

# AAPA Environmental Improvement Award Application

## Collaboration and Consensus: The Craney Island Mitigation Plan

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*The future Craney Island Eastward Expansion Marine Terminal*

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## EXECUTIVE SUMMARY

In 2002, the U. S. Army Corps of Engineers (USACE) and The Port of Virginia partnered to sponsor a joint Federal/State project for the eastward expansion of the USACE-owned Craney Island Dredged Material Management Area (CIDMMA) in Norfolk Harbor. The 520-acre Craney Island Eastward Expansion (CIEE) will provide additional dredge material disposal capacity and accommodate the construction of a marine terminal to meet the growing need for containerized cargo at The Port of Virginia. CIEE construction consists of filling 520 acres of open water in the Elizabeth River, for which compensatory mitigation is required.

Developed over four years by 12 State and Federal Agencies and three local interest groups, the Craney Island Mitigation Plan utilizes a “landscape approach” recommended by the Virginia Institute of Marine Science (VIMS). This approach encourages biodiversity and connectivity of three major aquatic habitats: oyster reefs, wetlands, and benthic sediments. At a cost of \$63 million, the plan targets a 411-acre section of the Southern Branch of the Elizabeth River prioritized by the Commonwealth’s Watershed Action Plan for the Elizabeth River. The plan will create 52 acres of tidal wetlands, 16.5 acres of oyster reefs, and 67 acres of sediment remediation, as shown in Figure I below. This mitigation will minimize and compensate for any environmental impact caused by the eastward expansion’s construction, as well as damage caused by industrial sites along the river over the years. This application summarizes the process by which a joint federal, state and local Craney Island Mitigation Committee, led by The Port of Virginia and USACE, worked collaboratively over several years to develop an innovative and creative solution to address a complex, under-funded river restoration project. The plan also included a way to provide waterfront education and outreach opportunities to economically depressed communities, and also allowed the port and USACE to obtain approval for one of the largest port expansion projects in the U. S.

The Craney Island Mitigation Plan is a creative and strategic approach to compensatory mitigation that meets regulatory objectives, habitat restoration, public access and education goals, and ultimately results in one of the largest river restoration projects in the country.

## INTRODUCTION

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This application summarizes the process by which a joint federal, state and local Craney Island Mitigation Committee, led by The Port of Virginia and USACE, worked collaboratively over several years to develop an innovative and creative solution to address a

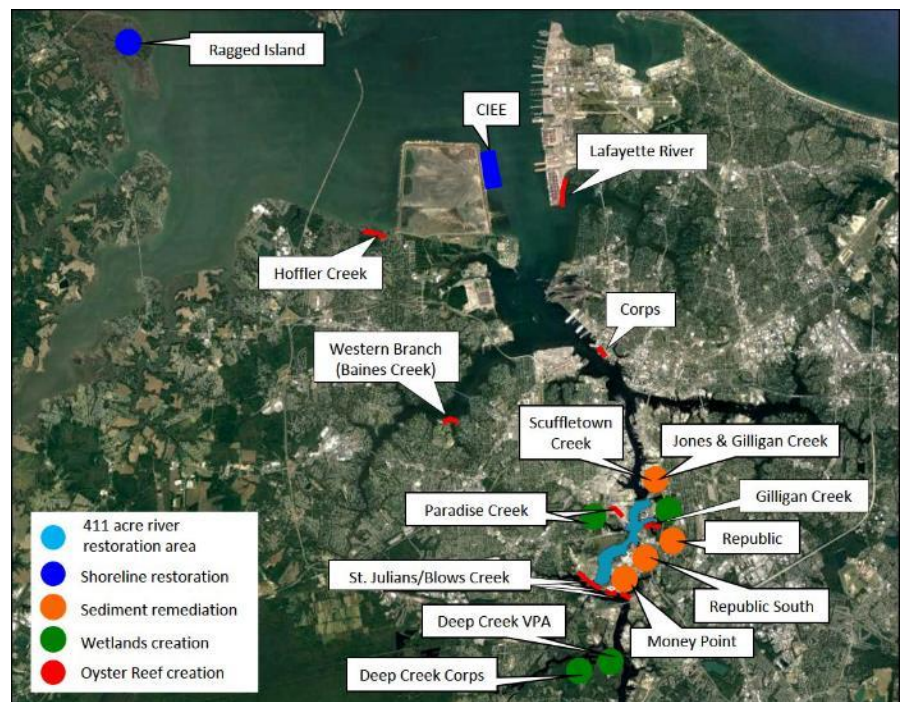


Figure I: Craney Island Mitigation Plan sites

complex, under-funded river restoration project, provide waterfront education and outreach opportunities to economically depressed communities, and allow the port and USACE to obtain approval for one of the largest port expansion projects in the U. S. The Craney Island Mitigation Plan is a creative and strategic approach to compensatory mitigation that meets regulatory objectives, habitat restoration, public access and education goals, and ultimately results in one of the largest river restoration projects in the country.

## **GOALS AND OBJECTIVES**

How do you compensate for the loss and function 520-acres of open water? The regulatory process recommends a compensation ratio of 1:1 for open water fill, and while it is possible to create open water areas from upland sources, 520-acres of upland conversion to waterfront creates additional and different environmental impacts and further compensation requirements.

A collaborative and creative and strategic approach to compensatory mitigation was needed to accommodate such a large undertaking. The Mitigation Committee's objective was to develop a scientifically justifiable plan, augmented by stakeholder participation, that would compensate for lost productivity, function with the expansion footprint, provide much needed river restoration and community waterfront access, and educational opportunities where none previously existed.

## **DISCUSSION**

### **Background**

Authorized by the River and Harbor Act of 1946 and constructed from 1956-1958, the Craney Island Dredged Material Management Area (CIDMMA) is operated by USACE and is used by private interests, local municipalities, Federal and Commonwealth of Virginia government agencies for the disposal of dredged material from Norfolk Harbor and its adjacent waterways, including the Elizabeth and Nansemond Rivers.

Originally designed for a 20-year life span, USACE has been studying ways to extend the life of CIDMMA since the 1970s. In 1997, the U. S. House of Representatives Committee on Transportation and Infrastructure authorized the Norfolk District to prepare a Feasibility Study to determine the feasibility of expanding Craney Island to the east, and to consider rapid filling of the new dredge material site to provide an area for a new marine terminal.

The Feasibility Study, concluded in 2006, determined that the existing CIDMMA would reach capacity in 2025 and the VPA would run out of cargo handling capacity in 2017. The objectives of the study were then focused on providing a solution that could address both of these capacity shortfalls. In accordance with the National Environmental Policy Act (NEPA), USACE evaluated all reasonable alternatives to avoid and minimize impacts to the environment.

The Corps evaluated a total of 51 alternatives for dredged material placement and a total of 25 port alternatives for container handling capacity. An eastward expansion emerged as the best solution to increase the capacity of CIDMMA for dredged material and containerized cargo for The Port of Virginia. The Feasibility Study, Environmental Impact Statement (EIS), and Mitigation Plan were approved by Chief of Engineers of the Army Corps of Engineers in October of 2006. Section 404 permits were approved by the Virginia Department of Environmental Quality in 2010.

The biggest challenge, beyond engineering design, was developing a mitigation plan that would compensate for the unprecedented loss of 520-acres of open water in Norfolk Harbor. An innovative approach and project that would address lost habitat function, address regulatory requirements, appeal to environmental interest groups, provide waterfront recreational and educational access, and advance revitalization of socioeconomically depressed communities was needed. Project leaders from The Port of Virginia and USACE determined that the best course of action was to involve all stakeholders, including federal and state agencies, local government, universities, and local community and environmental interest group, and from there, the Craney Island Mitigation Subcommittee was formed.

### **Objectives and Methodology**

Consisting of representatives from 12 Federal and State agencies and three local interest groups, the Committee convened on 16 occasions between June 2002 and February 2005, and stayed engaged through the public comment and permitting phases through 2010.<sup>1</sup> In addition to the socioeconomic criteria, the group was tasked

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<sup>1</sup> USEPA, USFWS, NOAA, USACE, VIMS, VDEQ, VA. Marine Resources Commission, VA. Dept. of Conservation & Recreation, VA. Dept. of Game & Inland Fisheries, The Port of Virginia, ODU, College of William & Mary, Elizabeth River Project, James River Association, and Wetlands Watch.

with assessing the degree of habitat impact associated with the 520-acre fill, formulating mitigation ratios to replace or to increase the ecological function and productivity of the area lost, and developing a conceptual mitigation plan comprised of various tidal and sub-tidal habitats. The conceptual mitigation plan was approved by the USACE in 2006 and the Virginia Department of Environmental Quality (VDEQ) in 2010.

From 2002 through 2004, the Committee reviewed benthic biomass, abundance, and diversity surveys conducted by Old Dominion University (ODU) and the Virginia Institute of Marine Science (VIMS), a cumulative impacts assessment commissioned by USEPA, and a baseline biological condition assessment conducted by the U. S. Fish and Wildlife Service (USFWS). These studies concluded that the habitat within the impact area, while pristine, was limited in function and biomass productivity. Clam populations and biomass were extremely low when compared to similar habitats in the river system. As a result, the area was not a significant feeding ground for blue crabs or finfish. No threatened or endangered were present and the area is classified by VIMS as a sub-aquatic vegetation (SAV) exclusion zone where SAV growth is not viable.

Using data from these studies, the Committee utilized a widely-applied Habitat Equivalency Analysis (HEA) model recommended by the EPA to quantify the impact of the proposed expansion and to determine the scale of compensatory mitigation required to replace existing water column and benthic productivity. Using data from the ODU and VIMS abundance and biomass surveys, the HEA model determined that 5.02 to 18.24 acres of oyster reefs or 66.9 to 243 acres of salt marsh would be required to replace the existing benthic and zooplankton productivity in the 520 acres of the expansion’s footprint. An additional model was run to determine the ratios for sediment remediation. The results concluded that 1 acre of sediment remediation would compensate for 0.89 acre of lost habitat, or 661 acres of sediment remediation, would be needed to replace 520 acres of impact. The Committee assessed the functional attributes of the existing open-water habitat and determined that the following mitigation alternatives had the highest likelihood of success in replacing the ecological functions of existing open-water habitat over the long term:

Salt marsh creation / restoration	Riparian buffer creation / restoration
Oyster reef creation / restoration	Sediment remediation
Wetlands conservation	

Finally, the Committee developed a list of criteria for evaluating 30 prospective mitigation sites in the Elizabeth and Lower James Rivers. Based on recommendations from VIMS, the Committee agreed that a “landscape approach,” or establishing physical connectivity between various habitat sites to establish ecological synergy, maximized productivity and ensured the long term viability of each of the sites. Therefore, proposed wetland, oyster reef, and sediment remediation sites that were contiguous or allowed the construction of multiple habitat types were given priority. Other evaluation criteria included:

In-kind relatedness	Ability to restore lost ecological functions
Proximity to impact site	Public education opportunities
Risk / long-term viability	Publicly recognized value of the habitat type

The committee also used a “modified” Delphi Technique, a well-known strategic planning and public policy tool, to collaboratively prioritize the prospective sites. The Southern Branch and Main Stem of the Elizabeth River and the Lower James River were targeted areas, given their proximity to the CIEE impact area and their need for habitat restoration. Based on the importance of sediment restoration in the Elizabeth River to the region and given that it is home to The Port of Virginia’s marine terminals, the Committee agreed that 67 acres of sediment

restoration should be a primary component of the plan. This focus was consistent with the Elizabeth River Watershed Action Plan (ERP, 1996; 2002). Focused on the benefits generated by the “landscape approach,” the Committee also recommended that the Mitigation Plan include 56 acres of salt marsh restoration and 20 acres of oyster/clam habitat restoration,



Figure 2: The landscape approach will establish ecological synergy between the sites.



much of which is focused in the Southern Branch. Figure 2 depicts the relationship between the various wetland, oyster reef, and sediment remediation sites in the Southern Branch of the Elizabeth River.

**Fulfilling the Award Criteria**

The completion of the “design by Committee” process produced a mitigation plan that, when fully executed, will result in 411+ acres / 3-miles of river restoration (Figure 3). The 67 acres of sediment remediation (5 sites) combined with 56 acres of contiguous salt march (5 sites) and 20+ acres (12 acres contiguous) of oyster reefs (7 sites) are concentrated primarily in a highly-contaminated section of the Southern Branch of the Elizabeth River. This section of the river is known for its degraded benthos and wetland loss as a result of years of poor

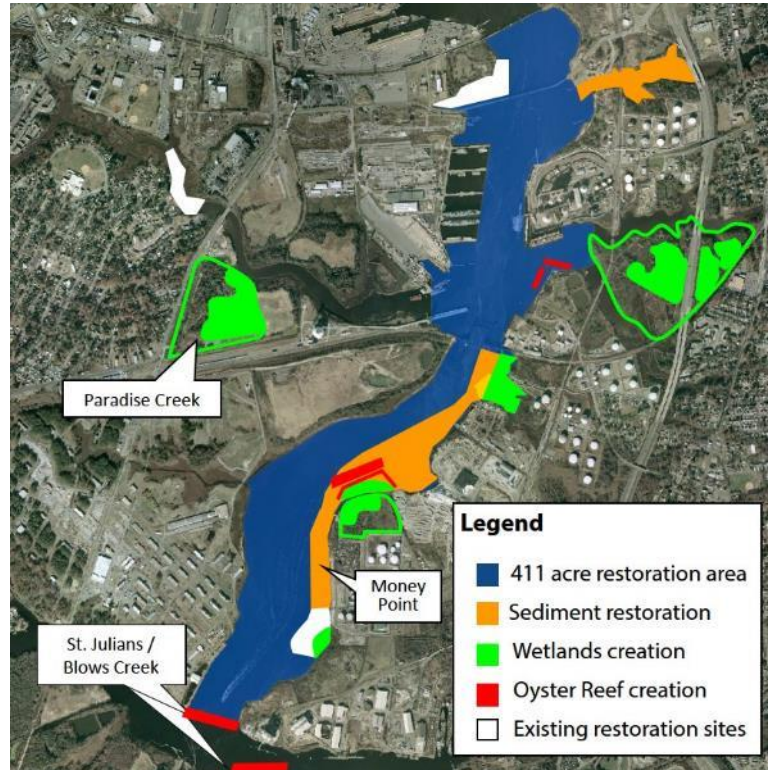


Figure 3: 411 acre river restoration area

industrial practices during the 1940’s and 1950’s, primarily direct discharge of creosote to the river. The Mitigation Plan is being executed in eight phases and in lock step with the phases of CIEE construction. The first two phases, Paradise Creek Park and 16.5 acres of oyster reefs, are complete. The third phase, 10 acres of sediment remediation at Money Point, is in the design stage and will move into construction once building resumes on the Expansion. The Paradise Creek Nature Park wetlands and the oyster reefs are already generating benefits and fulfilling the AAPA award criteria.

**1. Level & Nature of Benefits to Environmental Quality and the Community**

Phase I: The Mitigation Plan’s signature project and “anchor” for the 411-acre restoration is Paradise Creek Nature Park. The park is joint effort between the Elizabeth River Project (ERP), the City of Portsmouth and The Port of Virginia. Designed by The Port of Virginia and ERP on property secured by the two organizations, the

park is a 40-acre nature and tidal wetland preserve located in the Craddock neighborhood in the City of Portsmouth and the center of the 411-acre river restoration area. Figure 4 shows the elements of the park's restoration plan.

The park resides in a light industrial section of the river and is connected to the Craddock property via a series of crosswalks installed by the City.



Figure 4: Paradise Creek Nature Park Master Plan.

Prior to the park's construction, the residents of Craddock had no public access to the Elizabeth River or to the two continuous miles of walking/running/cycling trails designed into the urban forest section park.

The property was formerly home to an 11-acre wetland tributary to the Elizabeth River, but the marsh was filled to an elevation of 20+' during the 1960's. At one time, the parcel housed a small repair boatyard and equipment storage, but was otherwise vacant. During the park's renovation, the site was excavated to its original contour and the 11-acre marsh was re-constructed and connected to the river. Additional project and port industry partners contributed educational signage, pavilions, lighting, kayak launches, and other amenities to the park. The park is operated by the City, while educational curriculum and outreach events are managed by ERP and their Urban Park Ranger. The park is the largest restored wetland area in the region and a national model for urban river restoration, showing how industry and nature can co-exist in harmony.

Paradise Creek Nature Park is not only serving as the anchor for a 411-acre river restoration, but is also teaching generations about what it takes to bring back the health of an urban river. Supporting its success and providing another educational and restoration component is the construction of oyster reefs within the same

three-mile stretch of river and in waters adjacent to the park. Completed in 2014, these oyster reefs are serving to filter millions of gallons of water tainted by the creosote contaminated sediments lying below.

Phase 2 of the Mitigation Plan is the construction of 16.5 acres of oyster reefs throughout the Elizabeth River System, and was completed in fall 2014. Seven reefs, ranging from 0.2 acres to six acres, are located through the Southern and Western Branches of the Elizabeth River, the Lafayette River, and Hoffer Creek (0.2 acres). The locations of the reefs are shown in Figure 1, and detailed graphics showing each location are in Appendix A.

In the early 20<sup>th</sup> Century, the Southern Branch of the Elizabeth River was home to a thriving oyster population and commercial fishery. All are sanctuary reefs and each contribute to the genetic rehabilitation of the historic oyster population within the Elizabeth and Lafayette River systems. After two years of monitoring, results of the reefs show high spat survival, “good” oyster health conditions, and improved water quality conditions. The Appendix includes a “Summary of Monitoring Results.”

## **2. Level of Independent Involvement and Effort by the Port**

The Mitigation Committee was co-chaired by The Port of Virginia and USACE, Norfolk District. Port colleagues held countless meeting with ERP, USEPA, VIMS, VDEQ, and the USFWS, outside of the regularly schedule committee meetings, to determine the best approach to compensation.

It was the port’s observation that if individual mitigation efforts could be concentrated within a three-mile stretch of the river using the “landscape” approach, then conceptually, the surrounding degraded benthic habitat would also be restored over time. VIMS agreed and helped present this option to EPA, VDEQ, ERP and the Committee at large. Port staff worked tirelessly to keep the Committee engaged, informed and motivated to find a solution. Once the “landscape approach” was agreed upon, port staff worked to determine the best approach for prioritizing or selecting specific projects for the plan. The modified Delphi method was presented to the Committee and the site selection and final planning meeting were facilitated by the port.

The Port has acquired all the properties required for the wetland mitigation elements and has either led or supported design efforts and initiated or overseen construction. The port continues to engage USACE and other stakeholders to advance the remaining project elements in the Mitigation Plan, including the first of the sediment

remediation projects, 10-acres at North Money Point. The initial engineering design for Money Point North is complete, and the port is working with USACE to secure funding for this next phase.

### 3. Creativity of the Solution

Typically, required compensatory mitigation is determined by pre-defined mitigation ratios established by USACE and/or the state and local agencies administering the CWA Section 404 permitting process. In the case of the CIEE project, a 1:1 ratio for the fill of open-water habitat had been established by USACE in VDEQ guidance. With a project of the CIEE's magnitude, all stakeholders agreed that creating 520 acres of open-water fill would create its own series of environmental impacts and would not necessarily compensate for the fill or replace the functions of the open-water habitat on the east side of CIDMMA.

The creative process and solutions that produced the Craney Island Mitigation Plan cannot be contributed to one entity or agency. The Mitigation Committee consisted of a team of experienced public policy and environmental professionals and non-profit advocates who were willing to be flexible in their approach and think "outside of the box." Their perseverance was greatly appreciated as it took five years for the plan to develop. The idea to use an HEA, which had historically been used to determine impacts from severe oil spills like Alaskan-Exxon Valdez, to assess productive and function loss, was proposed by the USFWS. The "landscape approach" for connecting the mitigation habitats was recommended by VIMS. These recommendations led the port to propose that the USACE, EPA, and VDEQ look at the Mitigation Plan as a full river restoration and "credit" the port with 411 acres of compensation, even though the total physical construction footprint of all the mitigation elements (wetlands, oyster reefs, and sediment remediation) was 144 acres.

Except for EPA's work on two Superfund sites, USACE, VDEQ, and EPA were aware that restoration had all but stalled on the Southern Branch of the Elizabeth River, primarily due to lack of funding and the arduous process for designating additional Superfund sites. ERP and VDEQ developed a Watershed Action Plan in 1996 to address the continued degradation of the River and the loss of marine species, including once abundant oyster reefs, but additional leadership was needed to advance restoration. Knowing that the Craney Island Mitigation Plan was possibly the best hope for restoring the Elizabeth River and that the 411-acre "credit" proposal was supported by sound science and extensive stakeholder input, the USACE, EPA, and VDEQ approved the

Mitigation Plan in 2006. The Plan is now driving the restoration envisioned by the region's leaders over 20 years ago. Had the regulatory agencies, the port, ERP, and the region's universities not been willing to think creatively and collaboratively, the best solution for the region, the River and the Port would not have been realized.

#### 4. Apparent Project/Program Results

Paradise Creek Nature Park and the 16.5 acres of oyster reefs (Phases 1 and 2 of the Craney Island Mitigation Plan) are complete. The design for Phase 3, North Money Point Sediment Remediation and Wetlands cap (Phase 3) is complete and awaiting funding.

##### Paradise Creek Wetlands

Completed in December 2012, Paradise Creek Nature Park restored approximately 11 acres of tidal wetlands to the Elizabeth River watershed. An as-built survey obtained from the contractor indicates that a combined acreage of 11.85 acres of mitigation was created. This includes 2.74 acres of tidal channels, 8.45 acres of tidal emergent wetlands and 0.66 acre of tidal shrub wetlands. Today, this former dredge disposal site and boatyard is now home to great egrets (*Ardea alba*), ospreys (*Pandion haliaetus*), marsh fiddler (*Uca pugnax*), and Chesapeake blue crabs (*Callinectes sapidus*) and common periwinkle (*Littorina littorea*). Schools of small fish are observed daily in the tidal channels.

Paradise Creek Nature Park is the anchor of the Craney Island Mitigation Plan and the Elizabeth River Restoration effort. The park provides a rare opportunity to explore first-hand what can be done to restore an urban river to health. The port's removal of 300,000 cubic yards of dredge spoils and construction tidal wetlands and shallow channels restored the health of the creek and has provided a place for citizens to bike, kayak (Figure 5), enjoy the outdoors, and learn about the environment.



Figure 5: Kayakers at Paradise Creek Nature Park. Photo courtesy of ERP.

The park is a companion education site to ERP’s award-winning Learning Barge. The park also includes two miles of trails, “green” parking, access roads, a kayak launch and the Dominion Wetlands Learning Lab. Hundreds of volunteers have worked thousands of hours to remove invasive vines and other invasive species and add picnic shelters, benches and birdhouses as well as more than 10,000 native trees, shrubs and flowers.

A letter from ERP’s Executive Director is attached in the Appendix, expressing the organization’s support for the Mitigation Plan and its positive affect it has had on the region.

### Oyster Reef Creation

The oyster reef creation phase of the Mitigation Plan consisted, in part, of constructing a network of oyster reefs throughout the Elizabeth River in partial compensation for ecological services lost due to the construction of the CIEE. Seven oyster reefs (shown in Figure 1 and also in the Appendix), were created in the following locations: Elizabeth River-Lafayette River (2 reefs), Elizabeth River Western Branch-Baines Creek, Elizabeth River Southern Branch-



Figure 6: Oysters stored at CIDMMA will be used for reefs built as part of the Crane Island Mitigation Plan. Photo courtesy of USACE.

Gilligan Creek (2 reefs), Elizabeth River Southern Branch-St. Julian’s/Blows Creek, and Lower James River-Hoffler Creek. The oyster shells are stored at CIDMMA (Figure 6) until it is time to construct the reefs.

Annual monitoring is demonstrating that the reefs are on a positive growth trajectory with three of the 7 sites exceeding already exceeding both the five-year compensation plan's and the GIT's metrics for sustainability.

The remaining 4 sites are meeting expectations with the Southern Branch Elizabeth River reefs (Blows Creek and Gilligan Creek) performing despite being in an area of high sedimentation and elevated heavy metals concentrations. Oyster settlement in these areas are good but the absence of large oysters on the reefs suggests natural recruitment may be slow until water quality in the area improves. However, through close coordination and adaptive management, each reef site may ultimately perform well and meet the compensation plan's expectations for oyster and non-oyster biomass.

## 5. Cost Effectiveness

The total projected cost for construction of the Craney Island Mitigation Plan is \$63 million. Capital construction bonds are being used to finance a portion of the construction. With the eight phases being constructed over 11 years, the port can plan and budget for project execution. Acceptance of the 411-acre river restoration and “creative” solution drives the cost per mitigation “credit” down to approximately \$153,000 per acre, making the solution extremely cost effective. In addition, the port continues to work with its partners at USACE and ERP to identify opportunities for early design, planning and funding that has permitted the port to acquire property for the wetland mitigation sites and prepare design plans and specifications at reduced costs.

## 6. Transferability to the Port Industry

The beauty of this collaborative approach to environmental mitigation is that it is creative, scalable and supported by scientific models and decision making processes from the social-science arena. The approach, processes, models and theories outline in this application can be used by any port entity to address complex projects of any size. The “landscape” approach is not new to the industry, as many mitigation project designs have multiple habitat elements. However, its use on a large scale is somewhat unprecedented. The use of an HEA to define impacts to habitat function and marine and benthic productivity from marine terminal construction and dredging is seldom used, but has proven to be a useful to delineating impacts and establishing a baseline budget in support of project selection. Also, the approach to engage all government, non-government, and industry stakeholders at all levels and invite them to join the Committee and be a part of the solution encouraged federal and state regulators to think beyond the traditional mitigation ratios and helped deliver a creative and innovative mitigation solution.

## CONCLUSION

The Craney Island Mitigation Plan is a creative and strategic approach to compensatory mitigation that meets regulatory objectives, habitat restoration, public access and education goals, and ultimately results in one of the largest river restoration projects in the country. The collaboration and collective leadership among the scientists, public policy officials, the port, and the environmental interest groups to find a creative solution to

compensatory mitigation that is supported by sound science is the success story behind the Craney Island Mitigation Plan. Thank you for this opportunity to share it with AAPA and our colleagues in the port industry.