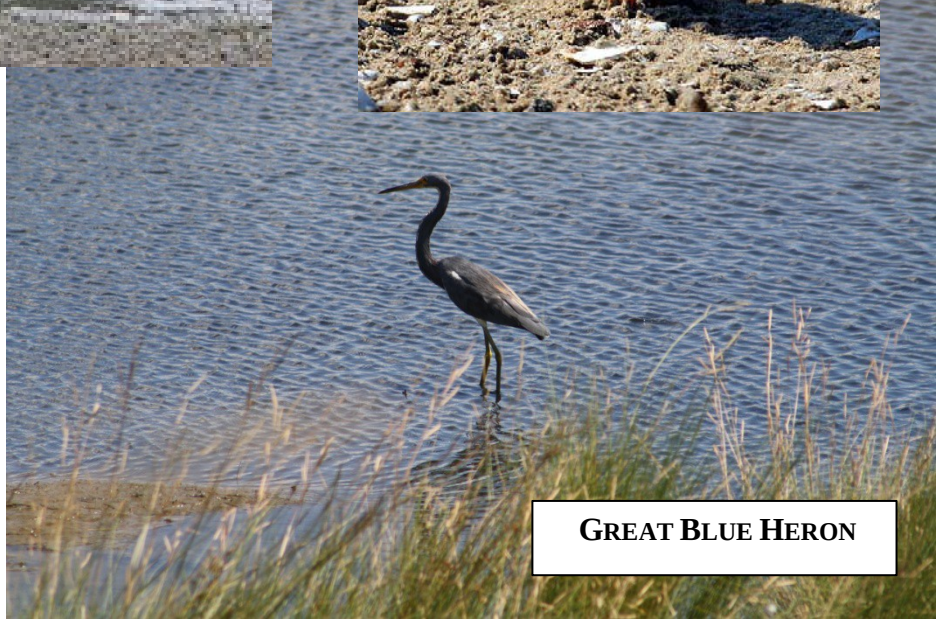
GLOSSY IBIS

BLACK-CROWNED NIGHT HERON



LEAST TERN CHICK

AMERICAN OYSTERCATCHER



GREAT BLUE HERON

7.6 SIGNIFICANCE

The Poplar Island project is nationally significant because of the uniqueness of this type of large-scale island habitat restoration as well as the value of the habitat being restored. Large-scale remote island habitat restoration using dredged material is largely unprecedented, especially considering the environmentally sensitive setting of the Chesapeake Bay. In addition, Poplar Island is making significant contributions towards achieving Chesapeake Bay restoration and E.O. 13508. As a result, this project has captured the imagination of people from a variety of disciplines.

According to the USACE Planning Guidance Notebook, ER 1105-2-100, the significance of resources and effects will be derived from institutional, public, and technical recognition. Institutional recognition of a resource or effect means its importance is recognized and acknowledged in the laws, plans and policies of government and private groups. Technical recognition of a resource or an effect is based upon scientific or other technical criteria that establish its significance. Public recognition means some segment of the public considers the resource or effect to be important. Public recognition may be manifest in controversy, support or opposition expressed in any number of formal or informal ways. For Poplar Island, recognition for the project has been seen for each of these three categories.

Institutional recognition has been demonstrated by the many international groups that have visited Poplar Island. These groups, including researchers, business leaders and government officials, have come to see this unique project and incorporate lessons learned to issues they are encountering in their home countries. Recent visitors have included groups from Japan, China, and Thailand. In addition, Poplar Island has received an award from the Coastal America Corporate Wetlands Restoration Partnership in 2003, as well as a National Association of Environmental Professionals (NAEP) award in 2006 for the long-term benefits of the project associated with providing remote island habitat for the long-term stewardship within the region and meeting near-term dredged material capacity needs.

There is a very significant interest from academia on a variety of research opportunities. These include diamondback terrapin research by Ohio University and research on the chemistry of the dredged sediments and monitoring the progress of completed wetland cells by the University of Maryland. There have also been Masters Degree theses written using information from the project on diamondback terrapin usage on Poplar Island.

Due to the significant public interest in the project, an educational tour system has been established to allow people of all ages to visit the project, learn about the Chesapeake Bay, and learn about what has been done so far and what the goals are for the future. Every year, thousands of people come out for a tour of Poplar Island. From March to July, school groups from all around Maryland visit Poplar Island to learn about the project and its benefit to the Chesapeake Bay ecosystem. Furthermore, hundreds of students participate in an educational program to raise diamondback terrapins in their classrooms and then release them on Poplar Island. There are diamondback hatchlings in over 130 classrooms where school children are using the terrapins in their education curriculum and incorporating them into a variety of subjects such as math, science, and art.

PUBLIC RECOGNITION

TECHNICAL RECOGNITION

INSTITUTIONAL RECOGNITION

The achievements and efforts of the Poplar Island project have been well documented. There been several radio and television shows on Poplar Island, as well as numerous articles and papers published in professional journals and presented at various conferences on a variety of topics including habitat restoration, beneficial use of dredged material, and wildlife usage. Additionally, there have been articles and papers that have been written about the Poplar Island project aimed at educating the public on the ecosystem gains being achieved. The vast number of articles and papers about the Poplar Island project demonstrate recognition in all fields, technical, institutional, as well as the public, that it is a unique and important project. Appendix E presents a list of articles and papers that have been written focused on the Poplar Island project.

8.0 CONCLUSION

The Poplar Island project is restoring upland and tidal marsh to provide remote island habitat for fish and wildlife species, and to provide food web support for the Chesapeake Bay ecosystem. Since construction began in 1998, Poplar Island has supported a variety of fish and wildlife species including over 125 bird species, 24 of which have been confirmed as nesting on the island, a variety of fish species, and other species of amphibians, mammals, and reptiles including diamondback terrapins.

For the LRR, the ecosystem benefits for Poplar Island were updated using the existing monitoring data and the construction schedule of inflow to determine an accurate representation of benefits realized to date. It was found that once the team incorporated the adaptive management change to exclude the high marsh intertidal pools from the completed wetland cells, and incorporated the updated project schedule timeline, the existing Poplar Island project ecosystem benefits exceeded the expected outputs as presented in the 2005 GRR. USACE has reviewed all previous NEPA documentation for the Poplar Island project. While the majority of the NEPA-evaluated impacts have not changed since the 2005 GRR, issues such as air quality, cultural resources, water quality (TMDL requirements), and rare, threatened and endangered species were revisited to ensure that the project's impacts in these areas did not change since that time. Results from the updated NEPA coordination concluded that no additional environmental assessments or environmental impact statements are necessary or required.

The project also represents a multi-objective, cost-effective and environmentally beneficial solution to manage dredged material associated with the Port of Baltimore navigation project. The Poplar Island project is one of the strongest examples of a national investment that not only supports a watershed of significance but also supports commerce and the safety of the Port of Baltimore. The Poplar Island project is comprised of the existing project, authorized in WRDA 1996 at a cost of $307 million (1996 price level) that is currently under construction, and Poplar Island expansion component, authorized by WRDA 2007 at an additional cost of $260 million (2007 price level). With the updated cost estimate prepared in 2010 and updated to FY 2013 price levels, it has been determined that the cost to complete both the existing project as well as the expansion has increased beyond that allowable under Section 902 of WRDA 1986. When comparing the 2005 GRR estimate and the current certified estimate there is a 59-perecent increase in estimated project first cost. This can be attributable to three major factors: (1) 34-percent of the increase is due to dredged material transportation and placement costs; (2) 36-percent of the increase is due to site operations costs; and (3) 23-percent of the increase is due to project contingency. The main drivers behind these increases can be traced to the increase in project duration (20 and 30 years in the 2005 and 2013 estimates, respectively), increasing fuel costs, and the inclusion of risk analysis in the cost engineering process.

In order to ensure that the existing Poplar Island can be appropriated sufficient funding to complete the construction and development process, and that the expansion can be funded to begin construction, modification of the authorization of the current cost estimate is needed. In order to complete the existing

Poplar Island component, the cost estimate at FY 2013 prices is approximately $669 million (which includes $308 million that has been expended on the project through October 2012) while the cost in FY 2013 dollars to complete the Poplar Island expansion is approximately $565 million, for a total first cost of $1.234 billion. The fully-funded cost for the existing component is $729 million, including sunk costs. This cost would be shared $546.8 million (75-percent) for the Federal government and $182.2 million (25-percent) for the non-Federal sponsor. The fully-funded cost of the Poplar Island expansion component is $701 million, which would be cost shared $455.7 million (65-percent) Federal and $245.3 million (35-percent) non-federal. The total fully-funded cost of the Poplar Island project is $1.43 billion cost shared $1.002 billion Federal and $428 million non-Federal. This cost does not include $6.4 million for project betterments, which were paid 100-percent by the MPA. It is recommended that the authorization for the Poplar Island project be further modified to reflect the current cost estimates and cost-sharing, at which point an amendment to the current Project Cooperation Agreement will be executed to include the project features authorized in Section 3087 of WRDA 2007.

If the Poplar Island project cannot be completed as designed, high quality remote island wetland and upland habitat that supports nationally significant fish, birds and other wildlife populations, as well as rare, threatened, and endangered species, would not be restored. In addition, current projections indicate that without additional dredged material placement sites, the existing Poplar Island capacity would be insufficient for the maintenance of the Baltimore Harbor and Channels Federal navigation project by FY 2017. An update to the 2005 DMMP is currently underway and preliminary data compiled thus far for the update has indicated that Poplar Island (existing and expansion) is still the most cost-effective alternative for dredged material placement. A disruption in the annual maintenance required to keep the Port of Baltimore operational would result in significant adverse effects to both the local, regional, and national economy and ecosystems of significance. Modification of the authorization of the project at the current estimated cost is needed before construction on the expansion component of the project can begin between 2015-2017. The additional capacity provided by the expansion is critical to ensure that all authorized components of the Poplar Island Environmental Restoration Project are constructed. Overloading Poplar Island will jeopardize the project's ability to deliver the full measure of the promised ecosystem restoration benefits, and to realize the goals of the Chesapeake Bay Protection and Restoration Executive Order by delaying habitat development until proper consolidation in the cells have occurred.

9.0 RECOMMENDATIONS

In conducting this Limited Re-evaluation Report, I have investigated the change in cost of the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island that has occurred since its original authorization in 1996 and modification in 2007. This Post Authorization Change Report is required pursuant to Section 902 of WRDA 1986, as amended, and in accord with related USACE implementation guidance based on the projected future exceedance of Section 902 cost limit thresholds. The Poplar Island project is critical to achieving the Chesapeake Bay habitat commitments per Executive Order 13508, contributes to the North Atlantic flyway, and is an essential component of a threatened and diminishing network of remote islands along the eastern shore of the Chesapeake Bay. The project also serves as an essential synergistic component of the operation and maintenance plan for the Baltimore Harbor and Channels Federal navigation project by providing for placement and beneficial reuse of clean, suitable dredged material. Environmental monitoring of results to date, along with future projections, indicate that environmental output ranges justify the current, fully funded costs and remain in the national interest. While the existing project component would not reach its Section 902 limit until 2021, modification of the project authorization to the current estimated cost is required before construction on the expansion component of the project can begin between 2015 and 2017. This is necessary in order to accept material by 2019 and avoid overloading the existing project and developing environmental benefits. I, therefore, recommend that the authorization for the Poplar Island project be modified now to reflect the current cost estimates and cost apportionment as outlined below.

The first cost of the Poplar Island project in 2013 dollars is $1.234 billion including all sunk costs through October 2012, which would be cost shared on a $869 million Federal and $365 million non-Federal basis. The total fully-funded cost of the Poplar Island project is $1.43 billion, cost shared on a $1.002 billion Federal and $428 million non-Federal basis. This cost does not include $6.4 million for project betterments, which were paid 100-percent by the MPA. It is important to note, the costs cited herein reflect the 75% Federal-25% non-Federal cost share for the existing component of the Poplar Island project and 65% Federal-35% non-Federal for the expansion component of the Poplar Island project as legislated by WRDA 2007.

Restoration at Poplar Island is providing upland and tidal marsh remote island habitat for fish and wildlife species and food web support for the Chesapeake Bay ecosystem. Since construction began in 1998, Poplar Island has supported a variety of fish and wildlife species including over 125 bird species, 24 of which have been confirmed as nesting on the island, a variety of fish species, and other species of amphibians, mammals, and reptiles including diamondback terrapins. If the Poplar Island project cannot be completed as designed, high quality remote island wetland and upland habitat that supports nationally significant fish, birds and other wildlife populations, as well as rare, threatened, and endangered species, would not be restored. In addition, current projections indicate that without additional dredged material placement sites, the existing Poplar Island capacity would be insufficient for the maintenance of the Baltimore Harbor and Channels Federal navigation project by FY 2017. An update to the 2005 DMMP is currently underway and preliminary data compiled thus far for the update has indicated that Poplar Island (existing and expansion) is still the most cost-effective alternative for dredged material placement. A disruption in the annual maintenance required to keep the Port of Baltimore operational would result in significant adverse effects to both the local, regional, and national economy.

The sponsoring agency, the MPA, has signed a Project Cooperation Agreement (PCA) for the Poplar Island project component to provide 25% of the ecosystem restoration costs above the Federal standard dredged material placement option. The MPA understands that costs in the PCA for the existing Poplar Island component are estimated costs and full project implementation and realization of benefits will require additional Federal and non-Federal contributions to complete in accord with the fully funded estimates. The MPA further understands that they will be required to continue to provide their items of

local cooperation for the existing project component and to provide assurance of their authority and willingness to

a. Provide 35% of the project costs for the expansion of Poplar Island as authorized in section 3087 of WRDA 2007 and as further specified below:

- Provide 25 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the expansion components of the project;

- Provide, during the first year of expansion construction, any additional funds necessary to pay the full non-Federal share of design costs;

- Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;

- Provide, during construction, any additional funds necessary to make its total contribution equal to 35 percent of total project costs for expansion components;

b. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;

c. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;

d. Shall not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project;

e. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended 942 U.S.C. 4601-4655), and the uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

f. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

g. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purposes of completing, inspecting, operating, operating, maintaining, repairing, rehabilitating, or replacing the project;

h. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

i. Keep and maintain books, records, documents, or other evidence pertaining to the costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

j. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantial change the provisions of the Davis Bacon Act (formerly 40 U.S.C. 276a *et seq.*), The Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);

k. Perform, or ensure performance of, any investigations for hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with specific with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

l. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsible for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;

m. Agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA;

n. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public

Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

The Baltimore District has performed a technical review of the document as well as a legal review to ensure that the recommendation and statements within this report are legally sufficient and are in compliance with USACE policies. The recommendations contained herein reflect the information available at this time and current USACE policies governing post authorization changes. The recommendations do not reflect program budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher-level reviews within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding.

4 Feb 14

J. Richard Jordan, III Date
District Engineer
Colonel, Corps of Engineers

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