

# FISCAL YEAR 2021 WORK PLAN SECTION 320 GALVESTON BAY ESTUARY PROGRAM

---

Revision 1.0  
EPA #CE-00655007  
TCEQ Grant #332020



---

A PROGRAM OF TCEQ

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

May 2020

---

## TABLE OF CONTENTS

|   |     |
|---|-----|
| LIST OF ABBREVIATIONS .....   | iii |
| SECTION 1: PROGRAM OVERVIEW .....   | 5   |
| SECTION 2: INTRODUCTION.....  | 7   |
| SECTION 2.1: ORGANIZATIONAL STRUCTURE .....                                       | 8   |
| SECTION 2.2: GOALS AND ACCOMPLISHMENTS SINCE FY 2020 WORK PLAN SUBMISSION.....    | 14  |
| SECTION 2.3: STRATEGIC ACTION PLAN GOALS TO FOCUS ON IN FY 2021.....              | 19  |
| SECTION 3: FY 2021 PROJECTS.....  | 22  |
| SECTION 3.1: FY 2021 FEDERAL PROJECTS - SUMMARY .....                             | 22  |
| SECTION 3.2: FY 2021 FEDERAL PROJECTS - DETAIL.....                               | 23  |
| SECTION 3.3: FY 2021 GRANT BUDGET SPREADSHEETS.....                               | 32  |
| SECTION 4: ONGOING PROJECTS .....   | 35  |
| SECTION 4.1: ONGOING FEDERAL PROJECTS - SUMMARY .....                             | 35  |
| SECTION 4.2: ONGOING FEDERAL PROJECTS - DETAIL .....                              | 36  |
| SECTION 5: COMPLETED PROJECTS.....  | 46  |
| SECTION 5.1: PROJECTS COMPLETED SINCE FY 2020 WORK PLAN SUBMISSION - SUMMARY..... | 46  |
| SECTION 5.2: PROJECTS COMPLETED SINCE FY 2020 WORK PLAN SUBMISSION - DETAIL.....  | 47  |

## LIST OF ABBREVIATIONS

**Table 1. Abbreviations List**

| Name  | Abbreviation                       |
|---|------------------------------------|
| Bacteria Implementation Group                         | BIG                                |
| Bacteria Source Tracking                              | BST                                |
| Comprehensive Conservation and Management Plan        | CCMP                               |
| Dissolved Oxygen                                      | DO                                 |
| Environmental Institute of Houston                    | EIH                                |
| Freshwater Inflow and Bay Circulation Action Plan     | FW                                 |
| Fiscal Year   | FY                                 |
| Galveston Bay Council                                 | GBC                                |
| Galveston Bay Estuary Program                         | GBEP                               |
| Galveston Bay Foundation                              | GBF                                |
| <i>Galveston Bay Plan</i>                             | <i>GBP</i>                         |
| <i>Galveston Bay Plan, 2<sup>nd</sup> Edition</i>     | <i>GBP, 2<sup>nd</sup> Edition</i> |
| Galveston Bay Public Awareness and Education Campaign | Back the Bay                       |
| Geographic Information System                         | GIS                                |
| GeoTechnology Research Institute                      | GTRI                               |
| Gulf of Mexico Alliance                               | GOMA                               |
| Houston Advanced Research Center                      | HARC                               |
| Houston-Galveston Area Council                        | H-GAC                              |
| Implementation Plan                                   | I-Plan                             |
| Lead  | Pb                                 |
| Monitoring and Research                               | M&R                                |
| National Estuary Program                              | NEP                                |
| Natural Resource Uses                                 | NRU                                |
| Nonpoint Source Pollution                             | NPS                                |
| Park Board of Trustees of the City of Galveston       | PBTG                               |
| Pharmaceutical and Personal Care Products             | PPCPs                              |
| Plastic Pollution Prevention Partnership              | P3P                                |
| Point Source  | PS                                 |
| Polychlorinated Biphenyls                             | PCBs                               |
| Polyfluorinated Alkyl Substances                      | PFAS                               |
| Public Participation and Education                    | PPE                                |
| Quality Assurance Project Plan                        | QAPP                               |
| Regional Monitoring Database                          | RMD                                |
| River, Lakes, Bays N' Bayous Trash Bash               | Trash Bash                         |

| Name   | Abbreviation   |
|--|----------------|
| 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 Department of State Health Services        | DSHS           |
| Texas Estuarine Restoration Network              | TERN           |
| Texas General Land Office                        | GLO            |
| Texas Institute for Applied Environment Research | TIAER          |
| Texas Parks and Wildlife Department              | TPWD           |
| Texas Water Resources Institute                  | TWRI           |
| Total Maximum Daily Load                         | TMDL           |
| Trinity Bay Discovery Center                     | TBDC           |
| 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           |
| Video Teleconference                             | VTC            |
| Water and Sediment Quality                       | WSQ            |
| Watershed Protection Plan                        | WPP            |

## SECTION 1: PROGRAM OVERVIEW

The initial application of grant #CE-00655007 was for three years of time and one year of funding with the intent to request another year of time and funding each year for the next two years and extend the grant term to five years total through 8/31/2024. The fiscal year (FY) 2021 Work Plan is the second request for funding for this grant. The Texas Commission on Environmental Quality (TCEQ) has found this method is most effective for successful operation and coordination of the Galveston Bay Estuary Program (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 (GLO), and TCEQ. The *Galveston Bay Plan, 2<sup>nd</sup> edition (GBP, 2<sup>nd</sup> Edition)* was approved by TCEQ in March 2019.

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 the Galveston Bay. GBEP received a grant from the EPA to begin implementing the *GBP* in 1995. This grant ran from FY 1995–1999 and is now closed. Subsequent grants have run from FY 2000–2003, FY 2004–2007, FY 2008–2010, FY 2011–2015, and FY 2014–2018. Grant #CE-00655006 (FY 2017–2021) 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 & Excellence in Communications/Important Message (Green Infrastructure for Texas – Exploration Green).

## 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 resources 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 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.

**Cynthia Clevenger,** Public Participation and Education (PPE) Coordinator and Community Relations Specialist: responsible for coordinating 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. Ms. Clevenger 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 implementation of habitat protection, species population protection, freshwater inflows, shoreline management, and spills and dumping actions in the *GBP*; coordinating invasive species workgroup 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 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 implementation of public health protection, WSQ, nonpoint source pollution (NPS), and point source pollution (PS) 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.

**Patricia Thompson, M.S.,** 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. Thompson also coordinates 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.

**Mary Stiles,** PPE Assistant: responsible for handling GBEP outreach events, maintains GBEP contacts database, handles timekeeping, conducts K-12 presentations, and supports general activities of the PPE team and PPE subcommittee. Ms. Stiles manages the annual Trash Bash contract and Spanish language community outreach.

**Doretta Thomas,** Administrative Assistant: responsible for travel coordination, vehicle and equipment maintenance and repairs, mail, correspondence, office safety, and general administrative support for GBEP.



## 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 25 approved January 2020) 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.

## FY 2020 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 2019–August 2020 (FY 2020). The number is subject to change as additional funding may be reported for the period.

**Table 2. FY 2020 Leveraging**

| EPA Funds to Program<br>(Section 320) | Other<br>Federal<br>Funds | State Funds | Local Government<br>Funds and In-Kind | Private funds &<br>In-kind |
|---------------------------------------|---------------------------|-------------|---------------------------------------|----------------------------|
| \$600,000                             | \$3,074,471               | \$911,653   | \$0                                   | \$6,649,333                |

Figures reported in Table 3 depict the travel expenses and tech transfer descriptions from FY 2020.

**Table 3. FY 2020 Travel and Tech Transfer**

| EVENT, LOCATION, & PURPOSE  | STAFF PERSON    | EPA<br>SECTION<br>320 FUNDS | TCEQ 100%<br>STATE FUNDS |
|---|-----------------|-----------------------------|--------------------------|
| Galveston Bay Foundation (GBF) Conservation Committee Meetings<br>Houston, Texas – Bimonthly (every two months)<br>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                      |
| Interagency Public Meeting for the U.S. Army Corps of Engineers (USACE) Coastal Texas Protection and Restoration Feasibility Study<br>Galveston, Texas (and via teleconference) – Monthly<br>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, & PURPOSE  | STAFF PERSON  | EPA<br>SECTION<br>320 FUNDS | TCEQ 100%<br>STATE FUNDS |
|---|---|-----------------------------|--------------------------|
| <p>The H-GAC Natural Resources Advisory Committee<br/>Houston, Texas - Quarterly<br/>These meetings provide information on issues related to natural resource management of the region. The GBEP Program Manager is a non-voting member.</p>  | Lisa Marshall   | \$0                         | \$0                      |
| <p>University of Houston-Clear Lake (UHCL)/<br/>Environmental Institute of Houston (EIH), Science<br/>Advisory Board<br/>Houston, Texas - Triannual<br/>The meetings provide updates from EIH staff and<br/>faculty on their research and educational initiatives.<br/>The GBEP Program Manager is a non-voting member.</p>   | Lisa Marshall   | \$0                         | \$0                      |
| <p>H-GAC Bacteria Implementation Group (BIG)<br/>Houston, Texas - Semiannual<br/>These meetings provide an update of implementation<br/>activities of the BIG Implementation Plan (I-Plan) and<br/>present topics that are related to water quality.</p>  | Lisa Marshall<br>Christian Rines                      | \$0                         | \$0                      |
| <p>Trash Summit Meetings<br/>Houston, Texas (and teleconference) - Monthly<br/>Watershed-wide coordinating initiative to research,<br/>track, and quantify litter. This stakeholder-led effort<br/>aims to identify prevention and removal strategies.<br/>Other efforts include identifying funding strategies,<br/>partnership opportunities, and communication<br/>approaches. Initial steps were taken to develop a<br/>regional action plan—like other water-based plans—<br/>focused on litter and marine debris prevention.</p>  | Cynthia Clevenger<br>Lisa Marshall<br>Christian Rines | \$0                         | \$0                      |
| <p>Plastic Pollution Prevention Partnership (P3P)<br/>Meetings<br/>Houston, Texas - Quarterly<br/>Region-wide collaborative of several organizations<br/>and agencies to address plastic debris affecting<br/>wildlife and water quality. The group organizes<br/>cleanups, wildlife entanglement rescues, and<br/>outreach and education efforts. This group is an<br/>outcome of regional efforts to address EPA's Trash<br/>Free Waters initiative.</p>  | Cynthia Clevenger                                     | \$0                         | \$0                      |
| <p>Fishing Line Recycling Work Group<br/>Houston, Texas - Quarterly<br/>An outcome of P3P addressing concerns about the<br/>large amount of monofilament fishing line causing<br/>wildlife entanglements and water quality issues on<br/>the Texas City Dike and Seawolf Park in Galveston,<br/>Texas. The project is a partnership with organizations<br/>and agencies working with the Texas City Waste<br/>Management Department and the City of Galveston<br/>Park Board of Trustees to develop a campaign to help<br/>anglers and visitors keep fishing line off the ground.</p> | Cynthia Clevenger                                     | \$0                         | \$0                      |

| EVENT, LOCATION, & PURPOSE  | STAFF PERSON                         | EPA<br>SECTION<br>320 FUNDS | TCEQ 100%<br>STATE FUNDS |
|---|--------------------------------------|-----------------------------|--------------------------|
| <p>Trash Bash Event Coordination Meetings<br/>Houston, Texas – Quarterly</p> <p>These meetings provide regional coordination, site selection, training, outreach materials development and training, and organizational support for the regional Trash Bash events.</p>   | Mary Stiles                          | \$0                         | \$0                      |
| <p>Texas Watershed Coordinator Roundtable Meetings<br/>Different locations across the state – Semiannual</p> <p>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.</p>                             | Christian Rines                      | \$0                         | \$0                      |
| <p>EPA Quality Assurance Training<br/>Dallas, Texas – March 2019</p> <p>The training provided individuals working with EPA funded projects the information and tools necessary to maintain an effective quality assurance program and develop QAPPs.</p>  | Christian Rines<br>Patricia Thompson | \$0                         | \$884                    |
| <p>Texas Soil Health Short Course<br/>Victoria, Texas – April 2019</p> <p>The course presented practical approaches to implementing soil health principles to increase the ecological wealth of systems. These principles increase the fundamental knowledge of water and sediment quality and habitat conservation.</p>  | Christian Rines<br>Lindsey Lippert   | \$0                         | \$861                    |
| <p>EPA Region 6 Stormwater Conference<br/>Denton, Texas – July 2019</p> <p>The conference provided information on water regulations, stormwater controls, and water conservation practices throughout the state and new technologies to address stormwater pollution discharges to surface waters. The conference provided networking opportunities and knowledge needed to fulfill the role of the WSQ Subcommittee Coordinator.</p> | Christian Rines                      | \$0                         | \$842                    |
| <p>Spatial Statistics Geographic Information System (GIS) Training<br/>Austin, Texas – August 2019</p> <p>The training provided information on how to use spatial statistics tools in ArcGIS, which will assist with tracking implementation of the <i>GBP</i> and coordinating the Regional Monitoring Plan.</p>   | Kristen McGovern                     | \$0                         | \$308                    |
| <p>Using Co-Production to Engage Stakeholders and Create Effective Science-to-Management Solutions Workshop<br/>San Marcos, Texas – September 2019</p> <p>The workshop focused on bringing together resource managers and scientists to build capacity, learn about science co-production, and discuss best practices to improve science for resource management in Texas.</p>  | Lisa Marshall                        | \$0                         | \$0                      |

| EVENT, LOCATION, & PURPOSE   | STAFF PERSON   | EPA<br>SECTION<br>320 FUNDS | TCEQ 100%<br>STATE FUNDS |
|--|--|-----------------------------|--------------------------|
| Fall EPA National Estuary Program (NEP) Tech Transfer Meeting<br>Washington, D.C. – October 2019<br>The meeting provided NEP program managers a chance to exchange information and network.  | Lisa Marshall  | \$1,809                     | \$0                      |
| Texas Conference for Women<br>Austin, Texas – October 2019<br>The conference provided networking opportunities and information for women and their careers.  | Christian Rines<br>Patricia Thompson   | \$0                         | \$348                    |
| Texas Plastic Pollution Symposium<br>Galveston, Texas – October 2019<br>The symposium provided networking opportunities and information on current plans, issues, and successes regarding plastic pollution in Texas.  | Cynthia Clevenger<br>Lisa Marshall<br>Christian Rines<br>Mary Stiles   | \$0                         | \$0                      |
| Gulf of Mexico Alliance (GOMA) Marine Debris Cross-Training<br>Corpus Christi, Texas – October 2019<br>The conference provided environmental education professionals ways to teach K-12 audiences through education and outreach activities that can be incorporated into GBEP's education and outreach efforts. | Cynthia Clevenger  | \$0                         | \$313                    |
| Bayou Preservation Association 2019 Symposium<br>Houston, Texas – October 2019<br>The conference provided information on the impact of healthy soil on the well-being of watersheds.   | Lisa Marshall<br>Christian Rines   | \$0                         | \$100                    |
| Severe Storm Predication, Education, and Evacuation from Disasters Center Conference<br>Houston, Texas – October 2019<br>The conference provided information to help implement plans for coastal resiliency acclimation, coastal surge, and flood mitigation.  | Kristen McGovern   | \$0                         | \$68                     |
| Coastal and Estuarine Research Federation Biennial Conference<br>Mobile, Alabama – November 2019<br>This conference provided networking opportunities and information on national trends in coastal and estuarine monitoring and research, restoration, management, and outreach.                                | Kristen McGovern   | \$260                       | \$2,461                  |
| State of the Bay Symposium<br>Galveston, Texas – January 2020<br>The conference was organized by GBEP staff and provided employees the opportunity to network and information on projects occurring in Galveston Bay.  | Cynthia Clevenger<br>Lindsey Lippert<br>Lisa Marshall<br>Kristen McGovern<br>Christian Rines<br>Mary Stiles<br>Patricia Thompson | \$0                         | \$1,824                  |

| EVENT, LOCATION, & PURPOSE   | STAFF PERSON                         | EPA<br>SECTION<br>320 FUNDS | TCEQ 100%<br>STATE FUNDS |
|--|--------------------------------------|-----------------------------|--------------------------|
| Surface Water Quality Monitoring Training<br>Houston, Texas – March 2020<br>The training explained the theory and methodology of surface water quality monitoring procedures with a hands-on component in local streams and bayous.  | Christian Rines<br>Patricia Thompson | \$0                         | \$350                    |
| *Spring EPA NEP Tech Transfer Meeting<br>Washington, D.C. – March 2020 (Canceled-\$2,420)<br>The meeting provided NEP program managers a chance to exchange information and network.   | Lisa Marshall                        | \$0                         | \$0                      |
| *Social Marketing Workshop<br>Austin, Texas – March 2020 (Canceled-\$620)<br>The training provided the latest tools and models of social media to effectively engage audiences online.   | Cynthia Clevenger                    | \$0                         | \$0                      |
| *GIS Expo<br>Houston, Texas – March 2020 (Canceled-\$69)<br>The expo provided opportunities to network with other entities working with geographic datasets and databases in the Galveston Bay watershed, which will be helpful for facilitating development of the Regional Monitoring Database (RMD) and implementation tracking of the <i>GBP</i> . | Kristen McGovern                     | \$0                         | \$0                      |
| *American Shore and Beach Preservation Association<br>Corpus Christi, Texas – March 2020 (Canceled-\$254)<br>The meeting brought 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.                                    | Kristen McGovern                     | \$0                         | \$0                      |
| *Urban Stream Processes and Restoration Training<br>The Woodlands, Texas – April 2020 (Canceled-\$100)<br>The training covered the hydrologic cycle, basics to stream morphology, stream classification, stream instability, stream restoration, stabilization structure, and vegetation monitoring.   | Christian Rines<br>Lisa Marshall     | \$0                         | \$0                      |
| *Texas Bays and Estuaries Meeting<br>Port Aransas, Texas – April 2020 (Canceled-\$896)<br>The conference provided networking opportunities and information on the bays, estuaries, and nearshore environments of the Gulf of Mexico.   | Christian Rines<br>Lisa Marshall     | \$0                         | \$0                      |
| *Mid-Coast Initiative Team Meeting and Grazing Workshop<br>Victoria, Texas – May 2020 (Tentative)<br>The meeting provided opportunities to network and discuss the conservation of priority bird habitat across 16 counties from Galveston to Corpus Christi and a grazing workshop.   | Lindsey Lippert                      | \$0                         | \$235                    |
| *2020 GOMA All Hands Meeting<br>Biloxi, Mississippi – June 2020 (Tentative)<br>The meeting provided networking opportunities with other organizations and governmental agencies working for the environment and economic health of the Gulf of Mexico.   | Cynthia Clevenger<br>Lisa Marshall   | \$1,800                     | \$0                      |

| EVENT, LOCATION, & PURPOSE  | STAFF PERSON      | EPA<br>SECTION<br>320 FUNDS | TCEQ 100%<br>STATE FUNDS |
|---|-------------------|-----------------------------|--------------------------|
| *Learning ArcGIS Pro 4: Sharing Your Maps and Data<br>Austin, Texas – June 2020 (Tentative)<br>The training provided information on how to use ArcGIS Pro, which will assist with tracking implementation of the <i>GBP</i> and coordinating the Regional Monitoring Plan.  | Kristen McGovern  | \$0                         | \$260                    |
| *Spatial Analyst with ArcGIS Pro and R, and met with TCEQ staff<br>Austin, TX – August 2020 (Tentative)<br>The training provided information on how to use spatial statistic tools in ArcGIS Pro and R, which will assist with tracking implementation. Met with GBEP's new Grant Manager and Budget Liaison to discuss budget tracking and grant deliverables. | Patricia Thompson | \$0                         | \$364                    |
| Total   |                   | \$3,869                     | \$9,218                  |

\*Tentative events may be rescheduled in FY 2020, but there is no guarantee that they will. Travel is dependent on TCEQ management review and approval. Rates for FY 2020 are subject to change.

## **SECTION 2.2: GOALS AND ACCOMPLISHMENTS SINCE FY 2020 WORK PLAN SUBMISSION**

GBEP partners made notable achievements in improving water quality, restoring wetlands, protecting unique habitats, and educating the public in FY 2020. 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 30,325 acres of important coastal habitats, leveraging \$113,599,180 in local, industry, state, and federal contributions. During FY 2019, GBEP protected and enhanced 557 acres of wetlands and coastal habitats, and leveraged \$9,723,804 in local, industry, state, and federal contributions. In addition, 7,920 linear feet of bay shoreline were enhanced through the installation of living shoreline and nearshore breakwater projects.

As of February 2020, an additional 35.27 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 5,000 acres of coastal habitat by August 2020.



**Figure 2. Aerial view of complete TBDC rip-rap breakwater and 300-foot oyster shell breakwater (photo credit: Galveston Bay Foundation).**

The Trinity Bay Discovery Center (TBDC) Living Shoreline project aimed to protect the shoreline of the TBDC property from erosion and restore fringing estuarine marsh habitat. Owned by GBF, TBDC is a 17-acre conservation and education property located on the northwest shoreline of Trinity Bay in Chambers County, Texas. Trinity Bay is a high wave energy environment, located along approximately 880 feet of eroding shoreline. Wind-driven waves have impaired the twenty-year-old bulkhead, installed by previous landowners, resulting in severe shoreline erosion as well as vegetation and soil losses.

GBF and project partners developed the TBDC Living Shoreline project to reduce wave energy impacting the shoreline, halt erosion, and promote deposition of suspended sediments landward of the structure. After acquiring the necessary permits and competitively bidding the project, GBF oversaw the construction of the 780-foot rip-rap breakwater which protects 540 feet of shoreline. In addition, GBF worked with volunteer groups to construct 400 linear feet of oyster shell breakwater along the northeastern shoreline which receives the lowest amount of wave action. The breakwater structure created approximately two-acres of calm water habitat that will allow for the re-establishment of the intertidal marsh. As of August 2019, over half an acre of this area has been planted with smooth cordgrass by GBF volunteers.

### **IMPROVING & 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 sometimes experience 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 within Highland Bayou (segment 2424A) and Marchand Bayou (segment 2424C) as impaired for these constituents of concern.

Texas AgriLife has coordinated the creation of a characterization report and a stakeholder-driven draft WPP for Highland Bayou. The current draft WPP only addresses bacteria and work to address the DO impairment is ongoing. Recent guidance from the EPA indicates that the DO impairment and flow both need to be included for a WPP to meet all requirements for approval as a watershed-based plan.

This project will result 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.

## **Water Quality Improvement Projects**

### *Green Infrastructure for Texas*

The [Green Infrastructure for Texas](#) project is a program of Texas A&M AgriLife Extension Service (Texas AgriLife) at the Texas Community Watershed Partners. Green Infrastructure for Texas aims to reach individual property owners, large scale undeveloped lands, and decision-makers in the watershed to increase local knowledge of green infrastructure, establish new partnerships, and empower entities to begin implementing green infrastructure practices in their communities. This project worked to demonstrate different green infrastructure practices throughout the lower Galveston Bay Watershed. In 2013, Texas AgriLife and Texas Parks and Wildlife Department (TPWD) partnered to establish vegetation monitoring protocols for newly created prairie wetlands at Sheldon Lake State Park. The goal of the vegetation monitoring was to understand how the plant community changes by season and over time (post initial planting). Currently, a total of 410 acres of former agricultural land has been restored to a coastal prairie freshwater wetland complex. The project restoration model can be used as a benchmark for similar projects in the watershed.

Additionally, Green Infrastructure for Texas initiated three wetland demonstration projects: 1) a basin on the MD Anderson Cancer Center campus in the Texas Medical Center in Houston; 2) three two-acre wetlands at Exploration Green Recreation Area in Clear Lake City; and 3) a basin at the Houston Botanic Garden. These sites demonstrate the benefits of designing wetlands into flood control basins to obtain water quality and natural habitat improvements.

### *Bacterial Source Tracking on Tributaries of Trinity and Galveston Bays*

The [Bacterial Source Tracking on Tributaries of Trinity and Galveston Bays](#) project looks to better characterize the origin of bacteria entering the bays by using bacteria source tracking (BST) techniques to determine the source of fecal bacteria from water samples. The Texas Water Resources Institute (TWRI) conducted monthly ambient water monitoring at five different waterbodies (Buffalo, Double, Cedar and Dickinson bayous, and Clear Creek) for a 12-month period (total of 60 water samples). TWRI also collected 75 known source fecal samples from the study area to supplement the Texas *Escherichia coli* (*E. coli*) BST Library. The water samples and known source samples were delivered to the Soil and Aquatic Microbiology Laboratory for *E. coli* isolation and analysis. Information from this project will help decision-makers determine appropriate management measures needed to reduce bacteria across the five waterbodies.

### *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 will follow a similar approach to the previous GBEP FY 2015 Top Five/Least Five project completed in May of 2017 but will only focus on the most impaired assessment units from the Top 10 “Most Wanted” Streams in the BIG project area. The previous project identified significant bacteria sources in four bacteria impaired assessment units in the BIG project area and reported those findings to local jurisdictions, which 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 convey the results to local jurisdictions and the general public to help promote the successes and importance of bacteria reduction efforts.





**Figure 3. Mary Stiles teaching children about the Galveston Bay watershed at Trash Bash 2019 (photo credit: Kristen McGovern).**

GBEP continued engaging communities with outreach and education through GBEP funded projects and partnering with stakeholders on various initiatives.

Examples of these activities include:

- Partnered with Artist Boat on an EPA grant for the *We Back the Bay* project that provided teachers from schools in the Galveston Bay watershed with professional development and curriculum resources for students. The participating schools also received funding and professional guidance for designing and building a water-smart landscape on the school's campuses. Ten percent of the funding for the landscape went toward outreach messaging using the Back the Bay campaign.
- Garnered funding from GOMA's Gulf Star Program for GBF to pilot a litter removal protocol for the region.
- Continued to partner with P3P to highlight messages about awareness on water pollution and marine debris risks to native wildlife at various education and outreach events.
- Continued participating 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. Partners are using Community-Based Social Marketing methods and working with the City of Galveston and the City of Texas City to install a photo display board with signed photos of anglers who have pledged to recycle their fishing line in bins at the site. This is a pilot program, and at the end of the pilot, partners will measure the success of the program and make needed changes before implementing to a wider audience.
- Presented the fishing line campaign project at the GOMA All Hands meeting and garnered support from the Education and Engagement Team for the project.
- Continued to share coordination with partner organizations on marine debris for a fourth Trash Summit workshop held at the Houston Zoo in May 2019. 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 this effort is to garner support for the Greater Houston-Galveston Trash-Based Aquatic Action Plan and coordinate research, removal, and reduction of litter in the region. More information on this effort can be found on the website [www.donttrashagoodthing.org](http://www.donttrashagoodthing.org).
- Partnered with Audubon Texas Coastal Program to conduct Texas Estuarine Restoration Network (TERN) program for City Municipal Libraries in Pasadena and Dickinson for children's programs that

engaged 65 children and 31 adults with the message of litter and plastic pollution prevention and protecting nesting birds on rookery islands.

- Partnered with Audubon Texas Coastal Program to deliver the TERN program to 600 students at a private school in Houston with a student population from an underrepresented community.
- Coordinated and hosted the 11<sup>th</sup> State of the Bay Symposium in Galveston, Texas.
- Coordinated and hosted 24 quarterly meetings of the GBC and its subcommittees.

### *Trash Bash*

Trash Bash 2020 was canceled; it is scheduled to be held on Saturday, March 27, 2021. In 2019, the 26<sup>th</sup> annual Trash Bash event had 4,290 volunteers from all over the Houston-Galveston area clean 153.30 miles of shoreline, collect approximately 56.09 tons of trash—including 513 tires—and recycle 2.82 tons of trash. During the 2019 event, GBEP hosted an outreach booth at Galveston-Virginia Point, one of 16 clean-up sites across the Houston-Galveston area. Each year, Trash Bash meets and surpasses volunteer goals.

The event promotes environmental stewardship and encourages volunteers to do their part at home by properly disposing of trash, household chemicals, and pet waste. Trash Bash supports two EPA FY 2018–2022 Strategic Plan Goals: Goal 1: A Cleaner, Healthier Environment 1.2) provide for clean and safe water and Goal 2: More Effective Partnerships 2.2) increase transparency and public participation. Trash Bash was awarded the TCEQ Texas Environmental Excellence Award, the Environmental Protection Agency Gulf Guardian Award, and the City of Houston/Keep Houston Beautiful Mayor's Proud Partner Award in Honor of project excellence and longevity. Trash Bash has received 30 awards in its lifetime, including nine in the last five years.

## **IMPROVING RESOURCE MANAGEMENT THROUGH TARGETED RESEARCH THAT INCREASES ECOSYSTEM UNDERSTANDING**

### *M&R Accomplishments*

Since the submission of the FY 2020 Work Plan, three M&R projects have reached completion and provided new insights into components of the Galveston Bay ecosystem:

[The Impacts of Assimilative Capacity of Reservoirs on Coastal Inflows](#) project evaluated the assimilative capacity of Lake Livingston reservoir and associated impacts on freshwater inflows to the Galveston Bay estuary system. Project data indicated that suspended sediments, phosphorus and total nitrogen in the water column decreased from north to south, likely due to higher turbidity in the northern portion of the lake. This indicates that nutrients and sediments are likely deposited in the main body of the reservoir, resulting in increased stratification of nutrient and sediment deposits in the southern portion of the lake. These project results suggest that Lake Livingston is a nutrient and sediment sink.

The [Freshwater Inflows in Galveston Bay: Relationship to Harmful Algal Blooms](#) project monitored phytoplankton populations at the entrance to Galveston Bay, enabling early detection of species entering the bay that may form harmful algal blooms. Although several harmful algal bloom-forming species were detected, they did not occur in high enough concentrations to qualify as a bloom or be considered harmful. The data incidentally captured changes in the phytoplankton community following Hurricane Harvey and the concomitant influx of freshwater into Galveston Bay. Although the phytoplankton community was dominated by dinoflagellates prior to the hurricane making landfall, post-Harvey the community comprised higher numbers of chlorophytes and cyanobacteria. No blooms occurred in association with the hurricane and may have been prevented by the high flushing rate of the bay due to flood water discharge.

The [Seafood Evaluation in a Portion of Upper Galveston Bay](#) project analyzed fish and crab samples from Upper Galveston Bay for environmental toxins to determine if adverse health effects could result from consumption. Fish and Shellfish Consumption Advisory 55 (ADV-55), issued by Texas Department of State Health Services (DSHS) in 2015, recommends that women of child-bearing age and children <12 do not eat and women past child-bearing age and adult men consume no more than one meal per month of all species of catfish, spotted seatrout, and blue crab from Upper Galveston Bay due to dioxins and polychlorinated biphenyls (PCBs) concentrations. Project results indicate that PCB and dioxin concentrations in gafftopsail catfish and spotted seatrout from Upper Galveston Bay still exceed DSHS guidelines for the protection of human health, while concentrations found in blue crabs no longer exceed DSHS guidelines for the protection of human health.

### *M&R Goals*

The M&R subcommittee has identified several focus priorities to guide the project selection process. These priorities include research on oyster reefs in intertidal areas, which is being targeted through the [Galveston Bay Intertidal Oyster Reef Mapping and Analysis](#) project; research on microplastics in Galveston Bay, which will

be 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 will be investigated through the [Lead Isotopes and Heavy Metal Concentrations in Galveston Bay Waters, Sediments, and Oysters](#), [Characterizing PCBs and Dioxins in the Houston Ship Channel and Galveston Bay Post Hurricane Harvey](#), and [The Distribution, Fate, and Transport of Emerging Contaminants in Galveston Bay](#) projects. Additional priorities to be targeted in upcoming projects include modeling larval transport in the Galveston Bay estuary and monitoring green infrastructure projects to determine water quality improvement success.

### **SECTION 2.3: STRATEGIC ACTION PLAN GOALS TO FOCUS ON IN FY 2021**

- 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*.

### **FY 2021 EXPECTED OUTCOMES**

- Conserve, restore, and enhance important coastal habitats.
- Improve knowledge of sources of bacteria pollution 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.
- Increase understanding of intertidal oyster population dynamics and community structure of oyster reefs.
- Improve knowledge of PCB and dioxin levels in Galveston Bay post Hurricane Harvey.
- Improve knowledge of lead isotope composition and heavy metal concentrations in Galveston Bay waters, sediments, and oysters.
- Improve knowledge of the types, quantities, and spatial distribution of microplastics in Galveston Bay and its tributaries.
- Improve knowledge of types and quantities of microplastics in Galveston Bay oysters relative to surface waters.
- Improve knowledge of spatial variation in oyster health relative to microplastic loads.
- Improve knowledge of microplastic accumulation in Galveston Bay fishes since 1952.
- Improve knowledge of the effect of microplastics on Galveston Bay fishes' swimming performance and physiology.
- Improve knowledge of spatial and temporal variation in per- and polyfluorinated alkyl substances (PFAS) and pharmaceutical and personal care products (PPCPs) concentrations in Galveston Bay and the Houston Ship Channel.

### **FY 2021 EXPECTED OUTPUTS**

- Conserve and protect 5,000 acres of habitat.
- Restore and enhance 802 acres of habitat.
- Complete/continue one BST project.
- Build upon three years of outreach on reducing NPS pollution by providing implementation resources for existing watershed-based plans.
- Coordinate/facilitate an environmental education workshop for educators who are working on environmental curriculum in the region.

- Complete two bird and wildlife habitat restoration projects that incorporate educational workshops, interpretive signage, and volunteer opportunities.
- Continue to participate in the coordination of Trash Bash.
- Continue implementing Back the Bay.
- Continue one project that monitors freshwater wetland restoration.
- Complete mapping oyster reef habitat and analysis of intertidal oyster population dynamics and community structure.
- Complete the State of the Bay Report, Fourth Edition.
- Maintain GBEP and Back the Bay websites.
- Continue an estuary resilience assessment of the goals, objectives, and actions in the *GBP, 2nd Edition*.
- 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.
- Complete a GIS database of oyster reef habitat in Galveston Bay.
- Initiate a targeted bacteria monitoring project to investigate sources of bacteria in impaired waterbodies and work with local jurisdictions to reduce or eliminate those sources.
- Initiate assessment of types and quantities of microplastics in watersheds draining to Galveston Bay.
- Initiate monitoring of PFAS and PPCPs concentrations in Galveston Bay and the Houston Ship Channel.
- Initiate monitoring of microplastic types and abundances in Galveston Bay oysters and surface water.
- Initiate analysis of historical microplastics accumulation in Galveston Bay fishes.
- Initiate construction of the RMD, containing datasets related to Galveston Bay conservation and management.

#### **FY 2018-2022 EPA STRATEGIC PLAN MEASURES IMPLEMENTED**

The projects proposed for FY 2021 implement objectives of all three goals identified in the FY 2018–2022 EPA Strategic Plan, including:

*Goal 1: A Cleaner, Healthier Environment - Deliver a cleaner, safer, and healthier environment for all Americans and future generations by caring out the Agency's core mission.*

- Objective 1.2: Provide for Clean and Safe Water: Ensure waters are clean through improved water infrastructure and, in partnership with states and tribes, sustainably manage programs to support drinking water, aquatic ecosystems, and recreational, economic, and subsistence activities.

As Objective 1.2 is the main goal of all NEPs, GBEP's projects focus on safeguarding human health and maintaining, restoring, and/or improving water quality through a variety of methods including land conservation, water quality implementation outreach, microplastics and emerging contaminants research, and development and implementation of watershed-based plans.

*Goal 2: More Effective Partnerships - Provide certainty to states, localities, tribal nations, and the regulated community in carrying out shared responsibilities and communicating results to all Americans.*

- Objective 2.1: Enhance Shared Accountability: Improve environmental protection through shared governance and enhanced collaboration with state, tribal, and federal partners using the full range of compliance assurance tools.

GBEP itself is an exercise in cooperative federalism between TCEQ, EPA, and the GBC. Projects are developed and implemented by a diverse partnership of federal and state agencies, local government, industry, and nonprofits.

- Objective 2.2: Increase Transparency and Public Participation: Listen to and collaborate with impacted stakeholders and provide effective platforms for public participation and meaningful engagement.

GBEP is a non-regulatory program that maintains stakeholder involvement associated with the GBC and its subcommittees. In addition, many of GBEP's projects have significant education and public outreach components that emphasize public participation to better partner with stakeholders and local communities to create tangible environmental results.

*Goal 3: Greater Certainty, Compliance, and Effectiveness - Increase certainty, compliance, and effectiveness by applying the rule of law to achieve more efficient and effective agency operations, service delivery, and regulatory relief.*

- Objective 3.3: Prioritize Robust Science: Refocus the EPA's robust research and scientific analysis to inform policy making.

GBEP's proposed M&R projects were developed and selected by the GBC and its subcommittees, composed of federal and state agencies, research and academia, and local industry, to address current and future environmental concerns and/or emerging environmental issues, develop new approaches, and improve the scientific foundation for environmental protection.

## **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**

To decrease the amount of toxic chemicals released into the environment via air, water, and waste pollutants in Texas by at least two percent, 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.

## **FY 2021 FEDERAL AND STATE FUNDING**

This request is for funding in the amount of \$662,500 (federal) and \$662,500 (state) for a total equaling \$1,325,000. The match ratio for this grant is 50/50. Full-time (FTE) equivalent for the grant are seven. Tables 5 and 6 provide funding and budget details.

**Table 5. FY 2021 Funding and FTE Summary**

| Program Element     |                             | Division               | Federal          | State Match      | Total              | FTEs     |
|---------------------|-----------------------------|------------------------|------------------|------------------|--------------------|----------|
| TCEQ Strategy 1.1.2 |                             |                        |                  |                  |                    |          |
| 1                   | GBEP Program Implementation | Water Quality Planning | \$662,500        | \$662,500        | \$1,325,000        | 7        |
| <b>Total</b>        |                             |                        | <b>\$662,500</b> | <b>\$662,500</b> | <b>\$1,325,000</b> | <b>7</b> |

**Table 6. FY 2021 Budget Detail**

| <b>Budget Detail- see also FY 2021 Federal Projects</b> | <b>Amount (\$)</b> |
|---|--------------------|
| Salaries (includes Fringe and Indirect)                 | \$608,272          |
| Travel  | \$9,418            |
| Capital   | \$12,000           |
| Supplies  | \$1,945            |
| Contracts   | \$6,000            |
| Other   | \$687,365          |
| <b>Total</b>  | <b>\$1,325,000</b> |

## **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, 2020, and to end August 31, 2023. 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 October 2019. The GBC approved the projects listed in this work plan at the October 16, 2019, 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: FY 2021 PROJECTS

#### SECTION 3.1: FY 2021 FEDERAL PROJECTS - SUMMARY

| PROJECT NAME  | FISCAL YEAR | FEDERAL      | STATE MATCH  | TOTAL 2021 GBEP BUDGET | STATUS  |
|---|-------------|--------------|--------------|------------------------|---------|
| Program Administration<br>(Includes supplies, travel, salary, fringe and indirect)                  | 2021        | \$309,967.50 | \$309,967.50 | \$619,935.00           | Annual  |
| Equipment   | 2021        | \$6,000.00   | \$6,000.00   | \$12,000.00            | New     |
| 1. <a href="#">GBEP Website Hosting and Maintenance</a>   | 2021        | \$3,000.00   | \$3,000.00   | \$6,000.00             | Annual  |
| 2. <a href="#">Mickey Leland Environmental Internship</a>   | 2021        | \$3,750.00   | \$3,750.00   | \$7,500.00             | Annual  |
| 3. <a href="#">Regional Monitoring Database</a>   | 2021        | \$65,000.50  | \$65,000.50  | \$130,001.00           | New     |
| Administration Total  |             | \$387,718.00 | \$387,718.00 | \$775,436.00           |         |
| 4. <a href="#">Conservation Assistance Program</a>  | 2021        | \$62,269.00  | \$62,269.00  | \$124,538.00           | Ongoing |
| NRU Total   |             | \$62,269.00  | \$62,269.00  | \$124,538.00           |         |
| 5. <a href="#">Targeted Bacteria Monitoring</a>   | 2021        | \$20,000.00  | \$20,000.00  | \$40,000.00            | Ongoing |
| 6. <a href="#">Outreach Implementation for Galveston Bay Watershed Water Quality Projects</a>       | 2021        | \$20,000.00  | \$20,000.00  | \$40,000.00            | New     |
| 7. <a href="#">Baseline Assessment of Microplastics in Galveston Bay</a>                            | 2021        | \$22,500.00  | \$22,500.00  | \$45,000.00            | New     |
| WSQ Total   |             | \$62,500.00  | \$62,500.00  | \$125,000.00           |         |
| 8. <a href="#">Trash Bash 2021</a>  | 2021        | \$5,000.00   | \$5,000.00   | \$10,000.00            | Ongoing |
| 9. <a href="#">Audubon TERN Citizen Science in Schools: Students as Field Researchers</a>           | 2021        | \$24,661.50  | \$24,661.50  | \$49,323.00            | New     |
| 10. <a href="#">Microplastics in the Galveston Bay Watershed: The Big Impacts of Tiny Pollution</a> | 2021        | \$32,229.00  | \$32,229.00  | \$64,458.00            | New     |
| PPE Total   |             | \$61,890.50  | \$61,890.50  | \$123,781.00           |         |
| 11. <a href="#">Galveston Bay Oyster Microplastics: Baselines and Impacts</a>                       | 2021        | \$45,213.50  | \$45,213.50  | \$90,427.00            | New     |

|   |      |              |              |                |     |
|---|------|--------------|--------------|----------------|-----|
| 12. <a href="#">The Effect of Microplastics on the Base of Marine Food Webs</a>                     | 2021 | \$18,469.50  | \$18,469.50  | \$36,939.00    | New |
| 13. <a href="#">The Distribution, Fate, and Transport of Emerging Contaminants in Galveston Bay</a> | 2021 | \$24,439.50  | \$24,439.50  | \$48,879.00    | New |
| M&R Total   |      | \$88,122.50  | \$88,122.50  | \$176,245.00   |     |
| FUNDING REQUEST<br>GRANT TOTAL  |      | \$662,500.00 | \$662,500.00 | \$1,325,000.00 |     |

## SECTION 3.2: FY 2021 FEDERAL PROJECT - DETAIL

### 3.2A - ADMINISTRATIVE PROJECTS FOR FY 2021

#### 1. GBEP Website Hosting and Maintenance

**CCMP Actions Implemented:** PPE-1, PPE-3, PPE-7, PPE-8

**EPA's Strategic Plan Measures Implemented:** Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.5 – Improve Efficiency and Effectiveness

**Grantee/Contractor:** Wilkins Group

**FY 2021 Budget:** \$6,000 (\$3,000 Federal, \$3,000 State)

**Total Project Budget:** \$6,000 (\$6,000 from Award #CE-00655007)

**Milestones:** N/A

**Project period:** September 2020–August 2021

**Status:** Annual project.

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

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

- [www.gbep.texas.gov](http://www.gbep.texas.gov): Tasks for GBEP website include maintenance and updates as needed throughout the year, hosting, and domain name registration;
- [www.backthebay.org](http://www.backthebay.org): Tasks for the Back the Bay website include maintenance and updates as needed throughout the year, hosting, and domain name registration;
- [www.gbep.texas.gov/galveston-bay-plan](http://www.gbep.texas.gov/galveston-bay-plan): Tasks for the *GBP, 2<sup>nd</sup> Edition* website include maintenance and updates as needed throughout the year, hosting, and domain name registration.

#### 2. Mickey Leland Environmental Intern

**CCMP Actions Implemented:** General support of all Action Plans

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** Goodwill Staffing Services/TCEQ

**FY 2021 Budget:** \$7,500 (\$3,750 Federal, \$3,750 State)

**Total Project Budget:** \$7,500 (\$7,500 from Award #CE-00655007)

**Milestones:** The selected intern will develop a white paper and final presentation that summarizes their efforts at the end of the summer internship period.

**Project period:** May 2021–August 2021

**Status:** Annual project.

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

**Project Description:** The Mickey Leland Environmental Intern will generate a white paper and final presentation that summarizes their efforts at the end of the summer internship period. The intern will work on a project that helps to implement or track implementation of the *GBP*.

### 3. Regional Monitoring Database

**CCMP Actions Implemented:** RSC-2

**EPA's Strategic Plan Measures Implemented:** Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** GeoTechnology Research Institute (GTRI)

**FY 2021 Budget:** \$130,001 (\$65,000.50 Federal, \$65,000.50 State)

**Total Project Budget:** \$350,227 (\$130,001 from Award #CE-00655007: FY 2021 \$130,001)

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project period:** September 2020–August 2024 (total project period to August 2025)

**Status:** New project.

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

**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, 2<sup>nd</sup> Edition*. Datasets included in the RMD will be informed by the ecosystem indicators identified in *GBP, 2<sup>nd</sup> Edition*. The RMD will: assist in evaluating whether the goals and objectives of the *GBP, 2<sup>nd</sup> 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):** GTRI will perform the tasks necessary to develop and launch the RMD. GTRI will consult with local stakeholders for input and feedback throughout the process.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- QAPP due November 2020;
- RMD to be released in three phases;
- Galveston Bay datasets and metadata; and
- Final report due July 2025.

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

### 3.2B - NRU PROJECTS FOR FY 2021

#### 4. Conservation Assistance Program

**CCMP Actions Implemented:** HP-1, HP-5, SP-1, SM-5, PPE-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water, Objective 1.3 – Revitalize Land and Prevent Contamination; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** GBF

**FY 2021 Budget:** \$124,538 (\$62,269 Federal, \$62,269 State)

**Total Project Budget:** \$600,000 (\$200,000 from Award #CE-00655006: FY 2018 \$100,000, FY 2019 \$100,000; \$224,538 from Award #CE-00655007: FY 2020 \$100,000, FY 2021 \$124,538)

**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 July 2018. Conservation Assistance Program work group meetings were held November 2018, March 2018, June 2019, and November 2019. Several acquisition projects are being developed, and one project (Angleton Prairie) has been completed.

**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 workgroup is comprised of a diverse group of federal, state, local, and non-governmental organization resource managers.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Annual report due August 31 until contract expiration; and
- Final report due August 2023.

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

### 3.2C - WSQ PROJECTS FOR FY 2021

#### 5. Targeted Bacteria Monitoring

**CCMP Actions Implemented:** NPS-1, NPS-2, NPS-3, PH-3, RSC-2, PPE-7

**EPA's Strategic Plan Measures Implemented:** Goal 1 - A Cleaner, Healthier Environment, Objective 1.2 - Provide for Clean and Safe Water; Goal 2 - More Effective Partnerships, Objective 2.1 - Enhance Shared Accountability, Objective 2.2 - Increase Transparency and Public Participation

**Grantee/Contractor:** H-GAC

**FY 2021 Budget:** \$40,000 (\$20,000 Federal, \$20,000 State)

**Total Project Budget:** \$80,000 (\$80,000 from Award #CE-00655007: FY 2020 \$40,000, FY 2021 \$40,000)

**Milestones:** The QAPP was executed in March 2020.

**Project period:** September 2019–August 2022

**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:** In its annual reports, the BIG identifies the Top 10 "Most Wanted" Streams - those designated assessment units with the highest geomeans of *E. coli* concentrations in the BIG project area. For the past eight years, the Bayou Preservation Association and/or H-GAC have conducted intensive bacteria monitoring within the most impaired assessment units, to help move these streams back to attaining the applicable recreational water quality standards.

This project will focus on the most impaired assessment units with the goal to identify relative differences in bacteria levels for the purpose of narrowing down the geographic location of the potential sources. When potential sources are identified, the information will be passed on to local authorities in a targeted monitoring report. The Performing Party will encourage local jurisdictions to investigate any identified sources and will report back on any action taken to address the identified source(s).

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

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Findings and preliminary action report June 2020;
- Outreach and education summary due June 2022;

- Targeted monitoring report August 2022; and
- Final report due August 2022.

**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 general public.

## 6. Outreach Implementation for Galveston Bay Watershed Water Quality Projects

**CCMP Actions Implemented:** NPS-1, NPS-2, NPS-3, NPS-5, PPE-5, PPE-7, PH-3

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** H-GAC

**FY 2021 Budget:** \$40,000 (\$20,000 Federal, \$20,000 State)

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

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project Period:** September 2020–August 2022

**Status:** New 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;
- Community-based needs assessment report due January 2022;
- Project Outreach and Education Plan report due July 2022;
- Final report due August 2022.

**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.

## 7. Baseline Assessment of Microplastics in Galveston Bay

**CCMP Actions Implemented:** NPS-3, WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** U.S. Geological Survey (USGS)

**FY 2021 Budget:** \$45,000 (\$22,500 Federal, \$22,500 State)

**Total Project Budget:** \$45,000 (\$45,000 from Award #CE-00655007: FY 2021 \$45,000)

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project Period:** September 2020–May 2023

**Status:** New 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 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 to 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 the USGS Microplastics Laboratory in the Washington Water Science Center 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 due May 2023; and
- Project summary due May 2023.

**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.

### 3.2D - PPE PROJECTS FOR FY 2021

#### 8. Trash Bash 2021

**CCMP Actions Implemented:** PPE-1, PPE-3, PPE-5, SD-5

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** H-GAC

**FY 2021 Budget:** \$10,000 (\$5,000 Federal, \$5,000 State)

**Total Project Budget:** \$35,000 (FY 2019 \$15,000 from Award #CE-00655006; \$20,000 from Award #CE-00655007; FY 2020 \$10,000, FY 2021 \$10,000)

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

**Project Period:** September 2018–August 2021

**Status:** Ongoing project. The Trash Bash Steering Committee is planning 2021 Trash Bash event.

**Objective(s):** The goal of Trash Bash is to promote environmental stewardship of the watershed through public education and providing 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 FY 2021, funding will go towards salary and fringe benefits for a portion of the H-GAC Trash Bash coordinator position and printing/lamination of replacement signs for all 16 sites.

**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 July 31 annually; and

- Final report due July 2021.

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

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

**CCMP Actions Implemented:** PPE-1, PPE-4, PPE-5

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** Harris County Department of Education

**FY 2021 Budget:** \$49,323 (\$24,661.50 Federal, \$24,661.50 State)

**Total Project Budget:** \$49,323 (\$49,323 from Award #CE-00655007: FY 2021 \$49,323)

**Milestones:** Coordination/orientation meeting anticipated in September 2020, teacher recruitment and training in December 2020.

**Project Period:** September 2020–August 2022

**Status:** New 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):** Harris County Department of Education 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 due June 2021; and
- Final Report due July 2022.

**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.

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

**CCMP Actions Implemented:** PPE-1, PPE-4, PPE-5, NPS-3, WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** UHCL

**FY 2021 Budget:** \$64,458 (\$32,229 Federal, \$32,229 State)

**Total Project Budget:** \$64,458 (\$64,458 from Award #CE-00655007: FY 2021 \$64,458)

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project Period:** September 2020–August 2023

**Status:** New 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 a 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 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):** Turtle Island Restoration Network will provide teacher and student training and oversee student data collection. UHCL will collect data, conduct research and geospatial statistical analysis of that data for microplastics in along designated shorelines in Galveston Bay. UHCL seeks to characterize the spatial distribution of plastic debris along Galveston bay shorelines.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Public outreach plan due December 2020;
- Teacher and student training materials;
- Student Citizen Science Sampling in Galveston Bay Task Report due May 2023; and
- Final Report due July 2023.

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

### 3.2E - M&R PROJECTS FOR FY 2021

#### 11. Galveston Bay Oyster Microplastics: Baselines and Impacts

**CCMP Actions Implemented:** WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

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

**FY 2021 Budget:** \$90,427 (\$45,213.50 Federal, \$45,213.50 State)

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

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project Period:** September 2020–October 2022

**Status:** New project.

**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 (pieces of plastic 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 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. University of Houston (UH) will



complete measurements of oyster condition index. GBF will facilitate the creation and dissemination of outreach and education materials.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- QAPP due November 2020;
- 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 due September 2022.

**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.

**12. The Effect of Microplastics on the Base of Marine Food Webs**

**CCMP Actions Implemented:** WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** TAMUG

**FY 2021 Budget:** \$36,939 (\$18,469.50 Federal, \$18,469.50 State)

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

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project Period:** September 2020–August 2022

**Status:** New project.

**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 Galveston Bay estuary system. 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 due November 2020;
- Model of historical microplastic accumulation in Galveston Bay fishes;
- Respiratory and swimming performance data; and
- Final report due July 2022.

**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.

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

#### **CCMP Actions Implemented:** WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** TAMU

**FY 2021 Budget:** \$48,879 (\$24,439.50 Federal, \$24,439.50 State)

**Total Project Budget:** \$98,428 (\$98,428 from Award #CE-00655007: FY 2021 \$48,879, FY 2022 \$49,549)

**Milestones:** Coordination/orientation and QAPP meeting anticipated in September 2020.

**Project Period:** September 2020–December 2022

**Status:** New project.

**Objective(s):** This project will measure concentrations of PFAS and PPCPs in water and sediment in Galveston Bay and the Houston Ship Channel over a two-year period.

**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. The Performing Party will conduct quarterly field observations at 13 sites in Galveston Bay and the Houston Ship Channel over a two-year period, 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 in relation to 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 due November 2020;
- PFAS concentration data for water and sediment samples;
- PPCPs concentration data for water and sediment samples; and
- Final report due November 2022.

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

**SECTION 3.3: FY 2021 GRANT BUDGET SPREADSHEETS***3.3A - FY 2021 Grant Budget by Category - Summary*

| <b>FY 2021<br/>Grant Budget<br/>Totals</b> | <b>Administration</b> | <b>NRU</b>      | <b>WSQ</b>       | <b>PPE</b>       | <b>M&amp;R</b>   | <b>Total Costs</b> |
|--|-----------------------|-----------------|------------------|------------------|------------------|--------------------|
| Project #                                  | TBD                   | TBD             | TBD              | TBD              | TBD              | TBD                |
| Salaries                                   | \$353,174             | \$0             | \$0              | \$0              | \$0              | \$353,174          |
| Contracts                                  | \$6,000               | \$0             | \$0              | \$0              | \$0              | \$6,000            |
| Travel                                     | \$9,418               | \$0             | \$0              | \$0              | \$0              | \$9,418            |
| Other                                      | \$172,587             | \$89,752        | \$125,000        | \$123,781        | \$176,245        | \$687,365          |
| Supplies                                   | \$1,945               | \$0             | \$0              | \$0              | \$0              | \$1,945            |
| Equipment                                  | \$12,000              | \$0             | \$0              | \$0              | \$0              | \$12,000           |
| Construction                               | \$0                   | \$0             | \$0              | \$0              | \$0              | \$0                |
| <b>Sub-Total</b>                           | <b>\$555,124</b>      | <b>\$89,752</b> | <b>\$125,000</b> | <b>\$123,781</b> | <b>\$176,245</b> | <b>\$1,069,902</b> |
| Fringe 38.65%                              | \$136,007             | \$0             | \$0              | \$0              | \$0              | \$136,007          |
| Indirect 33.25%                            | \$119,091             | \$0             | \$0              | \$0              | \$0              | \$119,091          |
| <b>GRANT TOTAL</b>                         | <b>\$810,222</b>      | <b>\$89,752</b> | <b>\$125,000</b> | <b>\$123,781</b> | <b>\$176,245</b> | <b>\$1,325,000</b> |



### 3.3B - FY 2021 Grant Budget by Category - Detail

| <b>FY 2021 GBEP Budget Summary by Grant Budget Category</b>   | <b>Amount</b>      |
|---|--------------------|
| <b>Salaries</b>   | <b>\$353,174</b>   |
| Salaries for GBEP Staff Members   | \$353,174          |
| <b>Contracts</b>  | <b>\$6,000</b>     |
| Website Hosting Costs   | \$6,000            |
| <b>Travel</b>   | <b>\$9,418</b>     |
| Travel for GBEP Program Manager and GBEP staff member to attend the Fall NEP meeting and the Restoring America's Estuary Conference | \$4,790            |
| Travel for GBEP Program Manager to attend Spring EPA NEP Workshop   | \$2,828            |
| Travel for two GBEP staff members to attend GOMA conference   | \$1,800            |
| <b>Other</b>  | <b>\$687,365</b>   |
| Mickey Leland Intern  | \$7,500            |
| Reginal Monitoring Database   | \$130,001          |
| Conservation Assistance Program   | \$124,538          |
| Targeted Bacteria Monitoring  | \$40,000           |
| Outreach Implementation for Galveston Bay Watershed Water Quality Projects  | \$40,000           |
| Baseline Assessment of Microplastics in Galveston Bay   | \$45,000           |
| Trash Bash 2021   | \$10,000           |
| Audubon TERN Citizens Science in Schools: Students as Field Researchers   | \$49,232           |
| Microplastics in the Galveston Bay Watershed: The Big Impacts of Tiny Pollution   | \$64,458           |
| Galveston Bay Oyster Microplastics: Baselines and Impacts   | \$90,427           |
| The Effect of Microplastics on the Base of Marine Food Webs   | \$36,939           |
| The Distribution, Fate, and Transport if Emerging Contaminants in Galveston Bay   | \$48,879           |
| Other Operating Expenses (website domain registration)  | \$300              |
| <b>Supplies</b>   | <b>\$1,945</b>     |
| *Supplies (replace office laptop ( $\leq$ \$1,500) and outreach and education supplies)   | \$1,945            |
| <b>Capital</b>  | <b>\$12,000</b>    |
| *Equipment (replace video-teleconference system (VTC))  | \$12,000           |
| <b>Fringe and Indirect</b>  | <b>\$255,098</b>   |
| <b>FY 2021 GRANT TOTAL</b>  | <b>\$1,325,000</b> |

\*The VTC system is used by program staff to attend trainings and meetings held at TCEQ headquarters (Austin, TX) remotely, and the laptop is shared by GBEP staff to use during meetings, travel, and group webinars. The costs are estimates as GBEP has not received final quotes and or final authority approval from TCEQ.

### 3.3C - FY 2021 Travel Summary by Trip

| FY 2021 Travel Summary by Trip  | Amount  |
|---|---------|
| Fall NEP Tech Transfer Meeting in Providence, Rhode Island (2-person travel, 4 days)  | \$4,790 |
| Airfare   | \$2,100 |
| Airport Parking   | \$300   |
| Lodging (\$157/night)   | \$1,256 |
| Hotel Tax (13.0%)   | \$244   |
| Taxi/transport  | \$200   |
| Per diem (\$55/day)   | \$440   |
| Conference registration   | \$250   |
| Spring EPA-NEP Workshop in Washington, D.C. (1-person travel, 4 days).  | \$2,828 |
| Airfare   | \$1,286 |
| Airport Parking   | \$150   |
| Lodging (\$189/night)   | \$756   |
| Hotel Tax (14.5%)   | \$110   |
| Taxi/transport  | \$100   |
| Per diem (\$69/day)   | \$276   |
| Conference registration   | \$150   |
| Travel for two GBEP staff members to attend GOMA conference (2-person travel, 5 days). Travel costs for the GBEP Program Manager will be covered by GOMA. | \$1,800 |
| FY 2021 Travel Estimate Total*  | \$9,418 |

\*All out of state travel is dependent on TCEQ management review and approval. Rates for FY 2021 are subject to change and estimates are based on previous trips from FY 2020 as well as the current FY 2020 federal and state per diem rates.

## SECTION 4: ONGOING PROJECTS

### SECTION 4.1: ONGOING FEDERAL PROJECTS - SUMMARY

| Ongoing Projects  |                 | Award #CE-00655007 |             |             | Award #CE-00655006 |
|---|-----------------|--------------------|-------------|-------------|--------------------|
| PROJECT NAME  | Contract Number | Funding Years      | 2021 Budget | 2020 Budget | 2017-2019 Budget   |
| 1. <a href="#">GBEP Website Hosting and Maintenance</a>   | N/A             | 2017-2021          | \$6,000     | \$6,000     | \$38,802           |
| 2. <a href="#">Mickey Leland Environmental Internship</a>   | N/A             | 2017-2021          | \$7,500     | \$7,500     | \$23,798           |
| 14. <a href="#">State of the Bay Report, Fourth Edition</a>   | 18-80343        | 2018-2020          | \$0         | \$25,000    | \$85,000           |
| 15. <a href="#">Estuary Resilience Assessment</a>   | 19-90217        | 2019-2022          | \$0         | \$20,000    | \$30,000           |
| Administration Total  |                 |                    | \$13,500    | \$58,500    | \$177,600          |
| 4. <a href="#">Conservation Assistance Program</a>  | 18-80344        | 2018-2023          | \$124,538   | \$100,000   | \$200,000          |
| NRU Total   |                 |                    | \$124,538   | \$100,000   | \$200,000          |
| 16. <a href="#">Bacteria Source Tracking on Tributaries of Trinity and Galveston Bays</a>   | 18-80240        | 2018-2020          | \$0         | \$21,421    | \$218,579          |
| 17. <a href="#">Highland Bayou Watershed Protection Plan</a>  | 19-90214        | 2019-2020          | \$0         | \$0         | \$68,362           |
| 18. <a href="#">Occurrence of Microplastics in Tributaries to Galveston Bay</a>   | 20-10173        | 2020-2021          | \$0         | \$40,000    | \$0                |
| 5. <a href="#">Targeted Bacteria Monitoring</a>   | 20-10367        | 2020-2021          | \$40,000    | \$40,000    | \$0                |
| WSQ Total   |                 |                    | \$40,000    | \$101,421   | \$286,941          |
| 7. <a href="#">Trash Bash 2021</a>  | 19-90216        | 2019-2021          | \$10,000    | \$10,000    | \$15,000           |
| 19. <a href="#">Texas Estuarine Resource Network Citizen Science Program in Galveston Bay</a>   | 17-73627        | 2017-2020          | \$0         | \$0         | \$75,000           |
| 20. <a href="#">Know Your Watershed</a>   | 19-90211        | 2019-2020          | \$0         | \$0         | \$38,341           |
| 21. <a href="#">Blackhawk Park Coastal Prairie Restoration and Education Project</a>  | 19-90212        | 2019-2020          | \$0         | \$0         | \$53,600           |
| 22. <a href="#">Galveston Seawall Recycling</a>   | 19-90210        | 2019-2020          | \$0         | \$0         | \$18,420           |
| 23. <a href="#">Public Perception Assessment and Community-Based Social Marketing Campaigns to Enhance Conservation and Educational Outreach Programs</a> | 20-10175        | 2020-2021          | \$0         | \$86,000    | \$0                |
| PPE Total   |                 |                    | \$10,000    | \$96,000    | \$200,361          |
| 24. <a href="#">Galveston Bay Intertidal Oyster Reef Mapping and Analysis</a>   | 19-90213        | 2019-2020          | \$0         | \$0         | \$64,883           |
| 25. <a href="#">Lead Isotopes and Heavy Metal Concentrations in Galveston Bay Waters, Sediments, and Oysters</a>  | 20-10170        | 2020-2021          | \$0         | \$133,668   | \$0                |
| 26. <a href="#">Characterizing PCBs and Dioxins in the Houston Ship Channel and Galveston Bay Post Harvey</a>   | 20-10179        | 2020-2021          | \$0         | \$60,000    | \$0                |
| M&R Total   |                 |                    | \$0         | \$193,668   | \$64,883           |
| GRANT TOTAL-ONGOING PROJECT FUNDING   |                 |                    | \$188,038   | \$549,589   | \$950,147          |

## **SECTION 4.2: ONGOING FEDERAL PROJECTS - DETAIL**

### **4.2A - ONGOING ADMINISTRATIVE PROJECTS**

#### **14. The State of the Bay, Fourth Edition**

**CCMP Actions Implemented:** All

**EPA's Strategic Plan Measures Implemented:** Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

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

**Total Project Budget:** \$110,000 (\$85,000 from Award #CE-00655006: FY 2018 \$85,000; \$25,000 from Award #CE-00655007: FY 2020 \$25,000)

**Milestones:** Draft chapters, storyboard, and success stories submitted for review by October 2019. Submit draft chapters, storyboard, and success stories to GBC and subcommittees by May 2020. Release website October 2020.

**Project period:** September 2017–December 2020

**Status:** Ongoing project. Chapters from the previous State of the Bay Report are being updated and new chapters, storyboard, and success stories are being revised based on comments by GBEP and TCEQ.

**Objective(s):** To create a web-based State of the Bay Report, 4<sup>th</sup> Edition based on the *GBP, 2<sup>nd</sup> Edition*. The report will summarize *GBP* implementation, research findings, monitoring data, indicators, and metrics for the Galveston Bay watershed. Information will be aggregated by sub-bay, watershed, or station as appropriate, based on stakeholder input and acquired and quality-assured monitoring data collected through 2017.

**Project Description:** The State of the Bay Report is a summary of current *GBP* implementation. This will include research, analysis, and presentation of the indicators and metrics available for Galveston Bay based on acquired and quality-assured monitoring data from the Galveston Bay Status and Trends project. Information will be related to the goals of the *GBP, 2<sup>nd</sup> Edition* and issues of concern for managers and stakeholders. The State of the Bay Report will be developed in a web-based format that will enable content, graphics, narrative GIS storyboard, analysis, and linked data to be presented in a format that is easily updated, sharable, and accessible to managers, scientists, and other stakeholders. In this format, the State of the Bay Report can become a continuing electronic record of the progress of the *GBP, 2<sup>nd</sup> Edition* and the accomplishments of GBEP, GBC, and partner organizations.

**Partners and Their Role(s):** HARC/GTRI

**Outputs/Deliverables:**

- Crosswalk document between old State of the Bay Report and new;
- 11 updated sections in a web format, storyboard and success stories;
- Quarterly progress reports until contract expiration;
- Final State of the Bay Report website due October 2020; and
- Final report due December 2020.

**Long-term Outcomes:** State of the Bay Report updated with the most current data and in a sharable and accessible format.

#### **15. Estuary Resilience Assessment**

**CCMP Actions Implemented:** Galveston Bay Regional Monitoring Program.

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** HARC/GTRI

**Total Project Budget:** \$50,000 (\$30,000 from Award #CE-00655006: FY 2019 \$30,000; \$20,000 from Award #CE-00655007: FY 2020 \$20,000)

**Milestones:** Draft Consequence/Probability Matrix due February 2020, Final Workgroup meeting in May 2020, and Final Consequence/Probability Matrix by July 2020.

**Project period:** September 2018–February 2022

**Status:** Ongoing project. The project and development of the report were significantly delayed due to a contract amendment executed in December 2019. Two stakeholder meetings have been held, and the work group is contributing to the assessment. HARC/GTRI developed a draft Consequence/Probability Matrix in

February 2020.

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

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

**Partners and Their Role(s):** While the lead contractor is HARC/GTRI, the Estuary Resilience Assessment 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:**

- Three stakeholder meetings or workshops;
- Quarterly progress reports until contract expiration;
- Final Estuary Resilience Assessment document and report due April 2020; and
- Final report due August 2020.

**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.

#### 4.2B - ONGOING NRU PROJECTS

None

#### 4.2C - ONGOING WSQ PROJECTS

##### 16. Bacteria Source Tracking on Tributaries of Trinity and Galveston Bays

**CCMP Actions Implemented:** NPS-3, WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 - A Cleaner, Healthier Environment, Objective 1.2 - Provide for Clean and Safe Water; Goal 2 - More Effective Partnerships, Objective 2.1 - Enhance Shared Accountability, Objective 2.2 - Increase Transparency and Public Participation; Goal 3 - Greater Certainty, Compliance, and Effectiveness, Objective 3.3 - Prioritize Robust Science

**Grantee/Contractor:** Texas AgriLife/TWRI

**Total Project Budget:** \$240,000 (\$218,579 from Award #CE-00655006: FY 2018 \$80,000, FY 2019 \$138,579; \$21,421 from Award #CE-00655007: FY2020 \$21,421)

**Milestones:** Known source fecal isolates have been added to the Texas *E. coli* BST library. Analysis of BST results and preparation of final reports are underway.

**Project Period:** September 2017-August 2020

**Status:** Ongoing project. The project is nearing completion, a no-cost extension will extend the contract end date to August 2020.

**Objective(s):** To gather information needed to address bacteria concerns in five watersheds of Trinity and Galveston Bays.

**Project Description:** Through this project, a water quality monitoring regime will be employed that will help decision-makers make appropriate recommendations for addressing the bacteria impairments in Buffalo, Double, Cedar, and Dickinson bayous and Clear Creek. Monthly sampling will be conducted by TWRI at one site on each waterbody for 12 months (five total sites). Field parameters collected will include pH, temperature, conductivity, and DO. Water samples will be collected and delivered to the TAMU Soil and Aquatic Microbiology Laboratory where *E. coli* will be prepared for BST analysis. The Soil and Aquatic Microbiology Laboratory will also conduct library-dependent BST and analyze *E. coli* isolates (four isolates per sample) using the ERIC-PCR and RiboPrinting combination method. TWRI will collect approximately 75 known source samples from local watersheds to improve the accuracy of BST results. Known source sample isolates will be archived in the Texas *E. coli* BST library. Results of both the known source sampling and BST analysis will be reported in a project final report and presented as necessary.

**Partners and Their Role(s):** TAMU will perform all water quality monitoring and collect all fecal samples. All water and fecal samples will be delivered to the Soil and Aquatic Microbiology Laboratory for analysis. The Soil and Aquatic Microbiology Laboratory will add source fecal samples to the BST Library using the ERIC-PCR and RiboPrinting combination method.

## Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Data results and interpretation due July 2020;
- Analysis of BST results for presentation and inclusion in the final report due July 2020;
- Final white paper due July 2020; and
- Final report due July 2020.

**Long-term Outcomes:** This project will provide a better understanding of the sources contributing to bacteria pollution in the lower Galveston Bay watershed. BST will further characterize the watershed and support the implementation of local watershed-based plans. The information will help decision-makers determine the most appropriate management measures needed to reduce bacteria.

### 17. Highland Bayou Watershed Protection Plan

**CCMP Actions Implemented:** NPS-3; WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** Texas AgriLife

**Total Project Budget:** \$68,362 (\$68,362 from Award #CE-00655006: FY 2019 \$68,362)

**Milestones:** Stakeholder meetings to get approval for the revised draft WPP. Submit draft WPP to TCEQ for review and submit final WPP to EPA for consistency review.

**Project Period:** September 2018–May 2020

**Status:** Ongoing project. The WPP is being revised and will then be submitted to TCEQ and EPA.

**Objective(s):** The goal of this project is to update the Highland Bayou WPP to include load reduction estimates which incorporate flow data in order to address both bacteria and DO impairments, and to shepherd the WPP through TCEQ and EPA Region 6 approval process.

## Project Description:

Highland and Marchand bayous sometimes experience periods of low 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 within Highland Bayou (segment 2424A) and Marchand Bayou (segment 2424C) as impaired for these constituents of concern.

Texas AgriLife has coordinated the creation of a characterization report and a stakeholder driven draft WPP for Highland Bayou. The current draft WPP only addresses bacteria and work to address the DO impairment is ongoing. Recent guidance from the EPA indicates that the DO impairment and flow both need to be included for a WPP to meet all requirements for approval as a watershed-based plan.

During FY 2018, the Texas Institute for Applied Environment Research (TIAER) at Tarleton State University, with funding from TCEQ's Total Maximum Daily Load (TMDL) program explored options for modeling flow with existing data from surrogate watersheds using various methods. TIAER's goal was to find an acceptable protocol for addressing flow without collecting new data. Once an acceptable protocol was determined, the TCEQ TMDL program began funding a second year (FY 2019) of work to complete the modeling and associated load reduction calculations for both bacteria and DO. The load reduction calculations will then be used to re-prioritize management measures and complete the WPP.

**Partners and Their Role(s):** TIAER and TCEQ's TMDL program.

## Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Education and outreach plan due November 2018;
- Updated Highland Bayou WPP website due November 2018;
- Draft WPP due March 2020; and
- Final report due May 2020.

**Long-term Outcomes:** Improved water quality in Highland and Marchand bayous.

### 18. Occurrence of Microplastics in Tributaries to Galveston Bay

**CCMP Actions Implemented:** NPS-3, WSQ-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 –



Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** USGS

**Project Budget:** \$40,000 (\$20,000 Federal, \$20,000 State)

**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–August 2021

**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 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 microplastics 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 the collection and analysis of microplastics from surface water samples. Collected samples will be submitted to the USGS Microplastics Laboratory in the Washington Water Science Center 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 due July 2021; and
- Project summary due August 2021.

**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.

## 4.2D - ONGOING PPE PROJECTS

### 19. Texas Estuarine Resource Network Citizen Science Program in Galveston Bay

**CCMP Actions Implemented:** PPE-1, PPE-5, PPE-8, SP-8, HP-7

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** TPWD

**Total Project Budget:** \$75,000 (\$75,000 from Award #CE-00655006: FY 2017 \$25,000, FY 2018 \$50,000)

**Milestones:** Final report due May 2020.

**Project period:** August 2017–August 2020

**Status:** Ongoing project. Audubon completed the Seabird Scout materials and workshop trainings for volunteers to help identify local colonial waterbirds and what to do when encountering an injured bird as well as permit requirements for transporting injured birds. Audubon conducted presentations at area schools and libraries and community groups on plastic pollution, bird identification, bird migration, and data collection.

**Objective(s):** The goal of this project is to conduct outreach and education on plastic pollution and wildlife

entanglement. Project partners will also develop a working guidance plan such as a Standard Operating Procedure for volunteers who will collect information to identify and report injured and sick birds and wildlife in need of aid.

**Project Description:** This project aims to develop a Seabird Scout Project and a plastic pollution education program to provide educational opportunities for new and existing citizen scientists. These volunteers will assist with documenting and coordinating a response to birds that have been injured by anthropogenic sources and educate the public on the impacts of plastic pollution. Project partners will work with volunteers to coordinate the collection of recycled monofilament fishing line materials and gather data from, at a minimum of three stations in Galveston County. This will help fill data gaps for area partners installing and maintaining fishing line recycling stations. Because there are limited resources and individuals who are permitted to handle and transport injured birds, an information guidance document pertaining to the TPWD and USFWS permitting process will be developed for citizen scientists so they can assist with capture and transport injured birds and wildlife in the Galveston Bay. The document will also provide volunteers with information regarding the necessary steps, timeline, and fees required for the permitting process.

**Partners and Their Role(s):** TPWD provided a memorandum of agreement with Audubon Texas and will be providing guidance for developing the permitting process document that will be produced by Audubon Texas. Additionally, Audubon Texas will conduct public outreach and education and coordinate the citizen scientist activities.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Education and outreach materials;
- Permitting process information document; and
- Installing and maintaining monofilament fishing line recycling containers.
- Final report due May 2020.

**Long-term Outcomes:** Supporting citizen science training and development and increasing the monitoring knowledge of injured birds and wildlife in the Galveston Bay watershed. Educating the public on the impacts of plastic pollution.

## 20. Know Your Watershed Educators Summer Institute

**CCMP Actions Implemented:** PPE-1, PPE-3, PPE-7, HP-1, FW-6

**EPA's Strategic Plan Measures Implemented:** Goal 1 - A Cleaner, Healthier Environment, Objective 1.2 - Provide for Clean and Safe Water; Goal 2 - More Effective Partnerships, Objective 2.2 - Increase Transparency and Public Participation

**Grantee/Contractor:** UHCL

**Total Project Budget:** \$38,341 (\$38,341 from Award #CE-00655006: FY 2019 \$38,341)

**Milestones:** Hold an eight-day summer institute and an administrator symposium by summer 2019.

**Project period:** September 2017-August 2020

**Status:** Ongoing project. Final report due July 2020.

**Objective(s):** To support formal K-12 education efforts to incorporate Galveston Bay watershed environmental education into classrooms in the region.

**Description:** The goal of the project is to hold an eight-day summer institute to provide educators with resources and field experiences on environmental education. The focus will be on the importance of watersheds, wetland creation and restoration, marshes, storm drain water quality, and benefits of best management practices for citizens that improve water quality. Educators will have the opportunity to tour wastewater treatment plants and constructed outfall wetlands for stormwater treatments. Teachers will learn how they can use this information in their classrooms, schools, and/or community. Additionally, the project will hold a one-day symposium for school administrators that will address questions on what environmental education entails and how they can support classroom teachers to incorporate environmental education into curriculums and lesson plans.

**Partners and Their Role(s):** UHCL will partner with GBF to provide support for creating and implementing the summer institute and the symposium. Additionally, in-field support will be provided by area municipalities and the Armand Bayou Nature Center.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;



- Summer institute and symposium; and
- Final report due July 2020.

**Long-term Outcomes:** Increase the awareness level of the connection between the natural environment and the impacts that environmental education can have on the public's understanding of water quality and habitat preservation.

## 21. Blackhawk Park Coastal Prairie Restoration and Education Project

**CCMP Actions Implemented:** PPE-1, PPE-3, PPE-7, HP-1, FW-6

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water, Objective 1.3 – Revitalize Land and Prevent Contamination; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** City of Houston Parks and Recreation Department

**Total Project Budget:** \$53,600 (\$53,600 from Award #CE-00655006: FY 2019 \$53,600)

**Milestones:** By July 2020, complete invasive species removal using a subcontractor, complete native plant species planting, install two interpretive signs, and complete the final report by July 2020.

**Project period:** September 2017–August 2020

**Status:** Ongoing project. Completed two native planting community events and one invasive species identification and removal community event. Removed 70% of invasive species from 10-acres of the park and planted 80% of the native plants in the same area.

**Objective(s):** To engage the community in restoring a city park to its historic coastal prairie pothole habitat. The project aims to involve the community in habitat restoration to learn the historic significance of coastal prairie, its benefit to wildlife, and the positive impacts that a prairie site can have on the community.

**Description:** The City of Houston Natural Resources Management Program targeted 47-acres of undeveloped land within Blackhawk Park for prairie restoration. This area was identified as a historic coastal prairie through satellite imagery and still contains valuable prairie plants. These plants are currently being crowded out by non-native woody vegetation. Once restored, this park has the potential to provide significant ecosystem functions, habitat value for wildlife, and educational importance for surrounding urban and coastal communities. GBEP is funding a 10-acre portion of the park through this project.

**Partners and Their Role(s):** The City of Houston will partner with the Student Conservation Association to perform habitat management activities focusing on the removal of invasive species. The Student Conservation Association will also lead community volunteers in planting native grasses and forbs that have been grown in the City of Houston's greenhouse by Master Naturalist volunteers.

### Outputs/Deliverables:

- Quarterly progress reports until contract expiration;
- Quarterly public education and volunteer events; and
- Final report due July 2020.

**Long-term Outcomes:** Increase the awareness level of the connection between the natural environment and the impacts the public can have on water quality and habitat preservation.

## 22. Galveston Seawall Recycling

**CCMP Actions Implemented:** PPE-1, PPE-3, PPE-7, NPS-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** The Park Board of Trustees of the City of Galveston (PBTG)

**Total Project Budget:** \$18,420 (\$18,420 from Award #CE-00655006: FY 2019 \$18,420)

**Milestones:** Collecting and analyzing materials in the recycling receptacles and complete final report by July 2020.

**Project period:** September 2017–August 2020

**Status:** Ongoing project. Recycling receptacles were deployed into the field along the seawall in February 2020.

**Objective(s):** The goal of the project is to provide recycling opportunities along approximately six miles of Galveston's seawall to reduce litter that could become marine debris affecting the stormwater system and

Galveston Bay.

**Description:** This project is an outcome of the Marine Debris Task Force, a collection of various groups including Artist Boat, the GLO, Turtle Island Restoration Network, the GBF, and National Oceanic Atmospheric Administration Flower Garden Banks National Marine Sanctuary. The Task Force was formed after a workshop meeting in Galveston in 2015 for EPA's Trash Free Waters Initiative. The group identified the need to purchase 20 recycling cans to place at seawall bus stops as well as a six-compartment recycle station that can be moved based on areas of highest need, particularly during special events. The project leverages \$58,500 of in-kind contributions from the PBTG. The Back the Bay message and logo will be incorporated on the recycling cans as well as any outreach efforts.

**Partners and Their Role(s):** The PBTG will partner with Artist Boat to coordinate efforts to deploy the recycling receptacles and analyze the materials collected in the containers to evaluate the success of the project.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Recycling receptacles;
- Map of where recycling containers are located;
- Analysis of materials collected; and
- Final report due August 2020.

**Long-term Outcomes:** Increase the awareness level of the connection between the natural environment and the impacts that the public can have on water quality.

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

**CCMP Actions Implemented:** PPE-1, PPE-3

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water, Objective 1.3 – Revitalize Land and Prevent Contamination; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** HARC/GTRI

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

**Milestones:** Public awareness and perception evaluation executed and evaluated in May 2020.

**Project period:** September 2019–August 2021

**Status:** Ongoing project. Advisory workgroup established in October 2019. Development of the public awareness and perception evaluation completed in February 2020.

**Objective(s):** This project seeks to conduct public assessment and awareness 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 the GBF to conduct the public awareness and perception assessment, and the GBF will implement the three outreach and education campaigns.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Final public assessment report due January 2020;
- Three small outreach and education campaigns; and
- Final report due August 2021.

**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.

#### 4.2E - ONGOING M&R PROJECTS

##### 24. Galveston Bay Intertidal Oyster Reef Mapping and Analysis

**CCMP Actions Implemented:** SP-1, SP-5, RSC-2

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** UH

**Total Project Budget:** \$64,883 (\$64,883 from Award #CE-00655006: FY 2019 \$64,883)

**Milestones:** The GIS QAPP was executed in May 2019 and the fieldwork QAPP was executed in June 2019. A fieldwork audit/site visit was conducted in January 2020 and a GIS desk audit was conducted in February 2020.

**Project period:** September 2018–October 2020

**Status:** Ongoing project. Fieldwork and ground-truthing have been completed at 23 of the 27 quadrants.

**Objective(s):** This project seeks to create a complete GIS database of oyster reef habitat in Galveston Bay while simultaneously assessing intertidal oyster population dynamics and community structure on selected reefs.

**Project Description:** Intertidal oyster shell reef locations in Galveston Bay have not been extensively mapped on a large scale in the last 20 years. Small scale exploratory projects have been conducted in Bastrop Bay and the Carancahua reef area in West Bay by EIH. Obtaining information on past intertidal reef locations will provide baseline data that can be used as a benchmark for analyzing restoration techniques in the bay and monitoring future growth/ loss of habitat.

The project proposes to use 2015 Texas Orthoimagery Program aerial photography to build historic intertidal reef datasets. Texas Orthoimagery Program data was recorded in a 0.5 m resolution, providing a higher quality image for habitat reclassification than other publicly available images.

After obtaining GIS created shapefiles of possible intertidal reef locations, ground-truthing will be conducted on a sub-sample of locations to validate the analysis and collect current elevation data with a sub-meter accuracy Global Positioning System unit. On a sub sample of the mapped intertidal reefs, oyster population characteristics will be assessed. These metrics will include oyster abundance, size demography, reef structure (overall percent cover of shell, percentage of live oysters, and rugosity), and oyster condition (provides a relative index of oyster health). Additionally, the benthic associated macrofauna will be excavated and community composition determined. This community analysis will not only indicate the value of Galveston Bay intertidal reefs as habitat but also provide a relative indication of the value of this habitat type for mobile nekton and birds.

**Partners and Their Role(s):** Black Cat GIS and Biological Services will create the GIS shapefiles and develop the online Story Map and Gulf Coast Bird Observatory will help assess the community structure on selected oyster reefs.

#### **Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Final shapefiles showing intertidal oyster reef habitat due April 2020;
- Final white paper due September 2020; and
- Final report due September 2020.

**Long-term Outcomes:** A complete GIS database of oyster reef habitat in Galveston Bay while simultaneously assessing intertidal oyster population dynamics and community structure on selected reefs.

##### 25. Lead Isotopes and Heavy Metal Concentrations in Galveston Bay Waters, Sediments, and Oysters

**CCMP Actions Implemented:** WSQ-2

**EPA's Strategic Plan Measures Implemented:** Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** UH

**Total Project Budget:** \$133,668 (\$133,668 from Award #CE-006550067: FY 2020 \$133,668)

**Milestones:** The QAPP was executed in November 2019.

**Project period:** September 2019–August 2021

**Status:** Ongoing project. One batch of oyster samples has been collected. A portion of the sediment heavy metal concentration analyses has been completed.

**Objective(s):** This study proposes lead (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:** Galveston Bay is an estuary, where industrial runoff, wastewater, and other pollutants enter the bay within incoming freshwaters. These flows can contain heavy metals, either dissolved in the waters or absorbed onto inflowing sediments, which can be toxic for humans and pelagic/benthic communities in the bay. This study proposes 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 pollution sources. Oyster samples will be collected from eight sites in Galveston Bay and analyzed for Pb isotope and heavy metal concentrations along with water and sediment samples collected with external funding at eight sites in Galveston Bay as well as up to fifteen inflowing freshwater sites. Together Pb isotope and heavy metal concentration data will highlight areas with elevated pollutant levels, provide insight into pollutant mobility, and constrain pollutant sources and fluxes. The Texas Surface Water Quality Standards and Texas Risk Reduction Program will be used as references for analyzing surface water and sediment samples. The information obtained from additional water, sediment, and oyster analyses will enhance understanding of pollution in Galveston Bay, and inform pollution reduction, remediation, and mitigation efforts. the region.

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

**Outputs/Deliverables:**

- Annual project work plan due at the beginning of each FY of the project;
- Quarterly progress reports until contract expiration;
- Heavy metal and Pb isotope data due August 2021; and
- Final report due August 2021.

**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.

**26. Characterizing PCBs and Dioxins in the Houston Ship Channel and Galveston Bay Post Hurricane Harvey CCMP Actions Implemented:** WSQ-4

**EPA's Strategic Plan Measures Implemented:** Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** UH

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

**Milestones:** The QAPP was executed in March 2020.

**Project period:** September 2019–August 2021

**Status:** Ongoing project.

**Objective(s):** This project seeks to collect fish and crab tissue and sediment samples to measure PCB and dioxin levels in the Houston Ship Channel and Galveston Bay post Hurricane Harvey for comparison to historical datasets from TMDL studies conducted by UH with TCEQ funding.

**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 dioxin and PCBs 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. An existing study funded by the GBF examining fish and crab dioxin and PCB levels in the San Jacinto River and the Houston Ship Channel is limited to a 5-mile radius around the San Jacinto River Waste Pits Superfund site. The main goal for this study is to expand the sampling scope beyond the 5-mile limit of the GBF study to encompass the remainder of the Houston Ship Channel and Galveston Bay system as applicable and appropriate.

**Partners and Their Role(s):** UH will perform the tasks necessary for the collection and analysis of sediment and tissue 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 FY of the project;
- Quarterly progress reports until contract expiration;
- PCB and dioxin data due August 2021; and
- Final report due August 2021.

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

## SECTION 5: COMPLETED PROJECTS

### SECTION 5.1: PROJECTS COMPLETED SINCE FY 2020 WORK PLAN SUBMISSION - SUMMARY

| Completed Projects Under   |                            |                  | Award #CE-00655006 |                |                | Award<br>#CE-00655005 |                           |
|--|----------------------------|------------------|--------------------|----------------|----------------|-----------------------|---------------------------|
| PROJECT NAME   | TCEQ<br>Contract<br>Number | Funding<br>Years | 2019<br>Budget     | 2018<br>Budget | 2017<br>Budget | 2014-2016             | Final Report<br>Submitted |
| 26. <a href="#">The Impacts of Assimilative Capacity of Reservoirs on Coastal Inflows</a>                    | 16-60126                   | 2016-2018        | \$0                | \$24,058       | \$55,942       | \$80,000              | May 2019                  |
| 27. <a href="#">Freshwater Inflows in Galveston Bay: Relationship to Harmful Algal Blooms</a>                | 17-70187                   | 2017             | \$0                | \$0            | \$80,000       | \$0                   | May 2019                  |
| 28. <a href="#">Seafood Evaluation in a Portion of Upper Galveston Bay</a>                                   | 18-80234                   | 2018-2019        | \$0                | \$66,544       | \$32,831       | \$0                   | August 2019               |
| 29. <a href="#">White Oak Parkway Native Habitat Restoration and Outreach</a>                                | 18-80341                   | 2018             | \$0                | \$45,000       | \$0            | \$0                   | August 2019               |
| 30. <a href="#">Green Infrastructure for Texas</a>   | 18-80237                   | 2018-2019        | \$37,500           | \$74,197       | \$0            | \$0                   | February 2020             |
| 31. <a href="#">Characterization of the Influence of Freshwater Inflow on Trinity River Delta Indicators</a> | 18-80338                   | 2018-2019        | \$18,000           | \$42,000       | \$0            | \$0                   | March 2020                |
| GRANT TOTAL-PROJECT FUNDING  |                            |                  | \$55,500           | \$251,799      | \$168,773      | \$80,000              |                           |



## **SECTION 5.2: PROJECTS COMPLETED SINCE FY 2020 WORK PLAN SUBMISSION – DETAIL**

### **27. The Impacts of Assimilative Capacity of Reservoirs on Coastal Inflows**

**CCMP Actions Implemented:** FW-1-5, RSC-2

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** HARC/GTRI

**Total Project Budget:** \$160,000 (\$94,642 from Award #CE-00655005: FY 2016 \$80,000, FY 2017 \$14,642; \$65,358 from Award #CE-00655006: FY 2017 \$41,300, FY 2018 \$24,058)

**Milestones:** Final report completed in May 2019.

**Project period:** September 2017–May 2019

**Status:** Completed project.

**Objective(s):** This project supported research to quantify the assimilative capacity of Lake Livingston to better understand the impacts reservoirs have on coastal ecosystems.

**Project Description:** This study analyzed the assimilative capacity of Lake Livingston. The project sampled the inflows into Lake Livingston and the outflows to obtain before and after numbers for nutrients and sediments. Because assimilative capacity changes depending on flows, the study obtained samples during low, medium and high flows (ambient and event monitoring). The determined residence time of Lake Livingston was an important factor and part of the study. Sample collection timing was based on the determined residence times. A baseline data set of measurements from available surface water quality samples for the study area was developed along with an assessment of methodologies capable of identifying spatial and temporal changes in water quality. The surface water data sampled during the project was analyzed to characterize the assimilative capacity of the reservoir for the supply of nutrients and sediments to the Galveston Bay ecosystem.

**Partners and Their Role(s):** HARC/GTRI led the project and analyzed the data while the subcontractor (USGS) was responsible for data collection.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration; and
- Final report due May 2019.

**Long-term Outcomes:** Provide insight into the assimilative capacity of reservoirs and impacts to inflows for Galveston Bay.

### **28. Freshwater Inflows in Galveston Bay: Relationships to Harmful Algal Blooms**

**CCMP Actions Implemented:** FW-1, FW-7, SP-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** TAMUG

**Total Project Budget:** \$80,000 (\$80,000 from Award #CE-00655006: FY 2017 \$80,000)

**Milestones:** Final report completed in June 2019.

**Project period:** January 2017–May 2019

**Status:** Completed project.

**Objective(s):** This project monitored the relationship between freshwater inflows and the presence of harmful algal blooms in Galveston Bay by using an Imaging FlowCytobot to detect harmful algal blooms earlier than previously documented.

**Project Description:** The current understanding of the factors which led to harmful algal blooms in Galveston Bay is limited. The use of a new type of technology, the Imaging FlowCytobot, allowed for a more proactive approach to providing early detection of harmful algal blooms in Galveston Bay. The Imaging FlowCytobot helped to 1) identify phytoplankton blooms—their timing, magnitude, and duration; 2) follow blooms and observe changes; and 3) develop predictive abilities to forecast subsequent blooms. Observations were related to water quality data that was collected concurrently and freshwater inflows data collected by the USGS. By



working with the TPWD Coastal Fisheries Division and the DSHS, the goal was to provide an early announcement to oyster and fisheries groups to protect consumers from disease or other health hazards associated with harvesting and/or consuming products exposed to (harmful) algal blooms.

**Partners and Their Role(s):** TAMUG collected daily samples and analyzed the samples with the Imaging FlowCytobot. Salinity, temperature, DO, and pH were measured concurrently. Freshwater inflows data were obtained from the USGS.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Phytoplankton and water quality data; and
- Final report due May 2019.

**Long-term Outcomes:** Insights into the influence of freshwater inflows on harmful algal blooms in Galveston Bay.

## 29. Seafood Evaluation in a Portion of Upper Galveston Bay

**CCMP Actions Implemented:** PH-1

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** DSHS

**Total Project Budget:** \$99,375 (\$99,375 from Award #CE-00655006: FY 2018 \$66,544, FY 2019 \$32,831)

**Milestones:** Final report completed in September 2019.

**Project period:** September 2017–August 2019

**Status:** Completed project.

**Objective(s):** To evaluate the risk associated with the consumption of fish and crabs from a portion of Galveston Bay.

**Project Description:** Fish tissue samples were collected from the upper portion of the Houston Ship Channel to assess current fish advisories. However, the advisory area below Highway 146 down to a line from Red Bluff Point to Five Mile Pass to Houston Point has not been recently sampled. This area has a consumption advisory for catfish, blue crabs, and spotted seatrout due to PCBs and Dioxins and fishing occurs regularly in Tabb's and Barnett Bays. It is important that the targeted area that is selected is a geographical area that is of a size that will allow an evaluation of tissue concentrations and risk that allows a high degree of confidence so that appropriate regulatory decisions can be made by the Commissioner of Health related to altering an existing fish consumption advisory.

Approximately 63 samples were collected and analyzed from this area. Four or five locations in the area were selected to collect fish and crab samples based upon habitat and areas where fishing occurs. Targeted species included those species that are commonly eaten such as blue crab, spotted seatrout, red drum, black drum, sheepshead, catfish, flounder, and croaker. Once the samples were collected and analyzed, a risk characterization was conducted to determine the adequacy of the current fish consumption advisory in this location.

**Partners and Their Role(s):** The Geochemical Environmental Research Group lab at TAMUG analyzed the samples while DSHS conducted the sampling.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration; and
- Final report due July 2019.

**Long-term Outcomes:** To determine if a fish advisory continues to be necessary for a portion of Galveston Bay.

## 30. White Oak Parkway Native Habitat Restoration and Outreach

**CCMP Actions Implemented:** PPE-1, PPE-3, PPE-7, HP-1, FW-6

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water, Objective 1.3 – Revitalize Land and Prevent Contamination; Goal 2 – More Effective Partnerships, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** City of Houston Parks and Recreation Department

**Total Project Budget:** \$45,000 (\$45,000 from Award #CE-00655006: FY 2018 \$45,000)

**Milestones:** Final report completed in August 2019.

**Project period:** September 2017–August 2019

**Status:** Completed project.

**Objective(s):** The goal of the project was to enhance urban bird and wildlife habitat along Houston's bayou corridors and serve as a demonstration for future birding interpretation and recreation sites within Houston.

**Project Description:** The project performed habitat management activities focused on the removal of invasive species and planting of native vegetation suited for the riparian corridor along White Oak Parkway. Additionally, the project provided outreach and education events as well as volunteer activities such as a community native planting event.

**Partners and Their Role(s):** The Student Conservation Association provided species removal and native plant installation as well as support for the community outreach events. The Houston Audubon provided bird interpretation stations and information at the community outreach events as well as language for the interpretive signs.

**Outputs/Deliverables:**

- Install three interpretive signs;
- Three community outreach events;
- Remove invasive species in 10 acres; and
- Install native plants in 10 acres.

**Long-term Outcomes:** Link Houston's birds to a diverse audience—from the casual passerby to the advanced citizen scientist—as well as families participating in activities at adjacent community centers. Provide community members the skills to identify invasive species and recognize the value of native habitats.

### 31. Green Infrastructure for Texas

**CCMP Actions Implemented:** HP-1, NPS-1, 2, PPE-1, 5

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water, Objective 1.3 – Revitalize Land and Prevent Contamination; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability, Objective 2.2 – Increase Transparency and Public Participation

**Grantee/Contractor:** Texas AgriLife

**Project Total:** \$111,697 (\$111,697 from Award #CE-00655006: FY 2018 \$74,197, FY 2019 \$37,500).

**Milestones:** Final report completed in February 2020.

**Project Period:** September 2017–February 2020

**Status:** Completed project.

**Objective(s):** The goal of this project was to monitor freshwater wetland restoration in Sheldon Lake State Park to provide a means to measure the success of such projects. The project also sought to develop and implement stormwater treatment wetlands in the watershed.

**Project Description:** Texas AgriLife demonstrated a range of green infrastructure techniques using a multi-level approach, from individual property owners to large-scale undeveloped lands, with built-in applied research projects focused on water quality and quantity. Green Infrastructure for Texas brought together three Texas AgriLife programs—Freshwater Wetland Restoration, Stormwater Treatment Wetlands, and Green Stormwater Infrastructure—for a unified, holistic approach to addressing current and emerging needs to protect surface water resources. Each of the programmatic areas had three components: 1) implement on-the-ground demonstration projects for stormwater benefits of best management practices; 2) conduct research to study green infrastructure in situ; and 3) educate stakeholders to manage their water resources through courses, workshops, and publications.

Under this project, stormwater treatment wetlands were developed in three areas: 1) an 8,500-square foot basin on the MD Anderson Cancer Center campus in the Texas Medical Center in Houston; 2) five acres of wetlands at Exploration Green Recreation Area in Clear Lake City (Phase one of five planned phases); and 3) a basin at the Houston Botanic Garden. In addition, this project monitored freshwater wetland restoration at Sheldon Lake State Park. The vegetation monitoring focused on understanding plant community changes by season and over time (post initial planting) to assess restoration success.

**Partners and Their Role(s):** MD Anderson Cancer Center, Clear Lake City, and Houston Botanic Garden

provided memorandums of understanding and contributed to the planning and maintenance of the stormwater wetlands. Sheldon Lake State Park assisted with monitoring and provided the land for the freshwater wetland restoration monitoring component of the project.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration;
- Final comparative study due February 2020; and
- Final report due February 2020.

**Long-term Outcomes:** Green infrastructure best management practices installed, monitored, and used to demonstrate the effectiveness of green infrastructure.

**32. Characterization of the Influence of Freshwater Inflow on Trinity River Delta Indicators**

**CCMP Actions Implemented:** FW-1; FW-3; FW-7

**EPA's Strategic Plan Measures Implemented:** Goal 1 – A Cleaner, Healthier Environment, Objective 1.2 – Provide for Clean and Safe Water; Goal 2 – More Effective Partnerships, Objective 2.1 – Enhance Shared Accountability; Goal 3 – Greater Certainty, Compliance, and Effectiveness, Objective 3.3 – Prioritize Robust Science

**Grantee/Contractor:** UHCL

**Total Project Budget:** \$60,000 (\$60,000 from Award #CE-00655006: FY 2018 \$42,000, FY 2019 \$18,000)

**Milestones:** The final report completed in March 2020.

**Project period:** September 2017–March 2020

**Status:** Completed project.

**Objective(s):** The objective of this project was to quantify the influence of freshwater inflow on the Trinity River delta salinity regime and indicator biota.

**Project Description:** Little is known about the influence of freshwater inflow on the salinity regime and response of multiple freshwater indicator fauna including *Rangia cuneate* (Rangia clams) and *Vallisneria americana* (wild celery). Recent studies have documented the recent and past abundances of Rangia clams in open bay portions of the Galveston Bay system. However, spatial and temporal trends in populations of Rangia clams and wild celery remain poorly documented within the shallow portions of the Trinity River delta. Therefore, UHCL conducted a comprehensive study that included three components: 1) remote sensing of submerged aquatic vegetation (wild celery and other species) using unmanned aerial vehicles and on the ground surveys; 2) establishment of a network of shallow automated salinity monitoring sites; and 3) an on the ground inventory of submerged aquatic vegetation and Rangia clams.

Sites containing submerged aquatic vegetation were delineated and input into GIS databases during the first phase of this project. This data and historical information were used to establish a network of monitoring sites within the delta. During the second phase 10-25 automated temperature and salinity/conductivity meters, one to two water/tide level recorders, and one to two recording precipitation gages were deployed at strategic locations within the delta region to characterize changes in salinity regime associated with freshwater input. The salinity/conductivity automated probes automatically logged salinity and temperature at varying intervals for over one and a half years. Data collected from these units were compared to nearby National Oceanic Atmospheric Association tide and precipitation gages, and the USGS gage at Romayor to assess temporal and spatial patterns and correlations between precipitation, tide stage, freshwater inflow and the response of ambient salinity, submerged aquatic vegetation, and Rangia clams. The third concurrent phase of the project was an inventory of submerged aquatic vegetation and Rangia clam beds.

**Partners and Their Role(s):** UHCL conducted all fieldwork and data analyses.

**Outputs/Deliverables:**

- Quarterly progress reports until contract expiration; and
- Final report due March 2020.

**Long-term Outcomes:** A better understanding of the influence of freshwater inflow on salinity and indicator biota.