FISCAL YEAR 2023 WORK PLAN
SECTION 320
GALVESTON BAY ESTUARY PROGRAM

Revision 0.0

EPA #TBD

TCEQ Grant #332023

A PROGRAM OF TCEQ

Texas Commission on Environmental Quality
P.O. Box 13087, Austin, Texas 78711-3087

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LIST OF ABBREVIATIONS

Table 1. Abbreviations List

Name	Abbreviation
Assessment Unit	AU
Bacteria Implementation Group	BIG
Bayou Preservation Association	BPA
Best Management Practice	BMP
Black, Indigenous, and Other People of Color	BIPOC
Coastal Heritage Preserve	CHP
Comprehensive Conservation and Management Plan	CCMP
Dissolved Oxygen	DO
Environmental Institute of Houston	EIH
Fiscal Year	FY
Environmental Protection Agency	EPA
Full Time Equivalent	FTE
Galveston Bay Council	GBC
Galveston Bay Estuary Program	GBEP
Galveston Bay Estuary System	GBES
Galveston Bay Foundation	GBF
Galveston Bay Plan	*GBP*
Galveston Bay Plan, 2nd Edition	*GBP, 2nd Edition*
Galveston Bay Public Awareness and Education Campaign	Back the Bay
Galveston Bay Report Card	GBRC
Geographic Information System	GIS
GeoTechnology Research Institute	GTRI
Green Infrastructure	GI
Gulf of Mexico Alliance	GOMA
Houston Advanced Research Center	HARC
Houston-Galveston Area Council	H-GAC
City of Houston Parks and Recreation Department	HPARD
Harris County Department of Education	HCDE
Implementation Plan	I-Plan
Lead	Pb
Monitoring and Research	M&R
National Estuary Program	NEP
Natural Resource Uses	NRU
Nonpoint Source	NPS

Name	Abbreviation
On-Site Sewage Facilities	OSSF
Pharmaceutical and Personal Care Products	PPCPs
Plastic Pollution Prevention Partnership	P3P
Point Source	PS
Polychlorinated Biphenyls	PCBs
Per- and Polyfluorinated Alkyl Substances	PFAS
Public Participation and Education	PPE
Quality Assurance Project Plan	QAPP
Restore America's Estuaries	RAE
Regional Monitoring Database	RMD
River, Lakes, Bays N' Bayous Trash Bash	Trash Bash
Science, Technology, Engineering, and Mathematics	STEM
Texas A&M AgriLife Extension Service	Texas AgriLife
Texas A&M University	TAMU
Texas A&M University at Galveston	TAMUG
Texas Commission on Environmental Quality	TCEQ
Texas Estuarine Restoration Network	TERN
Total Maximum Daily Load	TMDL
Turtle Island Restoration Network	TIRN
U.S. Army Corps of Engineers	USACE
U.S. Environmental Protection Agency	EPA
U.S. Fish and Wildlife Service	USFWS
U.S. Geological Survey	USGS
University of Houston	UH
University of Houston – Clear Lake	UHCL
Water and Sediment Quality	WSQ
Watershed Protection Plan	WPP

SECTION 1: PROGRAM OVERVIEW

Revision 0.0 of Fiscal Year (FY) 2023 Section 320 Galveston Bay Estuary Program (GBEP) (pre-USAS #332023) is to request three years of time and one year of funding with the intent to request another year of funding for years two and three and extend the grant term to five years total through 8/31/27. The Texas Commission on Environmental Quality (TCEQ) has found this method is most effective for successful operation and coordination of GBEP.

Galveston Bay is the largest and one of the most productive estuaries in Texas. It sits adjacent to one of the most heavily industrialized areas in the nation. The GBEP service area encompasses 5,000 square miles and 232 miles of estuarine shoreline along the upper Texas Coast and incorporates the five-county area bordering Galveston Bay: Liberty, Chambers, Harris, Galveston, and Brazoria counties.

GBEP was established in 1989 to provide comprehensive management of this vital resource. In 1990, GBEP began working with a diverse group of stakeholders to develop a comprehensive plan that would receive broad-based support from, and involvement by, federal and state agencies with jurisdiction in Galveston Bay, industries and businesses, local government officials, commercial and recreational fisherman, conservation organizations, and citizens. In 1994, the *Galveston Bay Plan* (*GBP*), the comprehensive conservation and management plan (CCMP), was completed, and in 1995, it was approved by the governor of Texas and the U.S. Environmental Protection Agency (EPA) administrator. The initial effort was jointly funded by EPA, the Texas General Land Office, and TCEQ. The *Galveston Bay Plan*, 2nd *Edition* (*GBP, 2nd Edition*) was approved by TCEQ in March 2019 and by EPA in September 2021.

The *GBP* identified 82 action items to protect and restore the health and productivity of the estuary while supporting continued economic growth and public use of Galveston Bay. GBEP received a grant from the EPA to begin implementing the *GBP* in 1995. This grant ran from fiscal years 1995–1999 and is now closed. Subsequent grants have run from fiscal years 2000–2003, 2004–2007, 2008–2010, 2011–2013, 2014–2016, and 2017-2019. Grant #CE-00655007 (fiscal years 2020–2022) is open but is no longer receiving funding allocations. Over 200 implementation projects have been initiated under these grants.

GBEP and its partners have received 17 national awards for their partnerships and progress in implementing the *GBP* and preserving Galveston Bay.

Pre-2008 AWARDS

- Four awards from Coastal America: one in 1999, Clear Creek Habitat Restoration project, for the beneficial use of dredge material, one in 2002 for Galveston Island State Park habitat restoration, one in 2003 for habitat restoration at Jumbile Cove, and one in 2005 for San Jacinto State Park for beneficial use of dredge material.
- Recognition award from the National Aeronautics and Space Administration for Galveston Bay estuary restoration and five years of implementation of the *GBP*.
- National Wetland Conservation Award for the Delehide Cove Protection and Restoration project from the U.S. Fish and Wildlife Service (USFWS) in 2006.
- EPA Gulf of Mexico Program Gulf Guardian Partnership Award for the Brays Bayou Urban Wetlands project.
- The Fisheries and Habitat Conservation Partnership award for the cumulative habitat conservation work on the part of the Natural Resource Uses (NRU) subcommittee.
- Two EPA Gulf of Mexico Program Gulf Guardian Awards to GBEP partners, including an award in the non-profit category to SCENIC GALVESTON for the Virginia Point Coastal Preserve in which GBEP played an instrumental role, and an award in the individual category to Dick Benoit, a highly active local citizen.

2008-PRESENT AWARDS

- EPA Gulf of Mexico Program awarded the First Place Gulf Guardian Award in the Partnership category for the East Bay Shoreline Protection project.
- Department of Interior's Collaborative Conservation award for the East Bay Shoreline Protection project.
- EPA's Gulf of Mexico Program Gulf Guardian Partnership Award for the North Deer Island Protection project.
- Coastal America Partnership Award for the North Deer Island Protection project.
- Coastal America Partnership Award for the Savannah Oaks Conservation project.

- TCEQ Texas Environmental Excellence Awards 2014 Finalist: Civic/Community for the Sheldon Lake Restoration project in 2014.
- Keep Houston Beautiful Mayors Proud Partner Award for the Sheldon Lake Restoration project in 2015.
- Houston-Galveston Area Council's (H-GAC) Our Great Region Diligence Award for Double Bayou Watershed Protection Plan (WPP) in 2016.
- USFWS Southwest Region Annual "Partnership of the Year" Award for 2016 for Oyster Lake Shoreline Protection and Marsh Restoration Project.
- H-GAC Our Great Region Award for the Double Bayou WPP in 2017.
- EPA's Gulf of Mexico Program Gulf Guardian Partnership Award for the Plastic Pollution Prevention Partnership in 2017.
- EPA's Gulf of Mexico Program Gulf Guardian Partnership Award for River, Lakes, Bays N' Bayous Trash Bash (Trash Bash) in 2017.
- TCEQ Texas Environmental Excellence Awards 2018 Winner: Civic/Community for Trash Bash.
- EPA 2018 Award for Green Infrastructure (GI) & Excellence in Communications/Important Message (GI for Texas – Exploration Green).
- TCEQ Texas Environmental Excellence Award for Trash Bash in 2019.
- EPA Gulf Guardian Award in for Trash Bash 2019.
- City of Houston/Keep Houston Beautiful Mayor's Proud Partner Award in Honor of project excellence and longevity for Trash Bash in 2019.

SECTION 2: INTRODUCTION

GBEP, a non-regulatory program of TCEQ, is a partnership of local governments, business and industry, conservation organizations, bay user groups, and resource agencies. GBEP is charged with implementing the *GBP*, the CCMP for Galveston Bay. GBEP is part of TCEQ's Office of Water, Water Quality Planning Division. A program manager and staff of seven located in the Houston-Galveston area directly oversee the implementation of the *GBP*. Program staff responsibilities are as follows:

- Acquire, manage, and disperse funds to implement specific actions in the *GBP*;
- Provide for coordination and communication among state and federal resource agencies for many cross-jurisdictional issues;
- Coordinate, monitor, and track implementation activities of Galveston Bay Council (GBC) partners;
- Identify and communicate bay improvements to agencies, stakeholders, and the public;
- Conduct public outreach and education to increase awareness of Galveston Bay;
- Advocate conservation of the estuary (see Figure 1); and
- Maintain stakeholder involvement in the decision-making process through the GBC and its subcommittees.

Figure 1. Great egret on a breakwater installed to decrease shoreline erosion near Galveston Island State Park (photo credit: Cassidy Kempf).

SECTION 2.1: ORGANIZATIONAL STRUCTURE

GBEP has the primary responsibility for coordinating and administering the work plan. Program staff and job descriptions are provided below.

Lisa Marshall, **M.S., GBEP Program Manager:** Responsible for the overall implementation of the *GBP*, including: securing and managing funds to support operations, staff, and projects; fostering stakeholder involvement to facilitate *GBP* implementation; managing program staff and operations to ensure efficient use of resources; and representing GBEP on national, state, and local boards and committees and at national and state conferences/events to garner federal and state support. Ms. Marshall also coordinates the GBC and the Budget and Priorities subcommittee.

Vacant, Public Participation and Education (PPE) Coordinator and Community Relations Specialist: responsible for coordinating the implementation of PPE actions in the *GBP;* building relationships and developing communication channels and dialogue with local government officials, private sector, and other outside organizations key to implementing the *GBP;* facilitating the PPE subcommittee of the GBC; providing information to stakeholders, the public and media; overseeing the Galveston Bay Public Awareness and Education Campaign (Back the Bay); promoting special events and projects; and overseeing the websites of GBEP. The PPE Coordinator also facilitates cross-sectoral learning of public relations and marketing activities for the Galveston Bay watershed; organizes and manages community relations events and the State of the Bay symposium; and tracks emerging stakeholder community concerns/issues.

Lindsey Lippert, NRU Coordinator: responsible for coordinating the implementation of habitat protection, species population protection, freshwater inflows, shoreline management, and spills and dumping actions in the *GBP*; coordinating invasive species work group and the NRU subcommittee of the GBC; implementing specific projects to protect, restore, and enhance coastal habitat and native species populations, and manage and control invasive species; maintaining Legislative Budget Board and EPA Government Performance and Results Act performance measures; and serving as a back-up budget liaison and bill analyst for the GBEP office.

Kristen McGovern, Ph.D., Monitoring and Research (M&R) Coordinator: responsible for coordinating research actions in the *GBP*; coordinating the regional monitoring program, including data management/reporting, and development and application of environmental indicators; facilitating the M&R subcommittee of the GBC; coordinating CCMP implementation tracking, and researching, evaluating, and reporting findings concerning scientific and technical issues impacting *GBP* implementation.

Christian Rines, M.S., Water and Sediment Quality (WSQ) Coordinator: responsible for coordinating the implementation of public health protection, WSQ, nonpoint source (NPS), and point source (PS) pollution actions in the *GBP*; implementing specific stormwater, wastewater, septic systems, and seafood safety projects; facilitating the WSQ subcommittee of the GBC; and researching, evaluating and reporting findings concerning scientific and technical issues impacting *GBP* implementation.

Vanessa Zemke, M.P.S.A., Technical and Quality Program Coordinator: responsible for serving as the quality assurance officer, assists with oversight of contract management, tracking, and execution, budget liaison, and grants coordinator for GBEP. Ms. Zemke also coordinates the development and submission of federal reports, identifies, and tracks the evolution of issues affecting bay management, and researches policy, technical, and management results that pertain to Galveston Bay in collaboration with the NRU and WSQ coordinators.

Alejandra Trevino, B.S., Administrative Assistant: responsible for travel coordination, vehicle and equipment maintenance and repairs, mail, correspondence, office safety, and general administrative support for GBEP.

Matthew Abernathy, M.A.R.M., Education and Outreach Coordinator: responsible for handling GBEP outreach events, conducting educational presentations in schools and at events, assisting with the informational needs of the program, managing contracts, and assisting subcommittee coordinators in implementing habitat, water quality, species protection, and monitoring projects.

PROGRAM COMPETENCY DEMONSTRATION

The following statements demonstrate GBEP's competency as a Continuing Environmental Program:

- Competency is demonstrated by TCEQ Quality Systems Audits conducted biennially by the TCEQ Quality Assurance Manager.
- Competency is demonstrated through EPA Quality Project and Program Management training taken by TCEQ GBEP staff. GBEP staff that review Quality Assurance Project Plans (QAPPs) or manage projects with QAPPs have taken this training and any new staff with QAPP-related responsibilities will be required to take this training. Certificates are available upon request.
- Competency is demonstrated through the EPA approved TCEQ Quality Management Plan (Revision 27 approved January 2022) that GBEP operates under, which provides descriptions of the quality assurance policies, including all the requirements described in the EPA document QA/R-2.
- The GBEP Program Manager and staff take many professional development training classes annually, which are also available upon request.

FISCAL YEAR 2022 LEVERAGING, TRAVEL, AND TECH TRANSFER AMOUNTS

Figures reported in Table 2 provide a mid-year estimate of leveraged funding reported by partners and grantees from September 2021–August 2022 (fiscal year 2022). The numbers are subject to change as additional funding may be reported for the period.

Table 2. Fiscal Year 2022 Leveraging

EPA Funds to Program (Section 320)	TCEQ State Allocation	As Reported in FY 2021 National Estuary Program Online Reporting Tool			
		Other Federal Funds	Other State Funds and In-kind	Local Government Funds and In-Kind	Private funds and In-kind
$700,000	$932,113	$3,771,500	$526,505	$0	$0

Figures reported in Table 3 depict the travel expenses and tech transfer descriptions from fiscal year 2022.

Table 3. Fiscal Year 2022 Travel and Tech Transfer

EVENT, LOCATION, AND PURPOSE	STAFF PERSON	EPA SECTION 320 FUNDS	TCEQ 100% STATE FUNDS
Trash Summit Meetings Houston, Texas (Virtual) – Monthly Watershed-wide coordinating initiative to research, track, and quantify litter. This stakeholder-led effort aims to identify prevention and removal strategies. Other efforts include identifying funding strategies, partnership opportunities, and communication approaches. Initial steps were taken to develop a regional action plan—like other water-based plans—focused on litter and marine debris prevention.	Cynthia Clevenger Lisa Marshall Christian Rines	$0	$0
Interagency Public Meeting for the U.S. Army Corps of Engineers (USACE) Coastal Texas Protection and Restoration Feasibility Study Galveston, Texas (Virtual) – Monthly USACE Galveston District meets with state and federal agency partners to consult on the progress of the study, which will identify critical data needs and recommend a comprehensive strategy for reducing coastal storm flood risk through structural and nonstructural measures that take advantage of natural features like barrier islands.	Lindsey Lippert	$0	$0

EVENT, LOCATION, AND PURPOSE	STAFF PERSON	EPA SECTION 320 FUNDS	TCEQ 100% STATE FUNDS
Galveston Bay Foundation (GBF) Conservation Committee Meetings Houston, Texas (Virtual) – Bimonthly The GBF and partners meet to discuss conservation projects, management needs, and funding strategies for lands held by GBF. The committee also reviews bylaws and requirements needed to maintain GBF's Land Trust Alliance accreditation.	Lindsey Lippert	$0	$0
The H-GAC Natural Resources Advisory Committee Meetings Houston, Texas (Virtual) – Quarterly These meetings provide information on issues related to natural resource management of the region. The GBEP Program Manager is a non-voting member.	Lisa Marshall	$0	$0
Fishing Line Recycling Work Group Houston, Texas (Virtual) – Quarterly This work group is an outcome of the Plastic Pollution Prevention Partnership (P3P) that addresses concerns about the large amount of monofilament fishing line causing wildlife entanglements and water quality issues on the Texas City Dike and Seawolf Park in Galveston, Texas. The work group is a partnership with organizations and agencies working with the Texas City Waste Management Department and the City of Galveston Park Board of Trustees to develop a campaign to help anglers and visitors keep fishing line off the ground.	Cynthia Clevenger Matthew Abernathy	$0	$0
P3P Meetings Houston, Texas (Virtual) - Quarterly Region-wide collaborative of several organizations and agencies to address plastic debris affecting wildlife and water quality. This group organizes cleanups, wildlife entanglement rescues, and outreach and education efforts. This group is an outcome of regional efforts to address EPA's Trash Free Water initiative.	Cynthia Clevenger	$0	$0
Trash Bash Event Coordination Meetings Houston, Texas (Virtual) – Quarterly These meetings provide regional coordination, site selection, training, outreach materials development and training, and organizational support for the regional Trash Bash events.	Christian Rines Wendy Forester	$0	$0
American Shore and Beach Preservation Association Texas Chapter Meeting Houston, Texas (Virtual) – Quarterly The meeting brings together academics, local government officials, state and federal agencies, and the public to discuss a broad range of topics, including coastal ecology, science, and resiliency.	Lisa Marshall Kristen McGovern	$0	$0

EVENT, LOCATION, AND PURPOSE	STAFF PERSON	EPA SECTION 320 FUNDS	TCEQ 100% STATE FUNDS
University of Houston-Clear Lake (UHCL)/ Environmental Institute of Houston (EIH) Science Advisory Board Houston, Texas (Virtual) – Biannually The meetings provide updates from EIH staff and faculty on their research and educational initiatives. The GBEP Program Manager is a non-voting member.	Lisa Marshall	$0	$0
H-GAC Bacteria Implementation Group (BIG) Houston, Texas (Virtual) – Biannually These meetings provide an update of implementation activities of the BIG Implementation Plan (I-Plan) and present topics that are related to water quality.	Lisa Marshall Christian Rines	$0	$0
Texas Watershed Coordinator Roundtable Meetings Different locations across the state (Virtual) – Biannually These meetings provide a forum for water professionals to establish and maintain dialogue between watershed coordinators, facilitate interactive solutions to common watershed issues faced throughout the state, and add to the fundamental knowledge conveyed at the short courses.	Lisa Marshall Christian Rines	$0	$72
Bayou Preservation Association (BPA) 2021 Symposium (Virtual) – October 2021 This conference provides information on the expanding importance of diversity in all its forms — physical, geomorphological, biological, socioeconomic, and conceptual.	Christian Rines Lisa Marshall	$0	$80
Spring EPA National Estuary Program (NEP) Workshop Tampa Bay, Florida – February-March 2022 This meeting provides NEP program managers a chance to exchange information and network.	Lisa Marshall	$1,382	$0
Lee College - WordPress Training (Virtual) – March 2022 This course provides expertise on using the website software to assist with updating and maintaining the Back the Bay and GBEP websites.	Vanessa Zemke	$0	$199
Texas Natural Resources Information System Geographic Information Systems (GIS) Training Forum Austin, Texas – March 2022 This forum provides an opportunity to learn about the latest advancements in the private and public sector. It also provided networking opportunities.	Kristen McGovern	$0	$1,345

EVENT, LOCATION, AND PURPOSE	STAFF PERSON	EPA SECTION 320 FUNDS	TCEQ 100% STATE FUNDS
UHCL EIH Surface Water Quality Monitoring Training Houston, Texas – March 2022 This training covers fundamental techniques for water quality and hydrological monitoring.	Vanessa Zemke	$0	$200
2022 Texas Plastic Pollution Symposium Port Aransas, Texas (Virtual) – March 2022 The symposium focuses on research, solutions, and public policy regarding plastic pollution around the state of Texas.	Lisa Marshall Christian Rines Vanessa Zemke	$0	$0
Gulf of Mexico Alliance (GOMA) Conference Baton Rouge, Louisiana – April 2022 This meeting provides networking opportunities with other organizations and governmental agencies working for the environment and economic health of the Gulf of Mexico.	Lisa Marshall	$0	$0
Gulf Coast Joint Venture Mid-Coast Meeting (Virtual) – May 2022 The meeting provides the NRU Subcommittee Coordinator the opportunity to discuss conservation priorities for bird habitat along the coast in 16 counties from Galveston to Corpus Christi, TX.	Lindsey Lippert	$0	$36
TCEQ Environmental Trade Fair and Conference Austin, Texas – May 2022 This trade fair and conference provides an opportunity to showcase GBEP's operations and accomplishments to municipalities, other organizations, and other staff within TCEQ.	Christian Rines	$0	$36
Leadership Academy Certificate Program – University of Texas at Austin (Virtual) – Spring 2022 This training helps the Program Manager become a better leader to achieve goals, build trust, and learn what motivates a team.	Lisa Marshall	$0	$3,213
EPA Region 6 Stormwater Conference (Virtual) – August 2022 This conference provides staff with national, regional, and state updates on water regulations and policy, as well as information on stormwater controls, water management practices, and new technologies that address NPS pollution. It also provides networking opportunities.	Christian Rines	$0	$225
Total		**$1,382**	**$5,406**

*Travel is dependent on TCEQ management review and approval. Rates for fiscal year 2022 are subject to change.

SECTION 2.2: GOALS AND ACCOMPLISHMENTS SINCE FISCAL YEAR 2022 WORK PLAN SUBMISSION

GBEP partners made notable achievements in improving water quality, restoring wetlands, protecting unique habitats, and educating the public in fiscal year 2022. These achievements are highlighted in the following sections.

HABITAT AND LANDSCAPE-LEVEL CONSERVATION: CREATE, RESTORE, AND PROTECT IMPORTANT COASTAL HABITATS

The Texas coast features a wealth of coastal habitats that support a tremendous abundance and diversity of fish and wildlife. Although the habitat conservation efforts of GBEP and its partners are bay wide, distinctive consideration has been given to the West Bay watershed. Preserving wetlands and natural areas is critical to maintaining water quality and protecting valuable fish and wildlife habitat in this region.

Since 2000, GBEP and its partners created, protected, and enhanced 35,232.99 acres of important coastal habitats, leveraging $169,837,830 in local, industry, state, and federal contributions, a leveraging rate of $14.62 to every dollar received from the EPA. During fiscal year 2021, GBEP protected and enhanced 1,340 acres of wetlands and coastal habitats, and leveraged $5,125,117.79 in local, industry, state, and federal contributions.

As of February 2022, an additional 4,714 acres of coastal habitat have been conserved via land acquisition. Through acquisition and restoration initiatives currently in progress, GBEP and partners are positioned to conserve and/or enhance an additional 400 acres of coastal habitat by August 2022.

Coastal Heritage Preserve (CHP), Sixth Addition

Figure 2. CHP at Sunset (photo credit: The Artist Boat).

The *CHP, Sixth Addition* through an acquisition at Middle Tract Project is located within the Gulf Coast Prairie and Marshes ecoregion on Galveston Island, Texas. Once covering most of the Texas coastal plain, 6.5 million acres, the coastal prairie is now a critically imperiled habitat and has been reduced to less than one percent of its original extent (USFWS 2000). Remaining prairie remnants are usually found in small fragments. Threats to the habitat include industry, agriculture, urban land use, and fragmentation. Other threats include loss of natural processes such as fire and periodic grazing which has led to the degradation of prairie leaving it more susceptible to invasion from exotic plant species such as, the Chinese tallow tree (*Triadica sebifera*) and Brazilian peppertree (*Schinus terebinthifolius*).

Coastal wetland loss in Texas and in the Galveston Bay system is significant and is a continuing concern because of the essential roles that wetlands perform. Wetland loss in coastal Texas has been rated by the EPA as severe (U.S. EPA, 1999). Wetland loss in the Galveston Bay system is greater than in many other areas of the state. Based on USFWS National Wetlands Inventory information, aerial photography and wetland status and

trends information, much of the wetland loss (and most of the seagrass loss) occurred in West Galveston Bay. This documented loss includes wetland types within the acquired tract.

The objective of the project was to purchase, in fee simple, and conserve in perpetuity approximately 45 acres of coastal habitats. Now completed, the 46-acre purchased tract was added to and is being managed as part of the 811-acre CHP. The acquired tract directly benefits and protects approximately three (2.6) acres temporarily flooded palustrine emergent persistent marsh habitat, 16 acres of seasonally flooded palustrine emergent persistent marsh habitat (of which 1.2 acres is excavated), one (0.5) acre of permanently flooded palustrine unconsolidated bottom excavated habitat, and 25 (24.7) acres of upland coastal prairie. The acquisition was completed on December 16, 2021.

This project conserves breeding, nesting, foraging, roosting, and wintering habitats that benefit numerous coastal-dependent and migratory bird species including the mottled duck (*Anas fulvigula*) and sandhill crane (*Grus canadensis*). The project also protects coastal habitats that serve as breeding, nursery, juvenile, and foraging habitat to marsh resident fishery species.

NRU Goals

The NRU subcommittee has also identified several focus priorities for project selection. These priorities include preserving wetlands and important coastal habitat, which is being addressed through the *Conservation Assistance Program;* preserving prairie habitat within Sylvan Rodriguez Park, which is the focus of *Sylvan Rodriguez Habitat Restoration Project (Phase III);* restoring several acres of prairie and riparian habitat within Blackhawk Park, which is the topic of *Blackhawk Park Habitat Restoration Project;* and providing data on sea turtles in Galveston Bay to properly manage these vital ecosystem participants, which is being collected through *The Impact of Cold-Stunning Events as Physical Stressors on Sea Turtle Movement and Behavior in Galveston Bay*.

IMPROVING AND PROTECTING WATER QUALITY: SUPPORTING CORE CLEAN WATER ACT PROGRAMS

In support of EPA's core Clean Water Act goals, GBEP has worked to build capacity of local stakeholders through watershed protection planning and implementation of water quality improvement projects. Through this effort in coordination with other water programs of TCEQ and local stakeholders, most of the impaired waters in the five-county region surrounding Galveston Bay have some level of watershed protection or improvement underway.

WPPs

Highland Bayou WPP

Highland and Marchand bayous experienced periods of low dissolved oxygen (DO) and elevated bacteria levels, which can impact aquatic life and can be harmful to human health, respectively. All the state's assessments (Texas 303(d) List) since 2002 have listed multiple assessment units (AUs) within Highland Bayou (segment 2424A) and Marchand Bayou (segment 2424C) as impaired for these constituents of concern. Texas AgriLife Extension Service (Texas AgriLife) coordinated the creation of a characterization report and a stakeholder-driven draft WPP for Highland Bayou. However, the draft WPP only addressed the bacteria impairment. Guidance from the EPA in 2018 indicated that the DO impairment and flow needed to be included for a WPP to meet all requirements for approval as a watershed-based plan. DO impairments and flow have now been addressed as well as three new AUs added to the WPP – Highland Bayou Diversion Canal (segment 2424G_01), Moses Bayou (segment 2431A_01), and Unnamed Tributary of Moses Lake (segment 2431C_01). This project resulted in the completion of the final WPP revisions which include finalizing load reductions, obtaining stakeholder approval and submitting the WPP to EPA for consistency review. The final version of the Highland Bayou WPP was accepted by the EPA on May 12, 2021.

Coordinating Implementation of a WPP for Double Bayou

The *Coordinating Implementation of a WPP for Double* Bayou project serves to fund water quality data analysis and maintain stakeholder efforts in the watershed, to support the implementation of the Double Bayou WPP. This project monitors current water quality of DO and bacteria in the bayous and communicate water quality conditions to stakeholders to support adaptive management and expand public knowledge and participation in the Double Bayou watershed. The Double Bayou WPP was approved in July 2016 in response to the West Fork being listed (Texas 303(d) List) for elevated bacteria levels and low DO and the East Fork being identified as a concern for near-nonattainment of water quality standards for elevated bacteria levels and as a water quality concern for low DO. The plan was developed through a stakeholder-driven process that provided a foundation to restore and maintain water quality in the Double Bayou Watershed. Since development, the plan has served as a living document to include new data and be modified as conditions in the watershed change over time. Stakeholder involvement has evolved from in-person meetings to virtual workshops, digital

stakeholder resources, and maintenance of the Double Bayou Watershed Partnership website and stakeholder list. Although the GBEP funded portion of the project ended in May 2021, water quality monitoring in coordination with the U.S. Geological Survey (USGS) and maintenance of the Partnership website continues.

Water Quality Improvement Projects

In addition, various WSQ projects are providing new insights into improving water quality, including reducing bacteria concentrations in the BIG project area and quantifying the distribution and concentration of microplastics in Galveston Bay.

Targeted Bacteria Monitoring

The *Targeted Bacteria Monitoring* project with H-GAC aims to reduce bacteria concentrations in impaired streams in the BIG project area. The objectives of the project are to 1) investigate bacteria sources in the most bacteria-impaired waterways in the BIG project area, and 2) work with local jurisdictions to reduce or eliminate those sources. This project follows a similar approach to the previous GBEP fiscal year 2015 Top Five/Least Five project completed in May of 2017 but has only focused on the most impaired AUs from the Top 10 "Most Wanted" Streams in the BIG project area. In the initial phase of the project the team worked to identify significant bacteria sources in four bacteria impaired AUs in the BIG project area and have since reported those findings to local jurisdictions. This resulted in corrective actions, such as the identification of collection system leaks and overflows, infrastructure repairs, increased wastewater treatment facility sampling, and resident education. Outreach for the *Targeted Bacteria Monitoring* project will better convey the results to local jurisdictions and the public to help promote the successes and importance of bacteria reduction efforts.

Occurrence of Microplastics in Tributaries to Galveston Bay

Litter and trash, such as plastics, is an issue of concern in Galveston Bay and its tributaries and has been identified by the WSQ and the PPE subcommittees of the GBC as a priority topic for research in recent years. It is the primary focus of the *Occurrence of Microplastics in Tributaries to Galveston Bay* project, particularly microplastics, which are plastic particles less than 5 mm in diameter, that are of increasing concern. The long-term effects of microplastics in the environment are currently not well known but concerns over potential effects have resulted in an increasing interest in understanding the extent and magnitude of their presence and their potential for bioaccumulation and disruption to ecosystem function and services. To date, no studies that assess the occurrence and abundance of microplastics in tributaries of Galveston Bay have been published. Collecting microplastic samples in this region can provide information about the spatial distribution and concentrations of microplastics in the Galveston Bay watershed. Results from this project will provide preliminary information on the occurrence of microplastics in the Galveston Bay watershed and will include quantification and categorization of microplastic particles and provide the foundation for future study and abatement.

Baseline Assessment of Microplastics in Galveston Bay

The *Baseline Assessment of Microplastics in Galveston Bay* project is assessing microplastics in the open waters of Galveston Bay to better understand their occurrence, spatial distribution, and abundance. Microplastics samples are being collected at the water's surface with a microplastics net and sent to a USGS laboratory for quantification and categorization. Microplastics will be categorized into one of the following classes: (1) fibers, (2) fragments, (3) films, (4) foams, and (5) beads. The data collected for this project will supplement data collected in tributaries to Galveston Bay as part of the previous (fiscal years 2020-2022) project and will result in a preliminary assessment that will also serve as the foundation for future study and abatement.

WSQ Goals

The WSQ subcommittee has also identified several focus priorities along with WPPs and microplastics. These priorities include conducting a needs assessment for small, non-municipal separate storm sewer systems in coastal communities, which is the focus of *Outreach Implementation for Galveston Bay Water Quality Projects*; developing regional best management GI practice list for local municipalities and decision makers, which is being addressed through the *Supporting the Use of Green Infrastructure (GI) in the Lower Galveston Bay Watershed*; creating two or more bioretention features in Townwood Park to slow stormwater runoff and support infiltration and water retention, which is the topic of *Townwood Park Green Stormwater Infrastructure;* and developing a Water Management Plan to provide guidance and establish strategies for addressing impacts to water quality and quantity throughout the City of Houston park system, which is being targeted in the *Houston Parks and Recreation Department Water Management Plan*.

CONTINUE BUILDING REGIONAL SUPPORT FOR PPE

Figure 3. GBEP staff member teaching children about the Galveston Bay watershed at Trash Bash 2019 (photo credit: Kristen McGovern).

PPE Accomplishments

GBEP continued engaging communities with outreach and education through GBEP funded projects and partnering with stakeholders on various initiatives. Due to the COVID-19 pandemic, face-to-face community engagement was moved to virtual and online outreach and education.

Examples of these activities include:

- Continued to participate in the Fishing Line Recycling campaign with the Fishing Line Recycling Work Group, a work group of the P3P, on a monofilament fishing line abatement project for the Texas City Dike and Seawolf Park in Galveston. Due to COVID-19, partners were not able to do one-on-one engagement with anglers. However, fishing line cleanups continued, and partners worked to create messaging to place on display boards to demonstrate how to recycle fishing line and why it's important to the health of Galveston Bay and wildlife.
- Continued to share coordination with partner organizations on marine debris for a sixth Trash Summit workshop held in May 2022. This was a continuation of efforts to coordinate regional planning and implementation as well as fill in missing gaps for projects, research, and communication on local trash, marine debris, and plastic pollution issues. This is in coordination with EPA's Trash Free Waters initiative. The goal of the meeting was to update partners on regional efforts on litter and marine debris mitigation and to establish working groups for removal, research, and communication. More information on this effort can be found on the website www.donttrashagoodthing.org.
- Continued to work with PLP work groups held in January 2022.
- Helped coordinate and participate in the 2022 Trash Bash.
- Coordinated and hosted 19 quarterly meetings of the GBC and its subcommittees.

Trash Bash

Trash Bash 2022 was held in-person on March 26, 2022 to promote environmental stewardship to properly dispose of trash, chemicals, and pet waste. In 2022, the 28th annual Trash Bash event had 2,589 volunteers from all over the Houston-Galveston area collect approximately 74.98 tons of trash—including 336 tires—and recycled 2.31 tons of trash. Trash Bash has also received 30 awards in its lifetime, including nine in the last five years.

PPE Goals

The PPE subcommittee has identified several focus priorities to guide the project selection process. These

priorities include working with vulnerable populations in coastal communities struggling with failing or insufficient wastewater treatment, which is being addressed through the *Water Quality Outreach Implementation for Vulnerable Rural Populations*; engaging with the local Southeast Asian community to ensure a healthy bay for generations to come, which is being targeted through the *Galveston Bay Report Card Vietnamese Outreach*; providing science, technology, engineering, and mathematics (STEM) activities on the Deer Park prairie and at EIH in Texas Region 4 communities, which is the focus of *Mobilizing the Environmental Education Community through Prairie Education in the Galveston Bay*; providing more effective stewardship and volunteer activities for underrepresented communities across the Houston region to Galveston Bay, which is the topic of *Engaging Diverse Communities in Conservation*; engaging with local underserved schools and communities in citizen science research concerning colonial waterbird foraging habitats within the school's backyard, which is being addressed through the *Audubon Texas Estuarine Restoration Network (TERN) Citizen Science in Schools: Students as Field Researchers*; creating a snapshot of the microplastic issue for the Gulf of Mexico while building public awareness among people of all ages, which is the focus of *Microplastics in the Galveston Bay Watershed: The Big Impacts of Tiny Pollution*; and assessing public perceptions and knowledge of Galveston Bay, as well as improving outreach about the Bay and the importance of conservation, which is being targeted through the *Public Perception Assessment and Community-Based Social Marketing Campaigns to Enhance Conservation and Education Outreach Programs*.

IMPROVING RESOURCE MANAGEMENT THROUGH TARGETED RESEARCH THAT INCREASES ECOSYSTEM UNDERSTANDING

M&R Accomplishments

Since the submission of the fiscal year 2022 Work Plan, two M&R projects have reached completion and provided new insights into components of the Galveston Bay ecosystem:

The *Lead (Pb) Isotopes and Heavy Metal Concentrations in Galveston Bay Waters, Sediments, and Oysters* project provided a detailed assessment of heavy metal geochemistry and new insights into heavy metal sources, fluxes, and toxicity in Galveston Bay. Heavy metal concentrations were determined for Galveston Bay water, sediments, and oysters and Pb isotope compositions were determined for sediments and oysters. Oysters and sediment metal concentrations were higher in regions with increased riverine inflow. The concentrations of cadmium and zinc, and to a lesser extent, Pb, in oyster tissues are likely toxic to humans based on federal and state screening values. Dissolved heavy metal loads in water were higher in low salinity regions, with the exception of cadmium, which tended to be higher in high salinity regions. Pb isotope tracing reinforces the presence of gasoline and industrial pre-derived Pb in Galveston Bay.

The *Characterizing Polychlorinated Biphenyls (PCBs) and Dioxins in the Houston Ship Channel and Galveston Bay Post Hurricane Harvey* project compared sediment PCB and dioxin levels in the Houston Ship Channel and Galveston Bay post-Hurricane Harvey to historical data (2003-2017) and conducted source apportionment analyses. Many stations exhibited lower sediment dioxin concentrations in 2021 compared to 2011-2012. Some stations that exhibited increases in sediment dioxin from 2017-2019 showed decreases from 2019-2021, while others had increases in sediment dioxin from 2019-2021. The majority of stations indicated overall declines in sediment PCBs in 2021 relative to 2011-2012 and compared to 2019. Source apportionment analyses indicated a weak correspondence between observed sediment dioxin congener patterns and those of the San Jacinto River Waste Pits, with two notable exceptions in 2005 and 2017 (after Hurricane Harvey), suggesting implications associated with mobilization of pollutants from the waste pits following severe storms or hurricanes.

M&R Goals

The M&R subcommittee has identified several focus priorities to guide the project selection process. These priorities include research on the effects of erosion control structures on shoreline marsh species populations, which is being targeted through the *Effects of Erosion Control Structure on Shoreline Marsh Species Populations* project; research on the resiliency and functional aspects of Living Shorelines restoration projects, which is being examined through the *Long-term Monitoring of Living Shorelines* project; research on zooplankton distribution and abundance in Galveston Bay, which is the focus of the *Monitoring Ecosystem Indicators for Science-Based Restoration and Enhancement* project; research on microplastics in Galveston Bay, which are being addressed by the *Galveston Bay Oyster Microplastics: Baselines and Impacts* and *The Effect of Microplastics on the Base of Marine Food Webs* projects; and research on contaminants in Galveston Bay, which are being investigated through *The Distribution, Fate, and Transport of Emerging Contaminants in Galveston Bay* and *The Fate of Emerging Per- and Polyfluorinated Alkyl Substances (PFAS) Pollutants in Shellfish and Fish of Galveston Bay* projects.

SECTION 2.3: STRATEGIC ACTION PLAN GOALS TO FOCUS ON IN FISCAL YEAR 2023

- Conserve, restore, and enhance important coastal habitats.
- Reduce NPS and PS pollutant loads.
- Implementation of watershed-based plans to address bacteria impaired contact recreation waters.
- Ensure adequate levels of freshwater inflows necessary to maintain the balance of salinity, nutrients, and sediments required to support a productive estuary.
- Create a sense of personal ownership and shared responsibility among all cultural components of the community, including the public, industry, and government.
- Ensure that stakeholders receive the knowledge necessary to act on GBEP's priorities in ways that benefit Galveston Bay and the entire community.
- Increase the number of partners actively involved in GBEP initiatives.
- Increase understanding of the Galveston Bay ecosystem.
- Make information available needed by the public, GBC members, and GBEP subcommittee members to support the implementation of the *GBP, 2nd Edition*.

FISCAL YEAR 2023 EXPECTED OUTCOMES

- Conserve, restore, and enhance important coastal habitats.
- Improve knowledge of the contributing sources of elevated bacteria and lowered DO levels in the lower Galveston Bay watershed.
- Increase coordination of marine debris and plastic pollution reduction efforts throughout the region.
- Increase the public's awareness of their connection to and effect on the Galveston Bay ecosystem.
- Increase coordination of environmental education efforts in the region.
- Engage students and teachers in citizen science research and conservation work in the Galveston Bay watershed.
- Improve knowledge of the types, quantities, and spatial distribution of microplastics in Galveston Bay, its tributaries, and oysters relative to surface waters.
- Improve knowledge of microplastic accumulation in Galveston Bay fishes since 1952 and their effect on swimming performance and physiology.
- Improve knowledge of spatial and temporal variation, and fate of PFAS and pharmaceutical and personal care products (PPCPs) concentrations in Galveston Bay and the Houston Ship Channel, and of PFAS fate and health effects in biota.
- Improve knowledge of the effects of erosion control structures on shoreline marsh species populations and how resiliency and functional aspects of Living Shorelines restoration projects differ in comparison to unrestored marsh and traditionally armored sites.
- Improve knowledge of spatial and temporal variations in the abundance and distribution of zooplankton in Galveston Bay.
- Improve the knowledge of local and regional GI best management practices (BMPs) through dissemination of referenceable prioritized BMP list and demonstration sites in Houston parks and rights-of-way.
- Improve knowledge, engagement, stewardship, and volunteer activities of underserved and underrepresented communities that need environmental education opportunities.
- Improve implementation of management measures and outreach requirements in watershed-based plans.

FISCAL YEAR 2023 EXPECTED OUTPUTS

- Conserve and protect 900 acres of habitat.
- Restore and enhance 100 acres of habitat.
- Build upon three years of outreach on reducing NPS pollution by providing implementation resources for existing watershed-based plans.
- Complete two bird and wildlife habitat restoration projects that incorporate educational workshops, interpretive signage, and volunteer opportunities.
- Complete an action plan to determine adaptation and mitigation options for each of the risks developed as part of the Estuary Resilience Assessment Report.

- Continue to participate in the coordination of Trash Bash and implementing Back the Bay.
- Continue monitoring freshwater wetland restoration.
- Continue maintaining GBEP and Back the Bay websites.
- Continue the assessment of the public's attitudes and perceptions of the Galveston Bay watershed and use the information gathered to create community-specific targeted education and outreach campaigns.
- Continue construction of the Regional Monitoring Database (RMD), containing datasets related to Galveston Bay conservation and management.
- Continue a targeted bacteria monitoring project to investigate sources of bacteria in impaired waterbodies and work with local jurisdictions to reduce or eliminate those sources.
- Continue an assessment of types, quantities, and historical accumulation of microplastics in Galveston Bay and its tributaries and in Galveston Bay fishes.
- Continue monitoring of PFAS and PPCPs concentrations in Galveston Bay and the Houston Ship Channel, and assessment of the fate and health effects of PFAS in Galveston Bay biota.
- Continue monitoring microplastic types and abundances in Galveston Bay oysters, fish, and surface water.
- Continue the assessment of the effects of erosion control structures on shoreline marsh species populations and initiate an assessment of the resiliency and functional aspects of Living Shorelines restoration projects in comparison to unrestored and traditionally armored sites.
- Continue a project to consolidate local and regional GI BMPs into a referenceable list utilized by stakeholders and initiate a project to create stormwater infrastructure demonstration features in Houston parks and rights-of-way.
- Initiate a project to develop a Water Management Plan to address impacts to water quality and quantity in City of Houston parks.
- Initiate an assessment mapping project to identify schools in need of environmental education.
- Initiate a project to host partner workshops and provide environmental education opportunities focused on native prairies.
- Initiate an assessment of spatial and temporal variations in the abundance and distribution of zooplankton, including eastern oyster larvae, in Galveston Bay.
- Initiate resources to address engagement barriers with underserved populations in coastal communities.
- Initiate a partnership between diverse communities for conservation.

FISCAL YEAR 2022–2026 EPA STRATEGIC PLAN MEASURES IMPLEMENTED

The projects proposed for fiscal year 2023 implement the objective of one goal identified in the Fiscal Year 2022–2026 EPA Strategic Plan:

Goal 5: Ensure Clean and Safe Water for All Communities.

- Objective 5.2: Protect and Restore Waterbodies and Watersheds.

As Objective 5.2 is the main goal of all NEPs, all of GBEP's projects outlined in this work plan focus on maintaining, restoring, and/or improving water quality through a variety of methods including, but not limited to, land conservation, water quality implementation outreach, GI projects, and microplastics and emerging contaminants research.

TCEQ GOAL, OBJECTIVE, AND STRATEGY

TCEQ Goal 1: Assessment, Planning, and Permitting

To protect public health and the environment by accurately assessing environmental conditions, by preventing or minimizing the level of contaminants released to the environment through regulation and permitting of facilities, individuals, or activities with potential to contribute to pollution levels.

- Objective 1.1: Reduce Toxic Releases

  Decrease the amount of toxic chemicals released into the environment via air, water, and waste pollutants in Texas by at least two percent as comparing the current Toxic Release Inventory (TRI) values to the previous reported TRI reporting year values and reduce air, water, and waste pollutants through assessing the environment.

- Outcome Measure 1.1 oc 10: Number of acres of habitat created, restored, and protected (through implementation of Estuary Action Plans).
- Strategy 1.1.2: Water Resource Assessment and Planning

  Develop plans to ensure an adequate, affordable supply of clean water by monitoring and assessing water quality and availability.

  Output Measures 1.1.2 op 1: Number of surface water assessments.

FISCAL YEAR 2023 FEDERAL AND STATE FUNDING

This request is for funding in the amount of $750,000 (federal) and $750,000 (state) for a total equaling $1,500,000. The match ratio for this grant is 50/50. Full-time equivalent (FTE) for the grant is seven. Tables 5 and 6 provide funding and budget details.

Table 4. Fiscal Year 2023 Funding and FTE Summary

Program Element	Division	Federal	State Match	Total	FTEs
GBEP Program Implementation	Water Quality Planning	$750,000	$750,000	$1,500,000	7
	Total	**$750,000**	**$750,000**	**$1,500,000**	**7**

Table 5. Fiscal Year 2023 Budget Detail

Budget Detail- see also FY 2023 Federal Projects	Amount ($)
Salaries (includes Fringe and Indirect)	$631,822[1]
Travel	$7,450
Capital	$0
Supplies	$444
Contracts	$5,868
Other	$854,416[2]
Total	**$1,500,000**

[1] Used rounded numbers to calculate Salaries, Fringe, and Indirect ($371,376 for Salaries from $371,375.64, $136,778 for Fringe from $136,777.65, and $123,668 for Indirect from $123,668.09).
[2] Rounded up from $854,415.63.

PROJECT SCHEDULE

The execution of the tasks associated with this work plan will occur over a 36-month period, which is anticipated to begin September 1, 2022, and end August 31, 2025. The exact start date of the work plan and all due dates for deliverables are contingent upon the actual date the grant funds are awarded and contracts are executed.

The projects outlined in this work plan were developed by the NRU, WSQ, PPE, and M&R subcommittees, balanced by the Budget and Priorities subcommittee, and submitted to the GBC for approval in November 2021. The GBC approved the projects listed in this work plan at the November 3, 2021, quarterly meeting.

The project scopes of work will be submitted to the TCEQ Quality Assurance Officer to determine which projects in the work plan will require a QAPP. Under the authority granted by EPA to TCEQ to approve QAPPs for GBEP, GBEP staff and their project partners will develop QAPPs for projects determined by TCEQ and EPA to require QAPPs. QAPPs will be developed in accordance with EPA QAPP requirements, EPA document QA/R-5.

SECTION 3: FISCAL YEAR 2023 PROJECTS

SECTION 3.1: FISCAL YEAR 2023 FEDERAL PROJECTS - SUMMARY

Table 6. Fiscal Year 2023 Federal Projects

PROJECT NAME	FY	FEDERAL	STATE MATCH	TOTAL 2023 GBEP BUDGET	STATUS
Program Administration (Includes supplies, travel, salary, fringe and indirect)	23	$319,933.19	$319,933.19	$639,866.38	Annual
1. GBEP Website Hosting and Maintenance	23	$2,934.00	$2,934.00	$5,868.00	Annual
2. Estuary Resilience Assessment	23	$17,060.75	$17,060.76	$34,121.51	Ongoing
3. Regional Monitoring Database	23	$17,965.50	$17,965.50	$35,931.00	Ongoing
Administration Total		$357,893.44	$357,893.45	$715,786.89	
4. Conservation Assistance Program	23	$50,000.00	$50,000.00	$100,000.00	Ongoing
5. Blackhawk Park Habitat Restoration Project	23	$25,000.00	$25,000.00	$50,000.00	New
6. The Impact of Cold-Stunning Events as Physical Stressors on Sea Turtle Movement and Behavior in Galveston Bay	23	$48,226.50	$48,226.50	$96,453.00	New
NRU Total		$123,226.50	$123,226.50	$246,453.00	
7. Targeted Bacteria Monitoring	23	$20,000.00	$20,000.00	$40,000.00	Ongoing
8. Houston Parks and Recreation Department Water Management Plan	23	$25,000.00	$25,000.00	$50,000.00	New
WSQ Total		$45,000.00	$45,000.00	$90,00.00	
9. Water Quality Outreach Implementation for Vulnerable Rural Populations	23	$20,000.00	$20,000.00	$40,000.00	New
10. Galveston Bay Report Card Vietnamese Outreach	23	$32,500.00	$32,500.00	$65,000.00	New
11. Engaging Diverse Communities in Conservation	23	$29,070.00	$29,070.00	$58,140.00	New
PPE Total		$81,570.00	$81,570.00	$163,140.00	
12. Long-term Monitoring of Living Shorelines	23	$63,895.50	$63,895.50	$127,791.00	New
13. Effects of Erosion Control Structure on Shoreline Marsh Species Populations	23	$15,570.00	$15,570.00	$31,140.00	Ongoing

14. The Fate of Emerging PFAS Pollutants in Shellfish and Fish of Galveston Bay	23	$18,546.50	$18,546.50	$37,093.00	Ongoing
15. Monitoring Ecosystem Indicators for Science-Based Restoration and Enhancement	23	$44,298.06	$44,298.06	$88,596.12	New
M&R Total		$142,310.06	$142,310.06	$284,620.12	
FUNDING REQUEST GRANT TOTAL		$750,000.00	$750,000.01	$1,500,000.01*	

*This is different than the total amount in Table 5 because of rounding differences.

SECTION 3.2: FISCAL YEAR 2023 FEDERAL PROJECT – DETAIL

3.2A - ADMINISTRATIVE PROJECTS FOR FISCAL YEAR 2023

1. GBEP Website Hosting and Maintenance

CCMP Actions Implemented: SPO-1, SPO-2, SPO-3

Grantee/Contractor: Wilkins Group

FY 2023 Budget: $5,868 ($2,934 Federal, $2,934 State)

Total Project Budget: $5,868 ($5,868 from Pre-USAS #332023: FY 2023 $5,868)

Milestones: N/A

Project period: September 2022–August 2023

Status: Annual project.

Objective(s): Support or maintain two websites for public participation, education, and outreach.

Project Description: This project provides support for two websites maintained by GBEP:

- www.gbep.texas.gov: Tasks for the GBEP website include hosting, maintenance, and updates as needed throughout the year.
- www.backthebay.org: Tasks for the Back the Bay website include hosting, maintenance, updates as needed throughout the year, and domain name registration.

2. Estuary Resilience Assessment

CCMP Actions Implemented: Regional Monitoring Plan

Grantee/Contractor: Houston Advanced Research Center/GeoTechnology Research Institute (HARC/GTRI)

FY 2023 Budget: $34,121.51 ($17,060.75 Federal, $17,060.76 State)

Total Project Budget: $136,108 ($30,000 from Award #CE-00655006: FY 2019 $30,000; $71,986 from Award #CE-00655007: FY 2020 $20,000, FY2022 $51,986; $34,122[3] from Pre-USAS #332023: FY2023 $34,122[3])

Milestones: Final Estuary Resilience Assessment submitted February 2022. Estuary Resiliency Action Plan anticipated June 2023.

Project period: September 2018–June 2023

Status: Ongoing project. The Final Estuary Resilience Assessment was submitted and approved in March 2022. The first stakeholder work group meeting was held in March 2022 to complete the risk evaluation for the Estuary Resilience Action Plan. The second stakeholder work group is scheduled in May 2022 to refine transfer and mitigation choices and brainstorm adaptation and mitigation options for each of the risks.

Objective(s): This project will assess the goals, objectives, and actions in the *GBP, 2nd Edition* against a series of coastal resilience criteria, meeting the requirements identified in the EPA NEP Funding Guidance.

[3] Rounded up from $34,121.51.

Project Description: The primary output of the project will be a companion document to the *GBP, 2nd Edition* and will provide resiliency adaptation considerations for implementers of the *GBP, 2nd Edition*. The document will be developed in coordination with subject matter experts and/or members of GBC and its subcommittees through workshops or via existing meeting structures. The project will follow the requirements identified in the EPA NEP Funding Guidance. The secondary output will be the Estuary Resiliency Action Plan.

Partners and Their Role(s): While the lead contractor is HARC/GTRI, the Estuary Resilience Assessment and Estuary Resilience Action Plan will draw on the expertise of GBC members and subcommittee members including a diverse group of research institutions and federal, state, local, and non-governmental organizations that collect data in the watershed.

Outputs/Deliverables:

- Five-seven stakeholder meetings or workshops;
- Quarterly progress reports until contract expiration;
- Final Estuary Resilience Assessment Report; and
- Final Estuary Resiliency Action Plan.

Long-term Outcomes: Galveston Bay estuary is managed by all GBEP partners based on best-known data and implementation efforts to consider resiliency during project selection.

3. Regional Monitoring Database

CCMP Actions Implemented: ACS-1, ACS-2

Grantee/Contractor: HARC/GTRI

FY 2023 Budget: $35,931 ($17,965.50 Federal, $17,965.50 State)

Total Project Budget: $350,228 ($234,019 from Award #CE-00655007: FY 2021 $130,001, FY 2022 $104,018; $35,931 from Pre-USAS #332023: FY 2023 $35,931)

Milestones: Coordination/orientation and QAPP meeting conducted in January 2021. Coordination meetings were held in July, September, and November 2021, and February 2022.

Project period: January 2021–August 2024 (total project period to August 2025)

Status: Ongoing project. The draft version of Phase One of the RMD was completed in March 2022; the contractor is on schedule to release this phase in July 2022.

Objective(s): This project will establish the Galveston Bay RMD, an interactive, web-based data portal through which users can view and download Galveston Bay watershed environmental data.

Project Description: This project will develop, launch, and maintain the RMD, an interactive web-based portal providing quality-assured data related to the conservation and management of Galveston Bay. The RMD will allow users to view, explore, and download data. The Performing Party will gather environmental datasets related to the lower Galveston Bay watershed in cooperation with federal, state, and local governments; universities; and research organizations in support of the Regional Monitoring Plan detailed in *GBP, 2nd Edition*. Datasets included in the RMD will be informed by the ecosystem indicators identified in *GBP, 2nd Edition*. The RMD will: assist in evaluating whether the goals and objectives of the *GBP, 2nd Edition* are being met; inform future State of the Bay Reports by GBEP; and provide the public and stakeholders access to data related to management and research within the lower Galveston Bay watershed.

Partners and Their Role(s): HARC/GTRI will perform the tasks necessary to develop and launch the RMD. HARC/GTRI will consult with local stakeholders for input and feedback throughout the process.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- RMD to be released in three phases;
- Galveston Bay datasets and metadata; and
- Final Report.

Long-term Outcomes: Dissemination of data related to the conservation and management of Galveston Bay.

3.2B - NRU PROJECTS FOR FISCAL YEAR 2023

4. Conservation Assistance Program

CCMP Actions Implemented: HC-1, HC-2, HC-3, SC-1, SC-2

Grantee/Contractor: GBF

FY 2023 Budget: $100,000 ($50,000 Federal, $50,000 State)

Total Project Budget: $600,000 ($200,000 from Award #CE-00655006: FY 2018 $100,000, FY 2019 $100,000; $300,000 from Award #CE-00655007: FY 2020 $100,000, FY 2021 $115,000, FY 2022 $85,000; $100,000 from Pre-USAS #332023: FY 2023 $100,000)

Milestones: Not applicable. Milestone dates for individual tasks are not applicable as project identification is a continuous task, and specific project support is applied for as needed.

Project period: September 2017–August 2023

Status: Ongoing project. GBF was selected as the project contractor and the contract was executed in July 2018. Conservation Assistance Program work group meetings were held November 2018, March 2019, June 2019, November 2019, May 2020, November 2020, May 2021, August 2021, February 2022, and May 2022. Several acquisition projects are being developed, and seven projects (Angleton Prairie, Dollar Bay, Chocolate Bay Preserve, Oyster Bayou, High Island Bargain Sale, Coastal Heritage Preserve, and Follet's Island) have been completed in the last calendar year. Several projects are projected to close in the next calendar year, including additional tracts for the Follet's Island Conservation Initiative and the Coastal Heritage Preserve.

Objective(s): The goal of this project is to place 2,500 acres of coastal habitat in the Galveston Bay area in permanent conservation.

Project Description: The overall goal of the Conservation Assistance Program is to support GBEP and its partners' efforts to preserve wetlands and other important coastal habitats to protect the long-term health and productivity of Galveston Bay. The Conservation Assistance Program will continue to accomplish these goals by:

- Identifying priority conservation properties with the help and consensus of conservation partners;
- Building funding strategies through grant identification, grant writing, and fundraising;
- Working with willing sellers to negotiate fee simple or conservation easement transactions;
- Carrying out legal, title, and other due diligence transaction support; and
- Finalizing the sale and transfer of title to a third-party organization or government entity.

Partners and Their Role(s): The Conservation Assistance Program work group is comprised of a diverse group of federal, state, local, and non-governmental organization resource managers.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration; and
- Annual Report due August 31 until contract expiration.

Long-term Outcomes: The permanent conservation of coastal habitat and preservation of important hydrologic and water quality functions in lower Galveston Bay.

5. Blackhawk Park Habitat Restoration Project

CCMP Actions Implemented: HC-2, HC-3, SC-1, SC-2

Grantee/Contractor: City of Houston Parks and Recreation Department (HPARD)

FY 2023 Budget: $50,000 ($25,000 Federal, $25,000 State)

Total Project Budget: $50,000 ($50,000 from Pre-USAS #332023: FY 2023 $50,000)

Milestones: Project Work Plan anticipated in November 2022.

Project period: September 2022–May 2025

Status: New project.

Objective(s): The goal of this project is to restore 30 acres of coastal prairie and riparian habitat within Blackhawk Park (Harris County, Texas).

Project Description: HPARD will restore and enhance habitat in the lower Galveston Bay watershed by performing invasive species removal to support resident and migratory wildlife. The project will utilize subcontractors, interns, and/or community volunteers to complete the work.

Historic aerial imagery dating back to 1944 shows Blackhawk Park and the surrounding areas contained coastal prairie pothole habitat, a critically endangered ecosystem. Residential development now surrounds the

park, and the historic prairie ecosystem has been converted to non-native forest dominated by Chinese Tallow (*Triadica sebifera*) and Privet species (*Ligustrum sp.*). The eastern edge of the park borders a drainage feature that flows downstream into Clear Creek.

The project will expand the footprint of an existing GBEP-funded habitat restoration at Blackhawk Park (10 acres). This will not only result in a larger piece of habitat that provides more significant wildlife habitat and ecosystem services, but also will reduce the amount of invasive species intrusion into the section of the park that is already restored.

Partners and Their Role(s): HPARD will provide project management and oversight of management activities at Blackhawk Park.

Outputs/Deliverables:

- Project Work Plan within 30 days of contract execution;
- Quarterly progress reports until contract expiration; and
- Final Report.

Long-term Outcomes: Provide benefits for native vegetation and wildlife by restoring and enhancing 30 acres of coastal prairie and riparian habitat that is degraded by invasive woody vegetation to increase the overall function as habitat for grassland-dependent species.

6. The Impact of Cold-Stunning Events as Physical Stressors on Sea Turtle Movement and Behavior in Galveston Bay

CCMP Actions Implemented: SC-2, RES-5

Grantee/Contractor: Texas A&M University at Galveston (TAMUG)

FY 2023 Budget: $96,453 ($48,226.50 Federal, $48,226.50 State)

Total Project Budget: $96,453 ($96,453 from Pre-USAS #332023: FY 2023 $96,453)

Milestones: Coordination/orientation and QAPP meeting anticipated in September 2022.

Project period: September 2022-May 2025

Status: New project.

Objective(s): The goal of the project is to characterize the physical stressors related to cold-stunning events that drive sea turtle movement and continue a newly established long-term mark and recapture program that provides data on population demographics and sea turtle health.

Project Description: The Houston-Galveston region experienced a historic winter storm that resulted in an exceptional "cold-stunning" event with a widespread kill of numerous marine species. In total, approximately 13,500 sea turtles in Texas were impacted by the sudden and extended drop in air and water temperatures from winter storm Uri. Generally, cold events are common physical and biological stressors in the Galveston Bay Estuary System (GBES) that occur almost every year. However, these events appear to be increasing in intensity, duration, and frequency, as demonstrated in February 2021 with winter storm Uri. To further explore how sea turtles respond to these annual stressors, TAMUG will deploy satellite tags that collect geolocation, and temperature and they will also deploy depth sensors onto sea turtles of varying life history stages in GBES. The goal is to characterize the physical and biological stressors related to cold-stun events that drive sea turtle movement.

Partners and Their Role(s): TAMUG will perform the tasks necessary to collect and analyze data for this project.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Sampling data;
- Data Collection and Lab Analyses;
- Data Analyses; and
- Final Report.

Long-term Outcomes: Insight into population dynamics and physical stressors on species populations and productivity.

3.2C - WSQ PROJECTS FOR FISCAL YEAR 2023

7. Targeted Bacteria Monitoring

CCMP Actions Implemented: NPS-1, NPS-2, NPS-3, PEA-1, PHA-3, PS-2, PS-3, RES-4, SPO-1, SPO-4

Grantee/Contractor: H-GAC

FY 2023 Budget: $40,000 ($20,000 Federal, $20,000 State)

Total Project Budget: $120,000 ($80,000 from Award #CE-00655007: FY 2020 $40,000, FY 2021 $40,000; $40,000 from Pre-USAS #332023: FY 2023 $40,000)

Milestones: The QAPP was executed in March 2020.

Project Period: September 2019-August 2024

Status: Ongoing project.

Objective(s): The goal of the Targeted Bacteria Monitoring project is to reduce bacteria concentrations in impaired streams in the BIG project area, toward meeting contact recreation standards. The objectives of the project are to 1) investigate bacteria sources in the most bacteria-impaired waterways in the BIG project area, and 2) work with local jurisdictions to reduce or eliminate those sources.

Project Description: This project will build on the work of the two previously funded phases of the Targeted Monitoring Project with the continued goal to significantly reduce bacteria levels within the Top 10 most impaired stream segments in the BIG I-Plan area. This phase of the project will accomplish this by: (1) continuing to work with local jurisdictions to reduce or eliminate identified bacteria sources; (2) conducting follow up monitoring on any corrective actions stemming from previous monitoring; and (3) working with local communities for focused outreach in areas with high occurrences of sanitary sewer overflows or where jurisdictions determined high bacteria levels originated from sources other than failing infrastructure.

Partners and Their Role(s): H-GAC will partner with the BPA on implementation of the project, with H-GAC in a primary technical advisory role and Student Conservation Association interns will conduct sampling.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Outreach and Education Summary;
- Targeted Monitoring Report; and
- Final Report.

Long-term Outcomes: Significantly reduce bacteria levels in impaired streams of the BIG project area and help move these streams back to attaining the applicable recreational water quality standards. Promote the importance of bacteria reduction efforts to other jurisdictions and the public.

8. Houston Parks and Recreation Department Water Management Plan

CCMP Actions Implemented: NPS-1, NPS-3

Grantee/Contractor: HPARD

FY 2023 Budget: $50,000 ($25,000 Federal, $25,000 State)

Total Project Budget: $50,000 ($50,000 from Pre-USAS #332023: FY 2023 $50,000)

Milestones: Coordination/orientation meeting anticipated in September 2022.

Project Period: September 2022–May 2025

Status: New project.

Objective(s): The goal of this project is to develop a Water Management Plan that will establish strategies for addressing impacts to water quality and quantity in City of Houston parks.

Project Description: HPARD owns and/or manages 380 parks throughout Houston with a footprint of over 25,000 acres. The parks fall within numerous watersheds and over 70 are immediately adjacent to a major bayou or tributary that flows into Galveston Bay. HPARD's Natural Resources Management Program is tasked with delivering solutions to water quality and quantity problems for the department in the form of nature-based and GI projects. To support increasing numbers of green stormwater infrastructure features throughout Houston's park system, HPARD has identified the need for a Water Management Plan that will provide guidance and establish strategies for addressing impacts to water quality and quantity throughout the park system and rights-of-way in Houston.

Partners and Their Role(s): HPARD will secure and oversee a subcontractor that will develop a Water

Management Plan for Houston parks and its rights-of-way.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Stakeholder meetings;
- Water Management Plan; and
- Final Report.

Long-term Outcomes: Provide a framework for nature-based infrastructure goals that will reduce sources of NPS pollution into Houston's waterways, reduce pollution and sediment loads via runoff, and create a drought contingency plan, including prescribed burns.

3.2D - PPE PROJECTS FOR FISCAL YEAR 2023

9. Water Quality Outreach Implementation for Vulnerable Rural Populations

CCMP Actions Implemented: SPO-2, SPO-3, SPO-4, PEA-1, PEA-2

Grantee/Contractor: H-GAC

FY 2023 Budget: $40,000 ($20,000 Federal, $20,000 State)

Total Project Budget: $40,000 ($40,000 from Pre-USAS #332023: FY 2023 $40,000)

Milestones: Coordination/orientation meeting anticipated in September 2022.

Project Period: September 2022-May 2025

Status: New project.

Objective(s): The goal of this project is to identify and work with some of the most vulnerable populations in the coastal communities struggling with failing or insufficient wastewater treatment. It is also to identify local partners and new engagement strategies to provide education and resources to those communities and individuals not reached by current project materials, and to work with local governments to assist them in finding community-wide solutions to these problems.

Project Description: The Coastal Communities water quality outreach project was designed to support implementation of management measures and outreach requirements in watershed-based plans. This proposed project aims to identify more underserved populations and test different engagement strategies to determine what barriers prevented engagement. Resources would then be adapted or developed to specifically address those barriers, whether they are language limitations, lack of reliable internet or transportation, etc. Engagement with these populations will provide information on all focus topics of the Coastal Communities project. However, residents will be targeted primarily based on low-income levels and high risk of On-Site Sewage Facilities (OSSF) in need of repair or replacement, which can have detrimental effects on resident and public health, and local waterways. Partnerships with local organizations and institutions will assist with identifying audiences and developing or testing engagement strategies. In this proposed project, H-GAC will expand the coastal communities support of watershed-based plan implementation.

Partners and Their Role(s): Project activities will supplement previous work conducted from the H-GAC watershed-based plan, Total Maximum Daily Load (TMDL), Clean Rivers Program, and Water Quality Management Plan funding and resources as appropriate. H-GAC has developed several public and private partnerships to provide resources and funding streams to support the goals of the Coastal Communities project, of which this is an extension.

Outputs/Deliverables:

- Quarterly progress reports due until contract expiration;
- List of vulnerable populations;
- Stakeholder meeting materials;
- Community Partners workshop materials;
- Outreach materials;
- OSSF workshops;
- Wastewater Grant Application Assistance; and
- Final Report.

Long-term Outcomes: Improve wastewater infrastructure in vulnerable populations and throughout the community.

10. Galveston Bay Report Card Vietnamese Outreach

CCMP Actions Implemented: SPO-2, SPO-3, PEA-1, PEA-2

Grantee/Contractor: HARC

FY 2022 Budget: $65,000 ($32,500 Federal, $32,500 State)

Total Project Budget: $65,000 ($65,000 from Pre-USAS #332023: FY 2023 $65,000)

Milestones: Coordination/orientation and QAPP meeting anticipated in September 2022.

Project Period: September 2022-March 2025

Status: New Project.

Objective(s): This project will use the Galveston Bay Report Card (GBRC) to engage underserved and underrepresented communities to ensure a healthy bay for generations to come by translating the GBRC into Vietnamese and engaging with the local Southeast Asian community. Community members will become aware of the proximity and importance of the bay and implement scientifically backed behavior changes, resulting in long-term improvements in the health of the bay and a larger number and greater diversity of environmental advocates.

Project Description: This project will strengthen and advance the GBRC - a community-driven, scientific analysis of the health of Galveston Bay. Twenty-two indicators across six categories (habitat, water quality, human health risk, pollution events and sources, wildlife, and coastal change) are graded to identify areas for improvement within the bay's ecosystem. The GBRC provides learning opportunities for the general public and scientific guidance on the direction of environmental work in the area. These outreach efforts connect approximately 5,700 people to the GBRC each year and the program serves as the model for watershed report cards. In this project, outreach and engagement activities will be targeted to the Vietnamese community surrounding Galveston Bay. According to the 2020 United States Census, 104,689 Vietnamese Americans lived in Harris County in 2019 and the Asian population is noted to be one of the fastest growing populations in the county. This project specifically aims to reach and engage this Vietnamese-speaking community surrounding Galveston Bay, known users of the Bay that are often overlooked in environmental engagement efforts, to create a more inclusive GBRC.

Partners and Their Role(s): HARC will conduct GBRC data analyses and GBF will lead public outreach and community engagement efforts.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Data Analysis and Grade Development;
- Community Engagement Plan; and
- Final Report.

Long-term Outcomes: Engage underserved communities to expand the GBRC audience and make future grades more inclusive of the community's needs.

11. Engaging Diverse Communities in Conservation

CCMP Actions Implemented: SPO-1, SPO-2, SPO-3, PEA-2

Grantee/Contractor: Harris County Department of Education (HCDE)

FY 2023 Budget: $58,140 ($29,070 Federal, $29,070 State)

Total Project Budget: $58,140 ($58,140 from Pre-USAS #332023: FY 2023 $58,140)

Milestones: Coordination/orientation meeting anticipated in September 2022.

Project Period: September 2022-August 2024

Status: New Project.

Objective(s): Increase participation in conservation stewardship and volunteering within the four collaborating partner organizations; and provide scholarships for Certified Interpretive Guide training to four black, indigenous, and other people of color (BIPOC) community members, to expand awareness opportunities.

Project Description: Bayou Land Conservancy, Armand Bayou Nature Center, HCDE, and Katy Prairie Conservancy, under the coordination of BPA, have formed a Cooperative Partnership to provide more effective stewardship and volunteer activities for underrepresented communities across the Houston region to

Galveston Bay. The partnership will create equitable opportunities for deeper and broader interorganizational collaboration with nonprofits and community groups led by BIPOC communities, as well as educational institutions and agencies that serve historically underrepresented communities. The partnership will provide for the extension of community members' roles from passive participant to active facilitator through an interpretive guide training program and recruitment strategy.

Partners and Their Role(s): HCDE will partner with BPA to coordinate the Cooperative Partnership.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Recruitment materials;
- Quarterly updates on partner activities; and
- Final Report.

Long-term Outcomes: Engage underserved communities to expand conservation education opportunities to the BIPOC population.

3.2E - M&R PROJECTS FOR FISCAL YEAR 2023

12. Long-Term Monitoring of Living Shorelines

CCMP Actions Implemented: PEA-2, RES-2, RES-3, RES-6

Grantee/Contractor: Lee College

FY 2022 Budget: $127,791 ($63,895.50 Federal, $63,895.50 State)

Total Project Budget: $127,791 ($127,791 from Pre-USAS #332023: FY 2023 $127,791)

Milestones: Coordination/orientation and QAPP meeting anticipated in September 2022.

Project Period: September 2022-November 2024

Status: New project.

Objective(s): Determine whether resiliency and functional aspects of Living Shorelines restoration projects differ in comparison to unrestored natural marsh reference sites and traditionally armored sites in Galveston Bay.

Project Description: This project will collect comprehensive data at Living Shorelines sites throughout the Galveston Bay system to assess the resiliency and functional aspects of small-scale restoration projects over time. Data will include biological community (e.g., plants, fish, benthic macroinvertebrates, sediment microorganisms), contaminants in sediment (e.g., heavy metals, organic pesticides, microplastics), and low altitude aerial imagery (to determine trends in shoreline erosion and elevation). Data will be compared to unrestored natural marsh reference sites and traditionally armored sites.

Partners and Their Role(s): Lee College will partner with UHCL and GBF to collect and analyze data from Living Shorelines and control sites.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Sampling data;
- Data Collection and Lab Analyses;
- Data Analyses; and
- Final Report.

Long-term Outcomes: Insight into effect of Living Shorelines restoration techniques on resiliency, biological communities, and contaminant loads.

13. Effects of Erosion Control Structures on Shoreline Marsh Species Populations

CCMP Actions Implemented: RES-3, RES-8, ACS-2

Grantee/Contractor: TAMUG

FY 2023 Budget: $31,140 ($15,570 Federal, $15,570 State)

Total Project Budget: $69,305 ($38,165 from Award #CE-00655007: FY 2022 $38,165; $31,140 from Pre-USAS #332023: FY2023 $31,140)

Milestones: Coordination/orientation and QAPP meeting conducted in February 2022. The QAPP was approved in February 2022.

Project Period: January 2022–October 2023

Status: Ongoing project, executed January 2022.

Objective(s): Determine if the presence or absence of erosion control structures (breakwaters) influence species populations in shoreline marsh areas.

Project Description: This project will examine whether the presence or absence of erosion control structures (breakwaters) influence species populations in shoreline marsh areas of Galveston Bay. This will be accomplished by surveying nekton and zooplankton in Galveston Bay shoreline marsh areas with and without breakwater or sill structures and examining productivity patterns.

Partners and Their Role(s): TAMUG will perform the tasks necessary to collect and analyze data for this project. This project leverages existing shoreline projects around Galveston Bay to study the effects of erosion control measures on species populations. The project also leverages existing research equipment, laboratory space, vessels and vessel maintenance, and high-resolution microscopes for species identification and zooplankton counts at TAMUG.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Biological sampling data;
- Biological Sampling and Field Surveys;
- Statistical Analysis; and
- Final Report.

Long-term Outcomes: Insight into the influence of erosion control structure presence in shoreline marsh areas on species populations and productivity.

14. The Fate of Emerging PFAS Pollutants in Shellfish and Fish of Galveston Bay

CCMP Actions Implemented: RES-2, RES-5

Grantee/Contractor: TAMUG

FY 2023 Budget: $37,093 ($18,546.50 Federal, $18,546.50 State)

Total Project Budget: $105,549 ($68,456 from Award #CE-00655007: FY 2022 $68,456; $37,093 from Pre-USAS #332023: FY 2023 $37,093)

Milestones: Coordination/orientation and QAPP meeting conducted in February 2022. The QAPP was approved in January 2022.

Project Period: January 2022-October 2023

Status: Ongoing project, executed January 2022.

Objective(s): Measure emerging PFAS pollutant body-burdens in shellfish and fish from Galveston Bay and assess biomarkers of health in the exposed shellfish and fish.

Project Description: This project aims to increase the current understanding of the fate of emerging pollutants in Galveston Bay biota. This project will generate data on the body-burdens of PFAS in fish and shellfish collected from Galveston Bay. Biomarkers of stress will also be measured in these organisms to determine the effect(s) of PFAS exposure on Galveston Bay fish and shellfish health.

Partners and Their Role(s): TAMUG will perform the tasks necessary to collect and analyze data for this project. This project leverages in-kind services from Texas Parks and Wildlife Department of collecting fish and shellfish samples, in-kind supplies from TAMUG including research equipment, laboratory space, and in-kind services from TAMUG co-principal investigators.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- PFAS body-burden data for Galveston Bay biota;
- Stress biomarker enzyme activity level data for Galveston Bay biota;
- PFAS Levels in Galveston Bay Biota;

- Stress Biomarker Enzyme Activity Levels in Galveston Bay Biota; and
- Final Report.

Long-term Outcomes: Insight into the fate of PFAS pollutants in Galveston Bay biota and associated health effects.

15. Monitoring Ecosystem Indicators for Science-Based Restoration and Enhancement

CCMP Actions Implemented: RES-3, ACS-1

Grantee/Contractor: TAMUG

FY 2023 Budget: $88,596.12 ($44,298.06 Federal, $44,298.06 State)

Total Project Budget: $130,663 ($88,596 from Pre-USAS #332023: FY 2023 $88,596)

Milestones: Coordination/orientation and QAPP meeting anticipated in September 2022.

Project Period: September 2022-March 2025

Status: New project.

Objective(s): Assess spatial and temporal variations in the abundance and distribution of zooplankton, including eastern oyster larvae, in Galveston Bay.

Project Description: Zooplankton are ecosystem health indicators of water quality and provide the principal conduits for energy transfer from phytoplankton to higher trophic levels. To date, only a few studies to examine the interactions between zooplankton and environmental factors and fisheries have been conducted. This project will conduct monthly sampling of zooplankton in Galveston Bay over two years to determine spatial and temporal variations in the abundance and distribution of eastern oyster larvae. The data generated will be used to estimate larval dispersal and recruitment success and will be used to validate a population model for Galveston Bay. The project data will fill an information gap needed for science-based ecosystem assessments of Galveston Bay.

Partners and Their Role(s): TAMUG will perform the tasks necessary to collect and analyze data for this project. This project leverages an existing time series of zooplankton data collected by TAMUG from Galveston Bay.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Sampling data;
- Zooplankton Sampling in Galveston Bay;
- Zooplankton Sample Processing and Analyses; and
- Final Report.

Long-term Outcomes: Insight into the abundance, distribution, and transport of zooplankton in Galveston Bay.

SECTION 3.3: FISCAL YEAR 2023 GRANT BUDGET SPREADSHEETS

3.3A – Fiscal Year 2023 Grant Budget by Category – Summary

Table 7. Fiscal Year 2023 Grant Budget Totals

FY 2023 Grant Budget Totals	Administration	NRU	WSQ	PPE	M&R	Total Costs
Project #	95994	95994	95994	95994	95994	95994
Salaries	$371,376[4]	$0	$0	$0	$0	$371,376[4]
Contracts	$5,868	$0	$0	$0	$0	$5,868
Travel	$7,450	$0	$0	$0	$0	$7,450
Other	$70,203[5]	$246,453	$90,000	$163,140	$284,620	$854,416
Supplies	$444	$0	$0	$0	$0	$444
Equipment	$0	$0	$0	$0	$0	$0
Construction	$0	$0	$0	$0	$0	$0
Sub-Total	**$455,341**	$246,453	$90,000	$163,140	$284,620	**$1,239,554**
Fringe 36.83%	$136,778[6]	$0	$0	$0	$0	$136,778[6]
Indirect 33.30%	$123,668	$0	$0	$0	$0	$123,668
GRANT TOTAL	**$715,787**	$246,453	$90,000	$163,140	$284,620	**$1,500,000**

[4] Rounded up from $371,375.64.
[5] Rounded up from $70,202.51.
[6] Rounded up from $136,777.65.

3.3B – Fiscal Year 2023 Grant Budget by Category - Detail

Table 8. Fiscal Year 2023 GBEP Budget Summary

FY 2023 GBEP Budget Summary by Grant Budget Category	Amount
Salaries	**$371,376**
Salaries for GBEP Staff Members	$371,376[7]
Contracts	**$5,868**
Website Hosting Costs	$5,868
Travel	**$7,450**
Travel for GBEP Program Manager and one staff member to attend the Fall NEP Tech Transfer Meeting and Restore America's Estuaries (RAE) Conference	$2,400
Travel for GBEP Program Manager to attend Spring EPA NEP Workshop	$3,115
Travel for GBEP Program Manager to attend GOMA conference	$0
To be allocated in a future Work Plan	$1,935
Other	**$854,416**
Estuary Resilience Assessment	$34,122[8]
Regional Monitoring Database	$35,931
Conservation Assistance Program	$100,000
Blackhawk Park Habitat Restoration Project	$50,000
The Impacts of Cold-Stunning Events as Physical Stressors on Sea Turtle Movement and Behavior in Galveston Bay	$96,453
Targeted Bacteria Monitoring Project (Phase III)	$40,000
Houston Parks and Recreation Department Water Management Plan	$50,000
Water Quality Outreach Implementation for Vulnerable Rural Populations	$40,000
Galveston Bay Report Card Vietnamese Outreach	$65,000
Engaging Diverse Communities in Conservation	$58,140
Long-term Monitoring of Living Shorelines for Restoring Shoreline Stability and Habitat Efficacy	$127,791
Effects of Erosion Control Structure on Shoreline Marsh Species Populations	$31,140
The Fate of Emerging PFAS Pollutants in Shellfish and Fish of Galveston Bay	$37,093
Monitoring Ecosystem Indicators for Science-Based Restoration and Enhancement of Pelagic Habitats of Galveston Bay	$88,596
Other Operating Expenses (website domain registration)	$150
Supplies	**$444**
Outreach and education supplies	$444
Fringe and Indirect	**$260,446[9]**
FY 2023 GRANT TOTAL	**$1,500,000**

[7] Rounded up from $371,375.64.
[8] Rounded up from $34,121.51.
[9] Rounded up from $260,445.99.

3.3C – Fiscal Year 2023 Travel Summary by Trip

Table 9. Fiscal Year 2023 Travel Summary

FY 2023 Travel Summary by Trip	Amount
Fall NEP Tech Transfer Meeting and RAE Conference in New Orleans, LA (2-person travel, 4-5 days)	$2,400
Lodging ($157/night)	$1,240
Hotel Tax (12.0%)	$150
Per diem ($61/day)	$610
Conference registration	$400
Spring EPA-NEP Workshop in Washington, D.C. (1-person travel, 4 days).	$3,115
Airfare	$1,135
Airport Parking	$150
Lodging ($189/night)	$1,032
Hotel Tax (14.5%)	$144
Taxi/transport	$150
Per diem ($76/day)	$304
Conference registration	$200
Travel for one GBEP staff member to attend the GOMA conference (1-person travel, 5 days). Travel costs for the GBEP Program Manager will be covered by GOMA.	$0
To be allocated in a future Work Plan	$1,935
FY 2023 Travel Estimate Total*	$7,450

*All out of state travel is dependent on TCEQ management review and approval. Rates for fiscal year 2023 are subject to change and estimates are based on actual cost or estimates of previous trips from fiscal year 2022 as well as the current fiscal year 2022 federal and state per diem rates.

SECTION 4: ONGOING PROJECTS

SECTION 4.1: ONGOING FEDERAL PROJECTS - SUMMARY

Table 10. Ongoing Federal Projects

Ongoing Projects	Grant Pre-USAS #332023			Award #CE-00655007	Award #CE-00655006
PROJECT NAME	Contract Number	Funding Years	2023 Budget	2020-2022 Budget	2017-2019 Budget
1. GBEP Website Hosting and Maintenance	N/A	2017–2023	$5,868	$17,736	$38,802
2. Estuary Resilience Assessment	19-90217	2019-2020, 2022-2023	$34,122[10]	$71,986	$30,000
3. Regional Monitoring Database	21-10088	2021–2023	$35,931	$234,019	$0
Administration Total			$75,921	$323,741	$68,802
4. Conservation Assistance Program	18-80344	2018–2023	$100,000	$300,000	$200,000
16. Sylvan Rodriguez Habitat Restoration Project (Phase III)	22-30257	2022	$0	$75,300	$0
NRU Total			$100,000	$375,300	$200,000
7. Targeted Bacteria Monitoring	20-10367	2020-2021, 2023	$40,000	$80,000	$0
17. Occurrence of Microplastics in Tributaries to Galveston Bay	20-10173	2020	$0	$40,000	$0
18. Baseline Assessment of Microplastics in Galveston Bay	21-10078	2021-2022	$0	$90,000	$0
19. Outreach Implementation for Galveston Bay Watershed Water Quality Projects	21-10087	2021	$0	$40,000	$0
20. Supporting the Use of Green Infrastructure (GI) in the Lower Galveston Bay Watershed	22-30136	2022	$0	$45,000	$0
21. Townwood Park Green Stormwater Infrastructure	22-30198	2022	$0	$55,000	$0
WSQ Total			$40,000	$350,000	$0
22.Trash Bash 2022	19-90216	2019–2021	$0	$20,000	$15,000
23. Public Perception Assessment and Community-Based Social Marketing Campaigns to Enhance Conservation and Educational Outreach Programs	20-10175	2020	$0	$86,000	$0
24. Microplastics in the Galveston Bay Watershed: The Big Impacts of Tiny Pollution	21-10096	2021–2022	$0	$114,458	$0
25. Audubon TERN Citizen Science in Schools: Students as Field Researchers	21-10097	2021-2022	$0	$89,323	$0
26. Mobilizing the Environmental Education Community through Prairie Education in the Galveston Bay	22-30208	2022	$0	$80,000	$0
PPE Total			$0	$389,781	$15,000
13. Effects of Erosion Control Structures on Shoreline Marsh Species Populations	22-30084	2022-2023	$31,140	$38,165	$0
14. The Fate of Emerging PFAS Pollutants in Shellfish and Fish of Galveston Bay	22-30197	2022-2023	$37,093	$68,456	$0

27. The Effect of Microplastics on the Base of Marine Food Webs	21-10079	2021	$0	$36,939	$0
28. Galveston Bay Oyster Microplastics: Baselines and Impacts	21-10080	2021	$0	$90,427	$0
29. The Distribution, Fate, and Transport of Emerging Contaminants in Galveston Bay	21-10104	2021-2022	$0	$108,438	$0
M&R Total			$68,233	$342,425	$0
GRANT TOTAL-ONGOING PROJECT FUNDING			$284,154	$1,781,247	$283,802

[10] Rounded up from $34,121.51.

SECTION 4.2: ONGOING FEDERAL PROJECTS - DETAIL

4.2A - ONGOING ADMINISTRATIVE PROJECTS

None.

4.2B - ONGOING NRU PROJECTS

16. Sylvan Rodriguez Habitat Restoration Project (Phase III)

CCMP Actions Implemented: HC-2, HC-3, SC-1, SC-2

Grantee/Contractor: HPARD

Total Project Budget: $75,300 ($75,300 from Award #CE-00655007: FY 2022 $75,300)

Milestones: Project Work Plan anticipated by April 2022.

Project period: February 2022–May 2024

Status: Ongoing project; executed February 2022.

Objective(s): To complete the restoration of the final 19 acres of the Sylvan Rodriguez Habitat Restoration Project. This project supports HPARD's overall goal of restoring natural ecosystem function to mitigate flooding, improve water quality, and enhance wildlife habitat.

Project Description: Sylvan Rodriguez Park is a 113.5-acre park acquired by the City of Houston on December 30, 1991. According to historical aerial imagery, the park consisted of coastal prairie habitat at the time of acquisition. Numerous prairie potholes and drainage features can be seen throughout the site in the historical photos dating back to 1944. In the absence of natural processes such as fire and intermittent grazing, the park became inundated by Chinese tallow and other woody vegetation. By the mid-2000s, HPARD had developed the southwestern portion of the park, which included two lacrosse fields, parking areas, restrooms, a retention pond, and trails.

HPARD is currently working on a multi-phased project that will result in 72 acres of coastal prairie and riparian habitat. This phase (Phase III) of the project will complete the restoration of the final 19 acres of prairie. A hydro-ax contractor will chip invasive tree species, leaving a mulch layer that will improve soil quality and provide the basis for a new prairie habitat. An herbicide contractor will treat the cut stumps and remove any invasive species that appear at the site after chipping occurs. The site will be seeded with native prairie plant species and will be planted with grasses and forbs. HPARD will host two community planting events to educate the community on the importance of prairie habitat and promote stewardship and appreciation of nature parks in local communities.

Partners and Their Role(s): HPARD will provide project management and oversight of management activities at Sylvan Park. They will also provide native herbaceous plants for the project.

Outputs/Deliverables:

- Project Work Plan within 30 days of contract execution;
- Quarterly progress reports until contract expiration; and
- Final Report.

Long-term Outcomes: Provide benefits for native vegetation and wildlife by restoring 12.5 acres of open grassland habitat that was degraded by invasive woody vegetation and enhancing 6.5 acres of existing grassland to increase the overall function as habitat for grassland-dependent species. The project will also provide opportunities to educate residents on the importance of prairie habitat and promote stewardship and appreciation of nature parks in local communities.

4.2C - ONGOING WSQ PROJECTS

17. Occurrence of Microplastics in Tributaries to Galveston Bay

CCMP Actions Implemented: NPS-1, PS-1, RES-2, RES-3, SPO-4

Grantee/Contractor: USGS

Total Project Budget: $40,000 ($40,000 from Award #CE-00655007: FY 2020 $40,000)

Milestones: The QAPP was executed in March 2020.

Project period: September 2019–May 2022

Status: Ongoing project.

Objective(s): The objectives of this study are to 1) investigate the occurrence of microplastics in selected watersheds draining to Galveston Bay; and 2) categorize the type(s) of microplastics present in these watersheds.

Project Description: Litter and trash, such as plastics, are an issue of concern in Galveston Bay and its tributaries and have been identified by the WSQ subcommittee as a priority topic for research. Microplastics, which are plastic particles less than 5 mm in diameter, are of increasing concern. These small particles are derived from the degradation or mechanical breakdown of larger plastic objects or particles and are introduced to waterways through urban runoff and wastewater effluent. Microplastics ingested by living organisms, such as birds, oysters, fish, and turtles can have effects on their health, including obstructions in the digestive system, impaired reproduction, malnourishment, and death. Microplastics also have high sorption capacities, enabling the accumulation of organic pollutants, pathogens, and metals that could potentially affect living organisms.

To date, no studies that assess the occurrence and abundance of microplastics in the tributaries of Galveston Bay have been published. Collecting microplastic samples in this region will provide baseline information about the spatial distribution and concentrations in the Galveston Bay watershed.

Partners and Their Role(s): USGS will perform the tasks necessary for sample collection. Collected samples will be submitted to OpthoKhemia Analytical laboratory for analysis.

Outputs/Deliverables:

- Annual Project Work Plan due at the beginning of each fiscal year of the project;
- Quarterly progress reports until contract expiration;
- Data release; and
- Project Summary.

Long-term Outcomes: Results will provide information on the occurrence of microplastics in the Galveston Bay watershed and will include quantification and categorization of microplastic particles. The results of this reconnaissance study will provide a preliminary assessment of where microplastics are found in the Galveston Bay watershed and provide the foundation for future study and abatement.

18. Baseline Assessment of Microplastics in Galveston Bay

CCMP Actions Implemented: NPS-1, PS-1, RES-2, RES-3, SPO-4

Grantee/Contractor: USGS

Total Project Budget: $90,000 ($90,000 from Award #CE-00655007: FY 2021 $79,343, FY 2022 $10,657)

Milestones: The QAPP was executed in March 2021.

Project Period: September 2020–August 2023

Status: Ongoing project.

Objective(s): The objectives of this study are to 1) investigate the occurrence of microplastics in the open waters of Galveston Bay, and 2) categorize the type(s) of microplastics present.

Project Description: Litter and trash, such as plastics, are an issue of concern in Galveston Bay and its tributaries and have been identified by GBEP as a priority topic for research. Microplastics, which are plastic particles less than 5 mm in diameter, are of increasing concern. These small particles are derived from the degradation or mechanical breakdown of larger plastic objects or particles and are introduced to waterways through urban runoff and wastewater effluent. Microplastics ingested by living organisms, such as birds, oysters, fish, and turtles can have effects on their health, including obstructions in the digestive system, impaired reproduction, malnourishment, and death. Microplastics also have high sorption capacities, enabling the accumulation of organic pollutants, pathogens, and metals that could potentially affect living organisms.

This study will contribute data to the current GBEP funded *Occurrence of Microplastics in Tributaries to Galveston Bay* project and other partner projects. These baseline studies can provide information about the spatial distribution and concentrations of microplastics in the Galveston Bay watershed.

Partners and Their Role(s): USGS will perform the tasks necessary for the collection and analysis of microplastics samples. Collected samples will be submitted to OptoKhemia Analytical laboratory for analysis.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Data release; and

- Final Project Summary.

Long-term Outcomes: Provide preliminary information on the occurrence of microplastics in Galveston Bay, including quantification and categorization of microplastic particles; as well as a preliminary assessment of the spatial distribution of microplastics in Galveston Bay to provide the foundation for future study and abatement.

19. Outreach Implementation for Galveston Bay Watershed Water Quality Projects

CCMP Actions Implemented: NPS-1, NPS-2, PS-1, PS-2, SPO-2, SPO-4

Grantee/Contractor: H-GAC

Total Project Budget: $40,000 ($40,000 from Award #CE-00655007: FY 2021 $40,000)

Milestones: Coordination/orientation meeting in March 2021.

Project Period: February 2021–August 2022

Status: Ongoing project.

Objective(s): This project will provide implementation resources for existing watershed-based plans in the Galveston Bay watershed that are adaptable to each community.

Project Description: All H-GAC watershed-based plans focus outreach efforts on reducing NPS by changing resident behavior. This project will build upon three years of outreach conducted under the Coastal Communities project, a Section 319 NPS Program grant-funded project. The Coastal Communities project provides implementation resources for watershed-based plans in the coastal portion of H-GAC's service region.

The Coastal Communities project currently works with small communities to determine their needs and identify ways to help reduce bacteria in local waterways with a regional approach tailored to each community. The Coastal Communities Roadmap was developed as an outreach implementation tool for this program. This project will specifically focus on conducting additional needs assessments and will further develop outreach materials and resources for 24 small, non-municipal separate storm sewer system coastal communities. Targeted outreach will help reduce four common types of NPS through proper disposal of pet waste; proper disposal of fats, oils, grease, and wipes; maintenance of on-site sewage facilities; and reducing litter and illegal dumping. The Performing Party will design a Community-Based Social Marketing pilot project that will focus on one of these four pollution types.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Public outreach materials;
- Project Outreach and Education Plan;
- Final Report.

Long-term Outcomes: This project will provide resources that directly and indirectly improve water quality across the lower Galveston Bay watershed by reducing NPS pollution.

20. Supporting the Use of Green Infrastructure (GI) in the Lower Galveston Bay Watershed

CCMP Actions Implemented: PS-1, NPS-4

Grantee/Contractor: H-GAC

Total Project Budget: $45,000 ($45,000 from Award #CE-00655007: FY 2022 $45,000)

Milestones: Coordination/orientation meeting was held on April 4, 2022.

Project Period: November 2021–February 2023

Status: Ongoing project, executed November 2021.

Objective(s): Make a recommended GI practice list that is based on local and regional data available to local decision-makers.

Project Description: H-GAC through this project will:

- Convene and organize a project committee (e.g. EIH, HARC/GTRI, Texas AgriLife, Harris County Flood Control District, Harris County, City of Houston);
- Compile available local BMP data, catalogued by practice(s);
- Complete analysis of BMP data and/or utilize existing analysis;
- Compare analysis with state and national examples from areas of common soils and precipitation;

- Recommend BMPs based on performance;
- Host at minimum one NPS workshop targeted to municipal separate storm sewer system operators and local governments; and
- Write a final report that includes a distribution and outreach plan.

Partners and Their Role(s): H-GAC will work with local water professionals to form a project committee that will catalog GI practices, identify and assist in acquiring local GI data, and develop weighted performance guidance (e.g., water quality, cost, maintenance, etc.). H-GAC will also work with partners, including GBEP, Texas AgriLife, HARC, GBF, and others to support BMP implementation through the partner's watershed-based plans.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- GI Priority List; and
- Final Report.

Long-term Outcomes: Provide a resource to local municipalities and decision-makers detailing regionally appropriate BMPs for GI projects to support improved water quality and flood prevention in the region.

21. Townwood Park Green Stormwater Infrastructure

CCMP Actions Implemented: NPS-3

Grantee/Contractor: HPARD

Total Project Budget: $55,000 ($55,000 from Award #CE-00655007: FY 2022 $55,000)

Milestones: Coordination/orientation meeting anticipated in March 2022.

Project Period: March 2022–May 2024

Status: Ongoing project, executed February 2022.

Objective(s): The project will create at least two green stormwater infrastructure demonstration features to support future implementation of similar projects in parks and private development in Houston.

Project Description: HPARD will create two bioretention demonstration projects in Townwood Park to slow stormwater runoff and support infiltration and water retention. Native grasses and forbs, collected locally and propagated by HPARD, will be installed to provide beatification, infiltration, and water quality improvements in the systems. HPARD will work with staff and volunteers to amend the soil and install a mix of native shrubs, grasses, and wildflowers. Interpretive signage will be installed adjacent to each feature to identify them as City of Houston approved green stormwater infrastructure examples for the incentive program. The signs will provide information on the functions of green stormwater infrastructure, the connections of Houston's watersheds to Galveston Bay, and the role that community members play in protecting our waterways. The project will tackle water quality, habitat creation, and community education.

Partners and Their Role(s): HPARD will provide project management and maintenance of the green stormwater infrastructure features. They will also provide native herbaceous plants for the project.

Outputs/Deliverables:

- Project Work Plan within 30 days of contact execution;
- Quarterly progress reports until contract expiration; and
- Final Report.

Long-term Outcomes: The establishment of these features will provide a needed nature-based approach to water quality and quantity concerns for the City of Houston and will be a key step in addressing Houston's resiliency challenges.

4.2D - ONGOING PPE PROJECTS

22. Trash Bash 2022

CCMP Actions Implemented: PEA-2, PEA-3, SPO-1, SPO-3

Grantee/Contractor: H-GAC

Total Project Budget: $35,000 ($15,000 from Award #CE-00655006: FY 2019 $15,000; $20,000 from Award #CE-0065007: FY2020 $10,000, FY2021 $10,000)

Milestones: Trash Bash event will occur between March and April of each year of the project.

Project Period: September 2019-August 2022

Status: Ongoing project.

Objective(s): The goal of Trash Bash is to promote environmental stewardship of the watershed through public education and to provide a means to clean up waterways in the Houston-Galveston area.

Project Description: Trash Bash is a successful volunteer-based litter cleanup event that has been held at multiple sites in the Houston-Galveston area on an annual basis since 1994. In fiscal year 2022, funding went towards salary and fringe benefits for a portion of the H-GAC Trash Bash coordinator position and other planning expenses.

Partners and Their Role(s): Partners for this project include H-GAC, which organizes and coordinates the event, Gulf Coast Authority, which provides equipment and t-shirts for the event, the Texas Conservation Fund, which manages the funding, and private and corporate sponsorships.

Outputs/Deliverables:

- Trash Bash Steering Committee meeting agendas and meeting minutes due annually; and
- Final Report.

Long-term Outcomes: Reduce the amount of trash in our waterways by promoting environmental stewardship using hands-on-education and public outreach.

23. Public Perception Assessment and Community-Based Social Marketing Campaigns to Enhance Conservation and Educational Outreach Programs

CCMP Actions Implemented: NPS-2, PEA-1, PEA-2, PEA-3, SPO-3

Grantee/Contractor: HARC/GTRI

Total Project Budget: $86,000 ($86,000 from Award #CE-00655007: FY 2020 $86,000)

Milestones: Annual coordination meeting took place in February 2022.

Project Period: September 2019–May 2022

Status: Ongoing Project. Advisory work group established in October 2019. Development of the public awareness and perception evaluation completed in September 2020.

Objective(s): This project seeks to assess public perception levels of Galveston Bay and implement three small education and outreach campaigns using a community-based engagement approach.

Project Description: The goal of the project is to conduct a community-centered approach to implementing public outreach and education campaigns. A public perception and awareness assessment will be conducted to identify communities and behaviors to target for the three small outreach and education campaigns. Once the targeted behaviors and communities have been identified, the campaigns will be created and implemented. Metrics will be developed to evaluate the success of each of the campaigns. The outcome of the campaigns and the public assessment and awareness information will be shared with stakeholders to demonstrate another approach to communicating with the public the importance of changing behaviors to conserve and protect Galveston Bay.

Partners and Their Role(s): HARC/GTRI will partner with GBF to conduct the public awareness and perception assessment, and GBF will implement the three outreach and education campaigns.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Final Public Assessment Report;
- Three small outreach and education campaigns; and
- Final Report.

Long-term Outcomes: Disseminating the project results to help partners and stakeholders have additional tools and resources to engage the public at the community-level on outreach and education campaigns that lead to sustainable behavior changes to preserve Galveston Bay.

24. Microplastics in the Galveston Bay Watershed: The Big Impacts of Tiny Pollution

CCMP Actions Implemented: NPS-2, SPO-3, PEA-1, PEA-2, PEA-3, RES-2, RES-3

Grantee/Contractor: UHCL EIH

Total Project Budget: $114,458 ($114,458 from Award #CE-00655007: FY 2021 $64,458, FY 2022 $50,000)

Milestones: Turtle Island Restoration Network (TIRN) QAPP was approved in August 2021 and UHCL EIH QAPP

was approved in January 2022. Contract coordination meeting held in September 2021.

Project Period: January 2021–May 2024

Status: Ongoing Project.

Objective(s): This project aims to build general scientific literacy and environmental stewardship among Galveston Bay residents regarding microplastics and increase public utilization and knowledge of the research capacity and conservation programs throughout the Galveston Bay area.

Project Description: This project targets fourth grade and high school grade levels in the Galveston Independent School District, a historically underserved district, by providing curriculum that focuses on watershed science, food web interactions, microplastics, marine debris, and conservation. Students will be guided in selecting sites within the Galveston Bay watershed to collect water and sediment samples for microplastics. The sites will be monitored monthly to compare data to water and sediment sample data collected by other area citizen science groups and utilized in biostatistical analysis. In addition, UHCL EIH will collect water and sediment samples along shorelines in the Galveston Bay watershed for research and geospatial statistical data analysis.

Partners and Their Role(s): TIRN will provide teacher and student training and oversee student data collection. UHCL EIH will collect data, conduct research, and geospatial statistical analysis of that data for microplastics along designated shorelines in Galveston Bay. UHCL EIH seeks to characterize the spatial distribution of plastic debris along Galveston Bay shorelines.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Teacher and student training materials;
- Student Citizen Science Sampling in Galveston Bay;
- Graduate Student Sampling Report; and
- Final Report.

Long-term Outcomes: Incorporate citizen science methodologies for monitoring and researching of microplastics in the classrooms to foster scientific literacy among students and create sustainable behavior change to reduce microplastics in addition to increasing knowledge of the spatial relationship and accumulation of microplastics along shorelines and the open waters of Galveston Bay.

25. Audubon TERN Citizen Science in Schools: Students as Field Researchers

CCMP Actions Implemented: SPO-2, SPO-3, PEA-3

Grantee/Contractor: HCDE

Total Project Budget: $89,323 ($89,323 from Award #CE-00655007: FY 2021 $49,323, FY 2022 $40,000)

Milestones: Coordination meeting held in October 2021.

Project Period: November 2020–May 2023

Status: Ongoing project.

Objective(s): This project will engage and train students and teachers in citizen science conservation work alongside biologists and Audubon staff in the Galveston Bay watershed through the TERN program created by Audubon Texas.

Project Description: The project targets schools identified in the Harris County School District that are at least 70% underserved and located near a waterbody. The TERN program will deliver trainings; classroom lessons and activities; and field trips to local sub-watersheds for bird monitoring and data collection. Teachers and students will be provided lessons that focus on bird identification, how to use the equipment, and how to analyze data. A field trip will be included for each school so students can apply what they learned in the classroom in a field setting. Each of these activities are Texas Essential Knowledge Skills aligned with the appropriate grade level.

Partners and Their Role(s): HCDE will help recruit schools and provide access to classrooms for Audubon Texas to deliver the TERN program.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Teacher and student training materials;
- End-of-school year projects created by students highlighting data and information collected; and

- Final Report.

Long-term Outcomes: Engage students and teachers in citizen science conservation work alongside biologists and wardens in the Galveston Bay watershed to demonstrate how citizen science and the data collected can help the community.

26. Mobilizing the Environmental Education Community through Prairie Education in the Galveston Bay

CCMP Actions Implemented: SPO-1, SPO-2, SPO-3, SPO-4, PEA-1, PEA-2, PEA-3

Grantee/Contractor: UHCL EIH

Total Project Budget: $80,000 ($80,000 from Award #CE-00655007: FY 2022 $80,000)

Milestones: QAPP meeting held in November 2021. Coordination/orientation meeting held in January 2022.

Project Period: November 2021–May 2024

Status: Ongoing project, executed November 2021.

Objective(s): This project will facilitate prairie education programs for K-12 students and educators in underserved and underrepresented populations in the lower Galveston Bay watershed. Agencies will also collect data as part of a vigorous mapping project to identify underserved school districts (and students) that do not receive (and could greatly benefit from) quality environmental education programming.

Project Description: Citizens Environmental Coalition and EcoRise will conduct a needs assessment for underserved and underrepresented communities and host a partner workshop to create a plan of action to deliver environmental education programs to those identified communities. UHCL EIH and Native Prairies Association of Texas will facilitate prairie education programs to increase knowledge and awareness of ecological services provided by native coastal prairies and wetlands for K-12 students, educators, and the community at large. The prairie programs will serve as the demonstration project/case study for how a program can adapt to meet the identified needs of the community. This project seeks to address the low science and math test scores and workforce development of students in Texas Region Four communities by providing STEM activities on the Deer Park Prairie and at UHCL EIH through field trips, summer camps, and teacher/administrator workshops. Activities can be adapted to virtual formats if needed.

Partners and Their Role(s): Citizens Environmental Coalition and EcoRise will conduct a needs assessment mapping project and host a partner workshop and the Native Prairies Association of Texas will assist UHCL EIH with prairie education programs.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Prairie education workshops and field trips;
- Map of underserved communities in need of environmental education;
- Environmental Education Delivery Action Plan; and
- Final Report.

Long-term Outcomes: Disseminate mapping project results to help partners engage communities in need of environmental education opportunities and provide field trips, tools, and resources to students and educators from underserved and underrepresented communities. STEM activities related to environmental education will connect those communities to environmental issues in the Galveston Bay watershed.

4.2E - ONGOING M&R PROJECTS

27. The Effect of Microplastics on the Base of Marine Food Webs

CCMP Actions Implemented: RES-2, RES-3

Grantee/Contractor: TAMUG

Total Project Budget: $36,939 ($36,939 from Award #CE-00655007: FY 2021 $36,939)

Milestones: Coordination/orientation and QAPP meeting were conducted in February 2021. The QAPP was executed in February 2021. An annual coordination meeting was held in October 2021.

Project Period: January 2021–May 2022

Status: Ongoing project. TAMUG is in the process of analyzing microplastic abundances and types in historical specimens and collecting appropriately sized fish for the swimming trials.

Objective(s): This project will investigate how microplastic exposure affects physiological and swimming performance in filter-feeding fishes and investigate the trend of plastic accumulation in filter-feeding fishes in Galveston Bay over the last 78 years.

Project Description: This project will use gulf menhaden and bay anchovies as model organisms to investigate if and how microplastics impact the survival needs of filter-feeding fishes, which comprise an important prey base for many marine food webs. Microplastic abundances in the respiratory tissue (gills) and gastrointestinal tract of specimens from the Texas A&M Biodiversity Research and Teaching Collection (1952–present) will be quantified using fluorescence microscopy. These data will be used to statistically model the trend of presumed microplastic accumulation over the past 78 years as well as predict future abundances in Galveston Bay and the western Gulf of Mexico. This project will also investigate the physiological impacts of exposure to microplastics on these species. Gulf menhaden and bay anchovies will be collected from the GBES. In the lab, fish will be placed into an intermittent-flow respirometer, exposed to varying concentrations of polyethylene terephthalate microplastic fibers, and subjected to increasing velocities of flow. Oxygen consumption and flow rate will be recorded and used to calculate several respiratory and swimming performance parameters. Video recordings of the swimming trials will be taken and analyzed to measure kinematic changes. These data will be used to compare environmental microplastic abundance to changes in respiratory, kinematic, and/or swimming performance. Microplastic abundance in the respiratory tissue and gastrointestinal tract will also be determined for a subset of these fish following the swimming trials.

Partners and Their Role(s): TAMUG will obtain historical fish specimens from Texas A&M University (TAMU). TAMUG will complete analyses of microplastic accumulation in Galveston Bay fishes and conduct swimming trials of fishes under exposure to varying concentrations of microplastics.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Model of historical microplastic accumulation in Galveston Bay fishes;
- Respiratory and swimming performance data; and
- Final Report.

Long-term Outcomes: Insight into microplastics accumulation in Galveston Bay fishes since 1952 and information on effects of microplastics on fish physiology and swimming performance.

28. Galveston Bay Oyster Microplastics: Baselines and Impacts

CCMP Actions Implemented: NPS-2, PEA-1, PEA-3, RES-2, RES-3

Grantee/Contractor: TAMUG

Total Project Budget: $90,427 ($90,427 from Award #CE-00655007: FY 2021 $90,427)

Milestones: Coordination/orientation and QAPP meeting was conducted in February 2021. The QAPP was executed in February 2021. An annual coordination meeting was held in October 2021.

Project Period: January 2021–April 2023

Status: Ongoing project. TAMUG has completed sampling and is working on microplastics analyses in the laboratory. University of Houston (UH) has completed measurements of the oyster condition index.

Objective(s): This project will examine spatial variation in the presence, type, and relative amount of microplastics in Galveston Bay oysters.

Project Description: This project will examine spatial variation in the presence, type, and relative amount (density per gram of tissue) of microplastic (less than 5 mm in diameter) particles and fibers in Galveston Bay oysters; identify and compare the composition of microplastics retained by oysters relative to the microplastics present in surface waters to ascertain whether oysters selectively retain certain types of microplastics; and examine the potential for microplastic loads in oysters to influence oyster health. The researchers will sample surface water and oysters at three sites in each of five major bay regions: Trinity Bay, East Bay, West Bay, Dickinson/Central Bay, and the Kemah/Seabrook area (15 sampling locations with up to 28 oysters per location for a total of 420 oyster samples and nine one-liter water samples per location for a total of 135 water samples). Up to 12 oyster samples per region will be used to determine the microplastic type(s) and abundance. Oyster tissue will be extracted in a clean fume hood in the laboratory before undergoing acid digestion and vacuum filtration to extract microplastics. Microplastic type(s) for oyster and water samples will be identified using Fourier Transform Infrared Spectroscopy, which identifies the chemical composition of polymers. Up to 16 oysters per region will be used to determine a representative oyster condition index for each sampling location. The condition index is calculated by determining the amount of tissue within an

oyster in relation to the available volume inside the shell and provides a relative indication of oyster health. This project will provide information on the links between spatial variations in surface water microplastic loads, oyster microplastic loads, and oyster health.

Partners and Their Role(s): TAMUG will complete measurements of microplastic loads and analysis of plastic types in oysters and sediments and facilitate completion of the final report. UH will complete measurements of the oyster condition index. GBF will facilitate the creation and dissemination of outreach and education materials.

Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- QAPP;
- Oyster condition index data;
- Oyster and surface water microplastic load data;
- Oyster and surface water microplastic composition data;
- Public outreach materials;
- Classroom curriculum materials; and
- Final Report.

Long-term Outcomes: Insight into types and amounts of microplastics in Galveston Bay oysters relative to that present in surface water, as well as spatial variation in oyster health relative to microplastic abundance.

29. The Distribution, Fate, and Transport of Emerging Contaminants in Galveston Bay

CCMP Actions Implemented: RES-2

Grantee/Contractor: TAMU

Total Project Budget: $108,438 ($108,438 from Award #CE-00655007: FY 2021 $92,938, FY 2022 $15,500)

Milestones: Coordination/orientation and QAPP meeting was conducted in February 2021. The QAPP was executed in February 2021. An annual coordination meeting was held in September 2021.

Project Period: January 2021–March 2024

Status: Ongoing project. TAMU has been conducting quarterly field observations on schedule to increase the number of sampling timepoints.

Objective(s): This project will measure concentrations of PFAS and PPCPs in water and sediment in Galveston Bay and the Houston Ship Channel

Project Description: This project will examine spatial and temporal variation in a group of emerging contaminants, including PFAS and PPCPs in Galveston Bay water and sediment. TAMU will conduct quarterly field observations at 13 sites in Galveston Bay and the Houston Ship Channel, extending a current dataset dating from June 2017 to present. Unlike legacy contaminants such as PCBs and dioxins, PFAS and PPCPs are soluble in water, which poses a threat to water quality. Baseline data on the distributions, fate, and transport of PFAS and PPCPs in Galveston Bay is scarce, making it difficult to understand whether and to what extent extreme events such as hurricanes and chemical releases contribute additional contamination to Galveston Bay. This project aims to answer: 1) What are the distributions of PFAS and PPCPs in Galveston Bay concerning river discharge rates and extreme events? 2) Do hurricanes and chemical releases contribute to elevated levels of PFAS and/or PPCPs in the bay, and if so, how long does it take to recover to background levels? and 3) What are the water/sediment partitioning patterns of these emerging contaminants in Galveston Bay?

Partners and Their Role(s): TAMU will conduct sampling and complete analyses for PFAS and PPCPs in Galveston Bay and the Houston Ship Channel.

Outputs/Deliverables:

· Quarterly progress reports until contract expiration;
· QAPP;
· PFAS concentration data for water and sediment samples;
· PPCPs concentration data for water and sediment samples; and
· Final Report.

Long-term Outcomes: Insight into spatial and temporal variation in PFAS and PPCPs concentrations in Galveston Bay and the Houston Ship Channel.

SECTION 5: COMPLETED PROJECTS

SECTION 5.1: PROJECTS COMPLETED SINCE FISCAL YEAR 2022 WORK PLAN SUBMISSION – SUMMARY

Table 11. Completed Projects

Completed Projects			Award #CE-00655007			Award #CE-00655006	
PROJECT NAME	TCEQ Contract Number	Funding Years	2022 Budget	2021 Budget	2020 Budget	2017-2019 Budget	Final Report Submitted
30. Mickey Leland Environmental Intern	N/A	2017–2021	$0	$7,632	$6,257	$23,976	N/A
31. Lead (Pb) Isotopes and Heavy Metal Concentrations in Galveston Bay Waters, Sediments, and Oysters	20-10170	2020	$0	$0	$133,235	$0	August 2021
32. Characterizing PCBs and Dioxins in the Houston Ship Channel and Galveston Bay Post Hurricane Harvey	20-10179	2020	$0	$0	$60,000	$0	May 2022
GRANT TOTAL-PROJECT FUNDING			$0	$7,632	$199,492	$23,976	

SECTION 5.2: PROJECTS COMPLETED SINCE FISCAL YEAR 2022 WORK PLAN SUBMISSION – DETAIL

30. Mickey Leland Environmental Intern

CCMP Actions Implemented: General support of all Action Plans

Grantee/Contractor: Goodwill Staffing Services/TCEQ

Total Project Budget: $37,865 ($23,976 from Award #CE-00655006: FY 2017 $8,410, FY 2018 $7,228, FY 2019 $8,338; $13,889 from Award #CE-00655007: FY 2020 $6,257, FY 2021 $7,632)

Milestones: The selected intern developed a white paper and final presentation that summarized their efforts at the end of the summer internship period.

Project period: This project ran annually from May to August of each year.

Status: Annual project.

Objective(s): An undergraduate or graduate college student learned about environmental issues specific to GBEP and gained professional work experience through a paid, full-time summer internship.

Project Description: The Mickey Leland Environmental Intern generated a white paper and final presentation that summarized their efforts at the end of the summer internship period. The intern worked on a project that helped to implement or track the implementation of the *GBP*.

31. Lead (Pb) Isotopes and Heavy Metal Concentrations in Galveston Bay Waters, Sediments and Oysters

CCMP Actions Implemented: RES-2, RES-5

Grantee/Contractor: UH

Total Project Budget: $133,235 ($133,235 from Award #CE-00655007: FY 2020 $133,235)

Milestones: Final Report completed August 2021.

Project period: September 2019–August 2021

Status: Completed project.

Objective(s): This study proposed Pb isotope compositions and heavy metal concentrations be determined for Galveston Bay waters, sediments, and oysters to evaluate the toxicity of the bay and identify types of industrial pollution sources.

Project Description: This project investigated heavy metal cycling in Galveston Bay sediments and oysters. The results offer a detailed assessment of Galveston Bay heavy metal geochemistry and provided new insight into heavy metal sources, fluxes, and toxicity in the Galveston Bay estuary. Additionally, this project offers the first Pb isotope dataset for Galveston Bay and serves as a testbed for future work in this region. The data demonstrate that Galveston Bay sediment and water heavy metal concentrations are shaped by riverine input and flocculation dynamics as well as anthropogenic activities. Lead isotope tracing reinforces the presence of gasoline- and industrial ore- derived Pb in Galveston Bay and identifies coal as another anthropogenic metal contaminant source in the bay. Sediments may supply zinc to oysters based on linear correlations between Galveston Bay sediment and oyster tissue metal concentrations. Moreover, Galveston Bay sediment and oyster tissue Pb isotope compositions largely overlap, demonstrating that oysters can incorporate metals from ambient sediments. No correlation between water (dissolved fraction) heavy metal contents and oyster tissue heavy metal contents was observed. This study highlights the importance of estuaries in regulating heavy metal exchange between terrestrial and marine environments.

Partners and Their Role(s): UH performed the laboratory preparation of samples (leaching, extracting, etc.) as well as the Pb isotope analysis. TAMU was subcontracted to perform the heavy metal concentration analyses.

Outputs/Deliverables:

- Annual Project Work Plan due at the beginning of each fiscal year of the project;
- Quarterly progress reports until contract expiration;
- Heavy metal and Pb isotope data; and
- Final Report.

Long-term Outcomes: Insights into Pb isotope composition, heavy metal concentrations, and potential types of industrial pollution sources in Galveston Bay and associated freshwater inflows.

32. Characterizing PCBs and Dioxins in the Houston Ship Channel and Galveston Bay Post Hurricane Harvey

CCMP Actions Implemented: RES-2, RES-5

Grantee/Contractor: UH

Total Project Budget: $60,000 ($60,000 from Award #CE-006550067: FY 2020 $60,000)

Milestones: Final Report completed May 2022.

Project period: September 2019–April 2022

Status: Completed project.

Objective(s): This project compared sediment PCB and dioxin levels in the Houston Ship Channel and Galveston Bay post-Hurricane Harvey to historical data and conducted source analyses.

Project Description: Two observations after Hurricane Harvey motivate this study: 1) some parts of the Houston Ship Channel and Galveston Bay exhibited higher concentrations of PCBs and dioxin in sediment after the hurricane relative to historic levels; and 2) it has been reported that the protective cap on the San Jacinto River Waste Pits site incurred failures during the hurricane, potentially exposing waste material in the pits to the San Jacinto River waters. This project compared sediment PCB and dioxin levels in the Houston Ship Channel and Galveston Bay post-Hurricane Harvey to historical data (2003-2017) and conducted source apportionment analyses. Many stations exhibited lower sediment dioxin concentrations in 2021 compared to 2011-2012. Some stations that exhibited increases in sediment dioxin from 2017-2019 showed decreases from 2019-2021, while others had increases in sediment dioxin from 2019-2021. The majority of stations indicated overall declines in sediment PCBs in 2021 relative to 2011-2012 and compared to 2019. Source apportionment analyses indicated a weak correspondence between observed sediment dioxin congener patterns and those of the San Jacinto River Waste Pits, with two notable exceptions in 2005 and 2017 (after Hurricane Harvey), suggesting implications associated with mobilization of pollutants from the waste pits following severe storms or hurricanes.

Partners and Their Role(s): UH performed the tasks necessary for the collection and analysis of PCB and dioxin samples and for comparing the measurements to historical data collected within the system to determine change, if any, post-Hurricane Harvey.

Outputs/Deliverables:

- Annual Project Work Plan due at the beginning of each fiscal year of the project;
- Quarterly progress reports until contract expiration;
- PCB and dioxin data; and
- Final Report.

Long-term Outcomes: Insight into potential changes in PCB and dioxin levels in the Houston Ship Channel and Galveston Bay following Hurricane Harvey.