Federal Bipartisan Infrastructure Law Proposals for FFY24

The proposal number, grantee, and project name are linked to the respective proposal. The GBEP logo on each proposal title page will link you back to the Table of Contents.

#	Grantee	Project Name	Total Request	Duration (months)
1	ABC	Reducing Human Impacts to Coastal Waterbirds Through Stewardship Informed by Social Science	$557,108.00	36
2	GBF	Resiliency Education and Infrastructure	$536,124.00	24
3	HARC	Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification	$548,608.00	48
4	HGAC	Application of Rapid Methods of Microbial Source Tracking to Assess the Source of Fecal Contamination to Western Galveston Bay, Basin 24	$552,018.96	36
5	HGAC	Supporting Equity-focused Conservation Efforts in the Lower Galveston Bay Watershed	$450,000.00	36
6	HPARD	Herman Brown Park Riparian Restoration and Community Engagement Project- Phase I	$350,000.00	48
7	TAMUG	Implementing a high-frequency framework for monitoring and assessment of ecosystem status subjected to climate related natural disasters in Galveston Bay	$745,838.00	33
8	TWT	Water Quality, nutrient, and nekton community dynamics associated with managed freshwater deliveries to East Bay, Texas.	$421,446.56	36
9	UHCL	Monitoring of Vibrio and Dermo in oysters in support of Natural Resource and Public Health Adaptive Management	$544,689.00	36
		TOTAL REQUEST	$4,705,832.52	

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

SECTION ONE: GENERAL INFORMATION

Project Name:

Reducing Human Impacts to Coastal Waterbirds Through Stewardship Informed by Social Science

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

American Bird Conservancy

☐ Federal, State, or Local Government ☐ Council of Government ☐ Public University
☒ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Emily Jo Williams
Project Representative Phone	706-818-1799
Project Representative Email	ejwilliams@abcbirds.org

Partners and Their Roles:

American Bird Conservancy: administers grant and coordinates partners with stewardship responsibilities; incorporates SPLASh program activities into the project.
Texas State University: Principal Investigator (PI) conducts social science design, implementation, analyses.
Virginia Tech: Co-PI coordinates and advises team on techniques and analyses.
National Audubon Society: Co-PI provides coordination with broader Gulf project and assists with analytical approaches and integration of results for larger scale impacts.

Amount Requested (minimum budgeted cost of $150,000):

$557,108

Is the project scalable? ☒

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$168,475
FY 2026 (09/01/2025-08/31/2026)	$203,830
FY 2027 (09/01/2026-08/31/2027)	$184,803
Total	$557,108

Total Project Cost:

$1,141,704

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

[Please indicate source, amount, and status (secured, potential, etc.)]
National Audubon Society: $344,596 NOAA RESTORE funds to support related community-based social marketing efforts (applied for funding)

American Bird Conservancy: $210,000 in-kind match consisting of beach-nesting bird stewardship activities (pending funding)
ABC/SPLASh: $30,000 in-kind match consisting of threat reduction activities /marine debris removal (pledged)

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

September 1, 2024 – August 31, 2027

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☐	NPS-3 ☐	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☐	HC-3 ☐
SC-1 ☒	SC-2 ☐	
FWI-1 ☐	FWI-2 ☐	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☒	SPO-2 ☒	SPO-3 ☐	SPO-4 ☐
PEA-1 ☒	PEA-2 ☒	PEA-3 ☒	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☐	RES-2 ☐	RES-3 ☐	RES-4 ☐
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☐
ACS-1 ☐	ACS-2 ☐	ACS-3 ☐	

Priority Area Actions Detail:

Protect and Sustain Living Resources: Species Conservation
SC-1. Project focuses on improved outcomes for at-risk bird species demonstrating steep declines that rely on coastal habitats during breeding, migration and winter. Species include Black Skimmer, Least Tern, Snowy and Wilson's Plovers, Red Knot and Piping Plover.

Engage Communities: Stakeholder and Partner Outreach
SPO-1. Project seeks to improve existing stewardship activities by a number of partners by better understanding human motivations and barriers to bird friendly coastal use. Stewardship and SPLASh provide volunteer opportunities.
SPO-2. SPLASh (Stopping Plastics and Litter Along Shorelines) and partner organizations organize and support a number of workshops for adults and youth and stakeholder events including FeatherFest and State of the Bay Symposium.

Engage Communities: Public Education and Awareness
PEA-1. Stewardship activities often involve direct interactions with recreationists and opportunities to demonstrate the value of healthy coastal habitats through compelling and adorable birds. SPLASh engages the public through community events and stakeholder meetings, and volunteers assist with coastal clean-up activities and community science. This project will add engagement through community based social marketing surveys.
PEA-2. This project is focused on using community based social marketing to change behaviors and attitudes in Galveston Bay and will primarily target adult user groups.
PEA-3. SPLASh educational programs include interactive classroom sessions, field study, educator-led sessions, activity books and supply kits designed to engage K-12 students. SPLASh staff work directly with educators regarding training in use of education materials. The curriculum focuses on cleaning up the coast to benefit people and wildlife.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☐ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☐ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☒ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☐ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☒ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☒ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☒ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

Project provides direct habitat protection and enhancement through stewardship and SPLASh activities. Stewardship uses a variety of techniques to intervene between people and birds at critical sites. Reducing human interactions enhances bird habitats, resulting in greater survival and productivity. Fencing, signage and other barriers also reduce human-caused degradation of sensitive coastal habitats. Removal of trash through the SPLASh program enhances habitats and increases safety for both birds and people.

Project supports ongoing stewardship activities and projects by increasing the efficacy of those efforts through social science research and community based social marketing.

SPLASh engages K-12 students and teachers through classroom and field based activities and adults through community events. Adults and youth are engaged in coastal cleanups as volunteers.

Project engages a diversity of state and community partners through work at five sites detailed in the project description.

Project is guided by three experienced social science researchers that will ensure the three measures outlined for Monitoring and Research.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?
☐ Reduction in nutrient pollution
☐ Water reuse and conservation
☒ Marine litter reduction
☐ Green infrastructure and resiliency

The SPLASh program (Stopping Plastics and Litter Along Shorelines) was originally funded by a three-year grant from EPA aimed at removing and reducing plastic and other marine litter along Texas shorelines. American Bird Conservancy recently completed the 2021-2023 EPA grant and greatly exceeded the grant deliverables including pounds of trash removed (almost 32,000 pounds), coastal and bay cleanups (95), number of people reached and/or educated (almost 12,000) and number of natural resource managers reached/educated. SPLASh continues operating with both private and public funding.

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☐	No x
If yes, will you comply with the law or submit a waiver?	Yes ☐	No ☐

Comments (if any):

[If yes, please summarize how the proposal complies with BABA, as applicable.]

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)
Yes ☐ No ☒

[If yes, please summarize how the proposal addresses the Justice40 initiative.]

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

This project targets the Houston-Galveston region. According to the polygonal area created through EJScreen, our project targets linguistically isolated (91%) and less than high school education (84%) demographics above the 80th percentile in the US.

As an additional measure, of the 1.1 million students enrolled in the project area (Region 4) in the Houston-Galveston region, 62% are considered part of an "economically disadvantaged" racial or ethnic group. According to the United States census, the eight counties within the Houston-Galveston region experience the following poverty rates among all residents (2015-2019): Harris - 15.7%, Chambers - 12.1%, Galveston - 12.4%, Brazoria - 8.7%, Waller - 16.5%, Liberty - 14.1%, Montgomery - 12.3%, and Fort Bend - 7.4%. However, when these numbers are broken down by race and/or ethnicity group, poverty rates are higher for certain groups. For example, when measuring poverty rates among "Hispanic or Latino (of any race)" residents, there is a poverty rate of 20.8% in Harris County, 26.9% in Chambers County, and 21% in Waller County. When measuring poverty rates among "Black or African American" residents, the poverty rate in Waller County jumps to 29.3% and to 19.9% in Harris County.

The project will address these demographics through community engagement and providing volunteer opportunities, ensuring 50% of our educational programming engages students in Title I schools within Region 4, and developing long-lasting community partnerships to clean natural habitat and improve the environmental quality along these waterways.

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☒ Yes
☐ No

SPLASh programming provides services to Title 1 schools.

Does the Project work with new, smaller communities/partnerships?

☒ Yes

☐ No

New, smaller communities that will be included in the project include but are not limited to Matagorda, Sargent, Galveston, Port Bolivar, Crystal Beach, Gilchrist, and High Island.

SECTION SIX: PROPOSAL DETAILS

Project Summary:

Our project will use community based social marketing to increase efficacy of stewardship programs that promote bird-friendly human behavioral changes at the scale necessary to enhance survival and recruitment of sensitive coastal bird species. We will assess the efficacy of a range of stewardship techniques deployed to mitigate recreational disturbances to coastal birds and their nesting sites, and our results will drive improvements in existing programs and design of future programs in Galveston Bay and the broader Gulf region.

Full Project Description (1,000 words or less):

Bird species that rely on coastal habitats, especially coastlines, have seen steep declines of at least 37% over the past 20 years. Major threats to these declining species are human disturbance and habitat degradation of nesting, resting, and foraging sites by pollution, particularly plastics and other trash. These bird species are a vital component of, and critical to the health of Galveston Bay. Conservation groups on the Texas coast are currently engaged in two major programs designed to reduce human impacts to coastal birds – stewardship and pollution prevention. This project will focus on integrating social science into stewardship and pollution prevention activities to increase effectiveness and acceptance of bird friendly behaviors.

Ecologically meaningful and socially acceptable conservation strategies are critical for sustaining coastal bird populations. To meet bird conservation targets and recreationists' expectations and needs, researchers and practitioners defer to stewardship and ways to cultivate it. Managers use an array of techniques to operationalize coastal bird stewardship among recreationists. These techniques include but are not limited to signage, educational programs, rope and other barriers, and closures, and can be used in combination to maximize effects on behavior and with respect to resource availability. Pollution prevention is accomplished through SPLASh (Stopping Plastic and Litter Along Shorelines) that is implemented through three programmatic pathways: education such as classroom sessions and field study, outreach including community events and stakeholder meetings, and community science including volunteer trash removal and data collection. SPLASh provides both stewardship activities and an excellent point of contact with key Galveston Bay stakeholders for engagement and dissemination of results.

Research findings demonstrate that although these practices and programs are valuable, they are not sufficient for mitigating impacts to birds. Successful execution of coastal bird conservation and related visitor impact management is constrained by myriad factors such as differences in factors that motivate stewardship, recreationists' interests, expectations, views about techniques used, willingness to engage in stewardship behaviors, as well as contextual differences stemming from regulations, social norms, communication preferences, local ecology, and deployable resources. Authority-led approaches to protect coastal birds from recreational disturbance must be harmonious with the social-ecological context to be efficacious and socially accepted (i.e., legitimate).

To overcome these challenges, researchers have demonstrated that community-based social marketing (CBSM) is a promising approach to promote bird-friendly human behavioral changes at larger scales by constructing a community of practice and contextualizing stewardship plans. The term refers to a form of social marketing that emphasizes identifying a set of behaviors to focus on a) maximizing benefits, b) identifying and removing barriers to their performance, and then c) designing, implementing, executing, and assessing programming to achieve a specific behavioral outcome in a targeted, holistic, networked, and efficient way.

To assess the best ways to design stewardship programs with the intention to enhance coastal bird survival and recruitment through CBSM along the Texas coast, we will test, observe, and assess the efficacy of a range of stewardship techniques deployed to mitigate recreational disturbances to coastal birds and their nesting sites. We will achieve the following objectives: a) elucidate user groups definitions of stewardship towards shorebirds, b) identify the most salient information, content framing, and communication delivery mechanisms that best match the preferences of each stewardship type; and c) determine which stewardship techniques are best for different user groups and species at each study site. Using the results from this research at the site level, managers and bird conservation groups will be able to adapt their stewardship approaches to align with the social-ecological context, enhancing the efficacy of behavioral norms among the target community. Broadly, findings will be integrated with our colleagues' tristate effort to assess CBSM to steward coastal bird populations along the Gulf of Mexico.

We have identified five suitable sites for CBSM: Anahuac Beach, Bolivar Peninsula; Bolivar Flats Shorebird Sanctuary; East Beach/Apffel Park, Galveston Island; San Luis Pass County Park, Follets Island; and Matagorda Beach, Matagorda County. In 2024-2025, we will administer a pre-CBSM survey to identify stewardship types and inform the CBSM program design. After the 2025 field season, we will co-produce the CBSM campaign content and approach with managers responsible for implementing them at study sites. In 2026-2027, we will conduct observations of the campaigns during the field season to assess the approach. At the end of the field season in 2027, we will use systematic random and purposive sampling to conduct post-CBSM social science surveys at study sites to calculate changes in stewardship definitions, beliefs about and attitudes toward stewardship (via benefits and barriers), and propensity to engage in coastal bird stewardship. Exposure to stewardship and changes in coastal recreationist behavior will be measured by conducting and comparing results from pre- and post-CBSM campaign surveys administered in-person, online, and postal mail (by request). Screening questions will be used to ensure that only respondents meeting our criteria participate. Data will be collected using Qualtrics survey software for in-person and web-based surveys. We will utilize Stata, SPSS, or other appropriate statistical software to produce descriptive statistics and conduct latent class analysis to segment coastal users. Additionally, we will employ causal modeling to identify variables that influence user group behaviors to determine optimal behavior change outreach that best match the preferences of each typology of user group. This study will be approved by the Texas State University Institutional Review Board to ensure ethical treatment of human subjects.

Co-production involving social science researchers and managers will ensure integration of project results into existing programs. Dissemination of results through conferences, publications, and other outlets will increase incorporation of the results into future programs. Involvement by National Audubon Society and Virginia Tech co-principal investigators will result in integration of our Texas results with those of similar research and stewardship efforts across the northern Gulf Coast. Because many of these bird species range widely throughout the Gulf Region, we must look for solutions to common threats at Gulf-wide scales.

Latitude/Longitude (Optional):

29°38'44.78"N, 95°20'26.08"W

Location:

This project is broad in scope. The five likely study sites are long-term beach-nesting bird stewardship sites managed by American Bird Conservancy, Houston Audubon, and Gulf Coast Bird Observatory in cooperation with county and private landowners. The outreach, education, and management of these important nesting sites take place on a much broader area of the Galveston Bay Watershed. We have limited this aspect to the Title 1 schools in Region 4. This is where education is conducted via the Stopping Plastic and Litter Along Shorelines (SPLASh) program to reduce the threat of marine debris for birdlife and other wildlife along Galveston Bay and Gulf shorelines.

Other Plans Implemented:

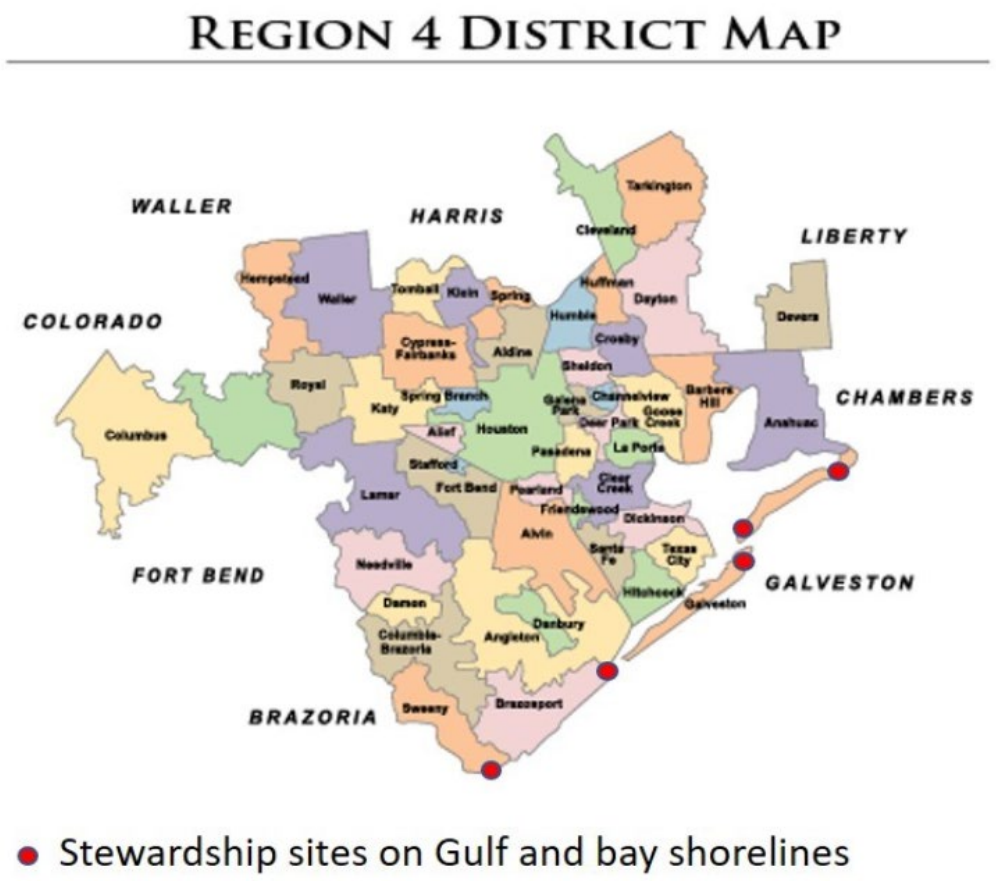
The project supports objectives from additional planning efforts in the Galveston Bay Estuary Program service area including the Gulf Coast Joint Venture, the Texas Coastal Management Plan, and the Texas Wildlife Action Plan.

This project directly addresses objectives of the Gulf Coast Joint Venture's Shorebird Plan -specifically, population goals for Wilson's and Snowy Plovers, both target species for the Gulf Coast Joint Venture. The Gulf Coast Joint Venture (GCJV) is a regional conservation partnership focused on science-driven habitat restoration, enhancement, and protection for priority bird species that involves federal agencies such as U.S. Fish and Wildlife Service, state wildlife agencies, non-governmental organizations, and research institutions. The GCJV has a shorebird advisory board, conservation objectives and focal species. Wilson's Plover and Snowy Plover are both included in the plan as needing work to stabilize and increase populations. Implementing the shorebird plan involves directly stewarding nesting species to increase nesting success and to increase the effectiveness of the stewardship actions to reduce disturbance, a major source of nest failure.

One of the main objectives of the Texas Coastal Management Plan is to manage habitats. This project is the leading edge of this objective, seeking to understand which stewardship actions are most effective in managing the interactions of declining beach-nesting bird species and the increasing number of beachgoers.

The Texas Wildlife Action Plan identifies species of greatest conservation need. Three of the four project target species are included in the Texas Wildlife Action Plan - Wilson's Plover, Snowy Plover, and Black Skimmer.

Project Map



Supplemental Photos/Graphics (Optional):

American Bird Conservancy volunteer stewards at East Beach, Galveston Island.


Wilson's Plover male, female, and three downy chicks by Gulf Coast Bird Observatory.


Teen volunteers sorting trash collected during a cleanup with SPLASh.

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	$108,182
b.	Fringe Benefits (26.35%)	$28,505.83
c.	Travel	$8,200.00
d.	Supplies	$1,500.00
e.	Equipment	
f.	Contractual – Subawards (3)	$362,015.00
g.	Construction	
h.	Other*	
i.	Total Direct Costs (Sum a - h)	$508,402
	Modified Total Direct Costs (includes the first 25K of each of 3 subawards)	$221,387
j.	Indirect Costs (22% MTDC)	$48,705
k.	Total (Sum of i & j)	**$557,108**

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 22% of (check one):

☐ salary and fringe benefits
☒ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

This rate is less than or equal to (check one):
☒ Predetermined Rate—an audited rate that is not subject to adjustment.
☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable]

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

Project Name:
Reducing Human Impacts to Coastal Waterbirds Through Stewardship Informed by Social Science

Partners and Their Roles:
Project Representative and Coordinator: Emily Jo Williams, Vice President, Southeast and Atlantic Coast Region, American Bird Conservancy
Principle Investigator: Christopher Serenari, Ph.D., Biology Department, Texas State University
Co-PI: Ashley A. Dayer, Ph.D., Assistant Professor of Human Dimensions, Department of Fish and Wildlife Conservation, Virginia Tech
Co-PI: Nicole Michel, Ph.D., Director of Quantitative Science, National Audubon Society

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Ecologically meaningful and socially acceptable conservation strategies are critical for sustaining coastal bird populations (Glover et al. 2011). To meet bird conservation targets and recreationists' expectations and needs, researchers and practitioners defer to stewardship and ways to cultivate it. Managers use an array of techniques to operationalize coastal bird stewardship among recreationists (Michel et al. 2021). These techniques include but are not limited to signage, educational programs, rope and other barriers, and closures, and can be used in combination to maximize effect on behavior and with respect to resource availability (Everly et al. 2021; Lafferty et al. 2006; Dodge et al. 2005). Pollution prevention is accomplished through SPLASh (Stopping Plastic and Litter Along Shorelines) that is implemented through three programmatic pathways: education such as classroom sessions and field study, outreach including community events and stakeholder meetings, and community science including volunteer trash removal and data collection. SPLASh provides both stewardship activities and an excellent point of contact with key Galveston Bay stakeholders for engagement and dissemination of results.

Research findings demonstrate that although these practices and programs are valuable, they are not sufficient for mitigating impacts to birds (Weston et al. 2012; Bowes et al. 2017). Successful execution of coastal bird conservation and related visitor impact management is constrained by myriad factors such as differences in factors that motivate stewardship (Bennett et al. 2018; Worrell & Appleby 2000), recreationists' interests, expectations, views about techniques used, willingness to engage in stewardship behaviors (Burger and Niles 2013; Schlacher et al. 2013), as well as contextual differences stemming from regulations, social

norms, communication preferences, local ecology, and deployable resources (Lindenmayer et al. 2022; Schoenleber et al. 2022; Schneider et al. 2020; Schlacher et al. 2013; McLachlan et al. 2013; Petel & Bunce 2012). These findings suggest that authority-led approaches to protect coastal birds from recreational disturbance must be harmonious with the social-ecological context to be efficacious and socially accepted (i.e., legitimate).

To overcome these challenges, researchers have demonstrated that community-based social marketing (CBSM) is a promising approach to promote bird-friendly human behavioral changes at larger scales by constructing a community of practice and contextualizing stewardship plans (Comber and Dayer 2022). The term refers to a form of social marketing that emphasizes identifying a set of behaviors to focus on a) maximizing benefits, b) identifying and removing barriers to their performance, and then c) designing, implementing, executing, and assessing programming to achieve a specific behavioral outcome in a targeted, holistic, networked, and efficient way (McKenzie-Mohr 1999).

To assess the best ways to design stewardship programs with the intention to enhance coastal bird survival and recruitment through CBSM along the Texas coast we will test, observe, and assess the efficacy of a range of stewardship techniques deployed to mitigate recreational disturbances to coastal birds and their nesting sites. We will achieve the following objectives: a) elucidate user groups definitions of stewardship towards shorebirds, b) identify the most salient information, content framing, and communication delivery mechanisms that best match the preferences of each stewardship type; and c) determine which stewardship techniques are best for different user groups and species at each study site. Using the results from this research at the site level, managers and bird conservation groups will be able to adapt their stewardship approaches to align with the social-ecological context, enhancing the efficacy of behavioral norms among the target community. Broadly, findings will be integrated with our colleagues' tristate effort to assess CBSM to steward coastal bird populations along the Gulf of Mexico.

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Involvement by National Audubon and Virginia Tech co-principal investigators will result in integration of our Texas results with those of similar research and stewardship throughout the Gulf Coast. Because many of these bird species range widely throughout the Gulf Region, we must look for solutions to common threats at Gulf-wide scales.

Literature Cited

Bennett, N. J., Whitty, T. S., Finkbeiner, E., Pittman, J., Bassett, H., Gelcich, S., & Allison, E. H. (2018). Environmental stewardship: A conceptual review and analytical framework. Environmental Management, 61(4), 597– 614. https://doi.org/10.1007/s00267-017-0993-2

Bowes, M., Keller, P., Rollins, R., & Gifford, R. (2017). The Effect of Ambivalence on On-Leash Dog Walking Compliance Behavior in Parks and Protected Areas. *Journal of Park & Recreation Administration*, *35*(3).

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Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

SECTION ONE: GENERAL INFORMATION

Project Name:

Resiliency Education and Infrastructure

Project Previously Funded by GBEP? Yes ☒ No ☐

Lead Implementer:

Galveston Bay Foundation (GBF)

☐ Federal, State, or Local Government ☐ Council of Government ☐ Public University
☒ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Cindy Wilems
Project Representative Phone	(281) 332-3381 x219
Project Representative Email	cwilems@galvbay.org

Partners and Their Roles:

Channelview Independent School District administrators, teachers, and support staff are integral partners in this project. Teachers are by far the most important partner any education program can have. Teachers participating in the teacher professional development will receive a $500 stipend to be used to facilitate learning in their classrooms.

Citizens Environmental Literacy Foundation establishes sustainability as an integral part of every child's K-12 learning experience. CELF will assist with the teacher professional development initiatives and provide lessons and resource related to civic science and project-based learning.

The Climate Initiative provides young climate champions education and engagement tools to steward our planet and catalyze the transition to climate-resilient communities. Through community-based education and empowerment initiatives, youth learn about local climate problems and possible solutions, giving them hope and the inspiration to become change agents in their communities and beyond. TCI education resources will be used during the teacher professional development and high school environmental systems students will participate in their "Community Conversation" program in year two of the project.

Amount Requested (minimum budgeted cost of $150,000):

Max: $536,124.00± Min: $336,124.00±
**Please refer to "Total Project Cost" for more information on the scalability of the proposed project.*

Is the project scalable? ☒

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$222,042
FY 2026 (09/01/2025-08/31/2026)	$314,081
FY 2027 (09/01/2026-05/31/2027)	$0.00
Total	$536,124

Total Project Cost:

Max: $536,124.00± Min: $336,124.00±

The total project cost includes all components of the proposed project discussed in this proposal: expansion of K-12 environmental education in Channelview ISD and green infrastructure upgrades at GBF's Trinity Bay Discovery Center (TBDC) including terrestrial and aquatic habitat restoration, expansion of the existing living shoreline, and installation of a bridge to establish a new water quality monitoring site.

GBF aims to establish a demonstrate site for green infrastructure at TBDC and has therefore included all components necessary to achieve this goal as well as long-term climate resiliency for the preserve. However, if funds are limited for the FY24 funding cycle, the living shoreline expansion (~$200,000.00) can be removed from this proposal, decreasing the total cost to $336,124.00.

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

Year 1:
GBF has submitted a proposal to receive **$40,000.00** from the Gulf of Mexico Alliance. $15,000 of these funds would support GBF's Bay Biodiversity program during the 2024-2025 school year for Crenshaw and De Zavala Elementary schools. If received, the GOMA grant will fund bus transportation reimbursement, teacher professional development, and related supplies. The funding award will be announced by fall 2023.

Year 2:
GBF plans to secure approximately **$5,000.00** in private/corporate donations to rent buses for the final Green Infrastructure Community Event during Year 2, providing transportation for families from participating schools.

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

Two years: September 1, 2024 – August 31, 2026

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☒	NPS-3 ☐	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☒	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☒	HC-3 ☒
SC-1 ☐	SC-2 ☐	
FWI-1 ☐	FWI-2 ☐	FWI-3 ☒

Plan Priority 3: Engage Communities

SPO-1 ☒	SPO-2 ☐	SPO-3 ☒	SPO-4 ☒
PEA-1 ☐	PEA-2 ☒	PEA-3 ☒	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☐	RES-2 ☐	RES-3 ☐	RES-4 ☒
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☐
ACS-1 ☐	ACS-2 ☐	ACS-3 ☐	

Priority Area Actions Detail:

The proposed project directly implements the following Priority Area Actions:

NSP-2: Continue NPS education and outreach and engage target populations by expanding the reach of the community programs into the Channelview ISD community.

PHA-2 & RES-4: Expanding the GBF Volunteer Water Monitoring program to include a site on Trinity Bay will add the opportunity to collect an additional bacteria sample and expand knowledge of potential contact recreation issues within the Trinity Bay area. This bacteria data can be used in local research as well as in community outreach efforts.

HC-2 & 3: Restore habitat form and function where it has been lost or degraded and enhance existing habitats to increase overall function and productivity by restoring native terrestrial and aquatic habitats at GBF's Trinity Bay Discovery Center (TBDC).

FWI-3: Develop or support outreach initiatives that promote water quality & conservation by expanding the reach of GBF's Volunteer Water Monitoring Program through the addition of a new monitoring site in Trinity Bay, installing rain barrels at participating schools, and providing rain barrel supplies at community events. The Volunteer Water Monitoring Program is part of the Texas Stream Team and helps contribute to a statewide dataset of water quality parameters.

SPO-1: Support and fund existing and new stewardship programs by providing opportunities for community members and students to plant native plants during habitat restoration at TBDC.

SPO-3: Support other regional campaigns, such as Back the Bay and GBF's Rain Barrel Program during community events held at TBDC.

SPO-4: Empower Channelview high school students to implement The Climate Initiative's "Community Conversations" Program and encourage them to connect with local government officials and engage them in local environmental issues.

PEA-2: Support and fund existing and new adult education and awareness programs by connecting adults and families to the proposed green infrastructure and climate resiliency initiatives via science nights, community conversations, and a final community event at TBDC.

PEA-3: Develop and support existing K-12 Galveston Bay estuary-related curricular materials for regional use by providing approximately 4000 students and teachers in Channelview ISD with green infrastructure and climate resiliency place-based education during field programs, classroom workshops, and teacher professional development. Through these intentional activities, GBF will strengthen the longstanding relationship with Channelview ISD and establish a demonstration project that could be replicated in other school districts in the future.

SECTION THREE: BIL PRIORITIES

Action Priorities

Proposals must address one or more of the following actions:

☐ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☒ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☒ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:
- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities

Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☒ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☒ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☒ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☐ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

Action Plan Priorities

Green infrastructure, watershed health, water reuse and conservation

The proposed project aims to connect students, teachers, and community members with green infrastructure and climate resilience initiatives at GBF's Trinity Bay Discovery Center (TBDC) and replicate those efforts in communities and schools. The multiple facets of the project (Green infrastructure and energy efficient upgrades to the TBDC facility, habitat restoration including expansion of the living shoreline at TBDC, Rain Barrel program, Volunteer Water Monitoring program, and K-12 student/teacher engagement programs) positively impact watershed health, introduce native species to degraded habitats, encourage water reuse and conservation, and engage community members to discuss climate resiliency in meaningful and relatable ways. The proposed infrastructure improvements at TBDC will allow GBF to demonstrate how citizens can retrofit their homes and/or properties to increase sustainability and reduce energy costs.

Habitat protection and enhancement

GBF proposes to conduct upland habitat restoration at TBDC, targeting degraded coastal prairie and/or coastal forests on the 17-acre, bayfront preserve owned and managed by the Foundation. If awarded FY24 funds, it estimated that up to 4.0-acres of coastal prairie will be restored and up to 100 native trees will be planted at TBDC. Furthermore, community and student volunteers will be engaged in these restoration efforts through native plantings as well as invasive species removal.

To further enhance the resilience of the TBDC shoreline, GBF proposes to expand the existing living shoreline where erosion is still active. The original living shoreline, constructed in 2018 (thanks in part to funding from the Galveston Bay Estuary Program), resulted in a 780-foot rip-rap breakwater, 400-foot oyster shell breakwater, and the restoration of over 1.00-acre of intertidal marsh. While the oyster shell breakwater is successfully functioning as oyster habitat, it does not provide sufficient protection for the shoreline and marsh is struggling to establish. Therefore, GBF proposes to extend the existing rip-rap breakwater by up to 350 feet along the northeastern shoreline of TBDC. Upon completion of construction, community and student volunteers will be engaged through smooth cordgrass to complete the living shoreline and restore an additional 0.20+ acres of marsh.

Support for existing projects

This project expands upon many of GBF's current programs, such as:

1. Expanding K-12 environmental education initiatives into additional Channelview ISD schools.
2. Continuing Bay Biodiversity K-5 environmental education programming in Crenshaw and De Zavala Elementary schools for an additional two years. Crenshaw has participated in the program since 2019 and De Zavala will start participating in the 2023-2024 school year.
3. Continuing the development of green infrastructure projects at TBDC to establish the site as a community showpiece for climate resiliency measures.
4. Adding a much-needed water monitoring site for Trinity Bay via the construction of the Cedar Gully bridge.
5. Installing rain barrels at participating schools and providing supplies to community members attending community events.

The proposed project will also reestablish a 2018 GBEP-funded project, "Know your Watershed," which provided teacher professional development over the local watershed via lessons and field trips. GBF partnered with UHCL to implement "Know your Watershed" and looks forward to implementing similar programming with Channelview ISD teachers as well as hosting the associated teacher workshops at TBDC for two years with regional partners.

Support Priorities

Underrepresented and/or under-resourced communities

GBF educators will collaborate directly with Channelview ISD teachers and administrators when planning all facets of the proposed K-12 programming for up to five schools within the district. GBF staff will physically be in the community during K-12 education programming and science nights to further engage community members and students. As documented by the Texas Education Agency, 66.2% of Channelview ISD students are at risk of dropping out, 38.4% are enrolled in bilingual and English language learning programs, 77.7% are considered economically disadvantaged, and 95% are of an underrepresented ethnicity. "I learned that mud isn't scary!" For many students, participating in one of GBF's programs is their first true encounter with nature, and having a positive experience is crucial for the future of the region. GBF educators meet participants where they are and create a safe place for everyone to learn, grow, and experience the wonders of Galveston Bay.

Engaging K-12 students and adults

The proposed project will engage K-12 students, teachers, and adults in a variety of K-12 environmental education activities over two years. An estimated 4000 participants will be directly served with classroom and field-based programming and up to 1000 community members will be engaged during school science nights, community conversations, and a community event at TBDC. The objectives of GBF's Environmental STEM Education Programs are to instill knowledge and appreciation of the Galveston Bay ecosystem, inspire participants to break down barriers and open themselves to new experiences, and empower students to become life-long advocates for a resilient Galveston Bay. The programs provide STEM-based environmental education focused on the importance of the Galveston Bay estuarine system and how all the seemingly vastly different components—Gulf of Mexico, rivers, lakes, bayous and streams, woodlands, prairies, marshlands, farmlands, urban and suburban areas—are intertwined, interconnected, and greatly impact the Bay itself. For this project, topics are even more focused on watershed health, climate issues, green infrastructure, and human impacts upon the ecosystem.

Specific hands-on and place-based program activities are outlined within the full project description. Through these activities, over 4000 students will gain experience in scientific data collection, public speaking, event planning, as well as increase their local ecosystem knowledge and connection with nature, learn about green infrastructure initiatives, and more. Teachers participating in the teacher workshops will learn the variety of habitats within the Galveston Bay watershed, discuss local environmental and social justice issues, and connect with a variety of community partners.

Annual feedback from participating teachers allows GBF Educator's to continuously improve and adapt GBF's programs. This feedback also ensures relevancy within the classroom and continued success of these programs across the region.

> *"We are very grateful for the learning opportunities Galveston Bay Foundation's Bay Biodiversity program has provided for our staff and students during the past several years. Galveston Bay Foundation's experienced educators engaged our students and staff in hands-on learning experiences about our Galveston Bay ecosystems, the primary functions and benefits of estuary plants and animals, the major threats facing these coastal habitats, and how we can protect and preserve them." – Campus science coordinator*

In addition, approximately 1000 family and community members will be engaged via science nights, community conversations, and a culminating community event held at TBDC. Through these events, adults will discuss environmental issues within the Channelview community, identify possible solutions, increase their knowledge of green infrastructure options, and relate the overall watershed health to the health of their families.

Diversifying Strategic Partners

During this project, GBF will partner with a variety of local and national organizations that have not connected to a GBEP-funded project thus far. These partnerships will facilitate several aspects of environmental and community education. Curriculum from The Climate Initiative will be used in the teacher professional development workshops and to empower students in implementing "Community Conversations" with community members. During the planning of these conversations, students will be encouraged to invite local government officials and community organizations to participate. The Children's Environmental Literacy Foundation will assist with the teacher professional development by connecting teachers with project-based learning initiatives. Additional regional/community partners (TBD) will be included at the teacher professional development workshops as guest speakers or field trip hosts and will also be invited to the culminating community event at TBDC at the end of year two. These partners will receive compensation for their efforts.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?

☒ Reduction in nutrient pollution
☒ Water reuse and conservation
☒ Marine litter reduction
☒ Green infrastructure and resiliency

This project aligns with all EPA areas of special interest in multifaceted ways:

1. Green infrastructure updates and habitat restoration will be implemented at TBDC to establish the property as a demonstration site and community showpiece for climate resiliency. Initiatives will increase native habitat, reduce nutrient pollution, reduce shoreline erosion, increase biodiversity across the property, reduce energy usage, and provide a space for residents to view and learn how to implement such projects themselves.
2. GBF's Rain Barrel Program ensures healthy freshwater inflows into the Bay, reduces the amount of pollution and bacteria being introduced into the watershed, and improves coastal resiliency by reducing flooding from heavy rain events.
3. GBF's Environmental STEM Education programs educate students and teachers on climate resiliency, marine litter reduction, green infrastructure, water reuse and conservation, and reduction of nutrient pollution via hands-on and place-based activities within the school and at TBDC.
4. GBF's Volunteer Water Monitoring program is part of a long-term monitoring effort. Data is shared with local partners and contributes to statewide water quality monitoring projects. Volunteers from this program become knowledgeable about water quality issues facing the region which empowers them to be voices in the community to support NPS pollution reduction efforts.

Build America, Buy America Act (BABA)

Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☒	No ☐
If yes, will you comply with the law or submit a waiver?	Yes ☒	No ☐

Comments (if any):

All contractual bids for construction will be reviewed for compliance with BABA.

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☒ No ☐

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

Yes ☒ No ☐

If awarded FY24 funding, the proposed project will utilize the majority of the funds to implement environmental education and community outreach efforts within the Channelview community adjacent to the I-10 corridor. GBF has specifically identified five schools for the proposed educational programming including Crenshaw Elementary, De Zavala Elementary, Aguirre Junior High, Alice Johnson Junior High, and Channelview High School, along with student families and community members. These populations are found in census tracts **48201252400**, **48201252600**, **48201252500**, and **48201252301** in the CEJST, which are all considered disadvantaged for both socioeconomic factors and multiple combinations of the following factors: building loss rate, proximity to risk management plan facilities, diesel particulate matter exposure, flood risk, low life expectancy, linguistic isolation, high school education (34%), proximity to superfund sites, formerly used defense sites, proximity to hazardous waste facilities, and traffic proximity and volume. Additional community tracts that share the same risk factors within the area will ultimately be engaged in community efforts due to the nature of program promotion and school district boundary lines. Please refer to the attached maps displaying the Channelview schools and census tracts below.

Through this project, GBF will strengthen relationships within the Channelview community via intentional K-12 environmental education, teacher professional development, and community events focused on green infrastructure, climate resiliency, local ecosystem knowledge, watershed health, and more. In addition to the place-based education occurring on site, the green infrastructure and habitat endeavors at GBF's Trinity Bay Discovery Center (TBDC) will be used for future community events to showcase projects homeowners and business owners can implement on their own properties. Furthermore, via a final Green Infrastructure Community Event at TBDC in Year 2, GBF plans to connect participants with local and federal climate resiliency and social justice grant programs.

GBF has established strong relationships with two of the identified schools and has support from Channelview ISD district leaders to increase programming in up to three new schools. Students and teachers will receive a variety of hands-on placed-based environmental education aimed to increase knowledge of the local watershed, bridge the substantial gap between them and the natural ecosystem, discuss and identify human impacts to the watershed and problem solve solutions (such as green infrastructure), and increase the overall connection to the Bay. Participating high school students will additionally assist with habitat restoration at TBDC, rain barrel installation at the participating schools, implementation of "Community Conversations" programming, and help plan the final community event.

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

Census tracts 48201252400, 48201252600, 48201252500, and 48201252301 are each broken down into nine qualifying smaller block groups that meet the "above 80th percentile" in the EJ Screen. Please refer to the EJ Screen maps included below. As described above, relationships will be created to engage the community in environmental education initiatives for students and adults through a variety of methods.

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☒ Yes
☐ No

All five Channelview ISD schools identified for the proposed project are considered Title 1: Crenshaw Elementary, De Zavala Elementary, Aguirre Junior High, Alice Johnson Junior High, and Channelview High School. GBF plans to reach over 4,000 students from these schools during the two-year project. Additionally, up to 24 teachers will be provided with targeted professional development opportunities each summer to learn about the watershed and impacts in the region.

Does the Project work with new, smaller communities/partnerships?
☒ Yes
☐ No

GBF has been developing relationships within Channelview ISD over the past few years and has a longstanding relationship with Crenshaw Elementary. The proposed project will allow GBF to strengthen the existing relationships and build new relationships with additional schools as well as connect with the entire community through science nights and community events.

Additionally, a new partnership with The Climate Initiative (TCI) will occur during this project by providing teachers with climate resiliency resources for their classroom and engaging high school students to learn how to conduct "Community Conversations" in Year 2 of the project. TCI's Community Conversations empower students to lead small roundtable meetings with members of their community to determine the spaces of value within the community and discuss how climate change will affect them. These in-person conversations consist of communication exercises, participatory mapping, a climate change simulation, and brainstorming actions to move forward towards climate mitigation. Students will be charged with determining who should attend and the overall topic of discussion.

SECTION SIX: PROPOSAL DETAILS

Project Summary:

The Galveston Bay Foundation proposes to implement a two-year, multi-faceted project to establish a demonstration site (the Trinity Bay Discovery Center) for green infrastructure that promotes climate resiliency and restores native habitat. In an effort to equip the community with climate knowledge and practical tools, the proposed project will also expand GBF's environmental education initiatives within the Channelview community through the expansion of K-12 programming for Channelview ISD, week-long teacher development workshops, science nights, and community events at the Trinity Bay Discovery Center to showcase green infrastructure in action.

Full Project Description (1,000 words or less):

The best way to involve a community in environmental issues is through the local schools. The proposed project aims to engage K-12 students, teachers, and families through a variety of activities focused on climate resiliency, human impacts on the watershed, and green infrastructure using GBF's Trinity Bay Discovery Center (TBDC) as a community showpiece. Students will build on their education from year to year, assisting with habitat restoration, rain barrel installations, "Community Conversations" programming, and planning a final community event. This project is a continuation of GBF's efforts over the past 10 years within the Channelview community and at TBDC and incorporates environmental education, community engagement, green infrastructure endeavors, and habitat restoration.

K-12 & Family Education within Channelview ISD

Each year, GBF's Environmental STEM Education programs provide over 11,000 students and teachers classroom and place-based STEM environmental education focused on Galveston Bay. The objectives of the programs are to instill knowledge and appreciation of the Galveston Bay ecosystem, inspire participants to break down barriers and open themselves to new experiences, and empower students to become life-long advocates for a resilient Galveston Bay.

GBF has identified five Title 1 schools within Channelview ISD to participate in a variety of environmental education programming throughout this project, including rain barrel installations, classroom workshops, field trips to TBDC, teacher professional development, and more. These schools are direct feeder schools to Channelview High School and are within 20-minutes of TBDC, allowing GBF to focus intentional watershed and green infrastructure-related education to over 4000 Kindergarten, 1st, 2nd, 3rd, 4th, 5th, 7th, 11th, and 12th grade students as well as their families. Education program details are as follows:

- Two-year implementation of **Bay Biodiversity**, GBF's elementary program that provides place-based classroom workshops and field trips for all K-5th grade students in two schools in Channelview ISD.
- Two-year implementation of **Classroom STEM Workshops and Field Experiences to 7th grade students** at the junior high feeder schools. These students completed the Bay Biodiversity program as elementary students and will continue their learning via hands-on inquiry-based activities identifying environmental problems around the bay and hypothesizing solutions.
- Two-year implementation of **Classroom STEM Workshops and Field Experiences to environmental systems and AP Environmental Science students** at Channelview HS. Students will be introduced to the Galveston Bay watershed via hands-on and discussion-based activities, research green infrastructure methods and companies in the region, and assist with habitat restoration at TBDC, rain barrel installations at each school, and the final Green Infrastructure Community Event.
- GBF educators will lead hands-on activities at school **science nights** in up to five schools, connecting families with watershed and green infrastructure activities.
- Environmental high school students will be trained on The Climate Initiative's **Community Conversation** program and will lead conversations within their local community during Year 2 of the program.
- Two-year implementation of a **five-day watershed teacher professional development** workshop at TBDC for 12 participating Channelview ISD teachers. In Year 1, teachers will be introduced to the Galveston Bay watershed, travel to regional partner sites to visit various watershed habitats, learn about project-based learning from the Citizen's Environmental Literacy Foundation, and explore lessons and resources from GBF and The Climate Initiative. In Year 2, teachers will focus on issues around the watershed (heat, marine debris, subsidence, water/air quality, social justice, etc.), discuss potential solutions via green infrastructure and community involvement, hear from guest speakers, and travel to local sites of concern. Participating teachers will receive supplies to implement lessons in the classroom, a monetary stipend, and support from GBF and partner organizations throughout the year.
- In Year 2, families will be invited to participate in a **Green Infrastructure Community Event** at TBDC to showcase the new features and share how green infrastructure can play a part in their lives. High school students will be involved in planning the event to empower them to become environmental leaders within their community. The event will include hands-on education activities across the property, a tour of green infrastructure projects, lunch, community partner booths, and giveaway items including rain barrels to encourage community members to implement climate-resilient strategies at home.

Green Infrastructure and Habitat Restoration

TBDC was acquired by GBF in 2014, with the goal of developing a publicly accessible nature center with a variety of habitat restoration demonstration projects, ongoing K-12 environmental education, and volunteer opportunities. The property sits on a point with views of Trinity Bay and is bisected by Cedar Gully, a freshwater gully which flows directly into the bay. To address severe shoreline erosion, GBF installed a living shoreline in 2018, resulting in the restoration of over 1.0-acre of intertidal habitat. Since then, over 4,300 students have visited the property, assisting with marsh restoration, oyster reef restoration, and environmental education activities. The property has also provided an excellent location for hosting teacher professional development, community workshops, and volunteer events. GBF envisions this property becoming a demonstration site for green infrastructure from which community homeowners and K-12 students can learn best practices. In 2023, a bus turnaround and freshwater bioswale was constructed to begin this process. When this project concludes, future outreach endeavors include inviting surrounding communities (such as Beach City, Baytown, and Anahuac) to visit TBDC to learn how they can implement green infrastructure, such as living shorelines, rain barrels, and bioswales at home.

To fully live out the vision of the property, additional work needs to be done to restore native habitat and incorporate green infrastructure and energy efficient upgrades. If awarded the FY24 BIL funds, the property will receive a variety of new **green infrastructure**, including a permeable parking lot, solar panels, energy efficient windows, rain barrel installation, energy and water efficient HVAC/appliances, facility improvements, terrestrial and aquatic **habitat restoration**, **expansion of the living shoreline** and a **bridge** over Cedar Gully to allow for trail access. This bridge will also allow GBF to add a **water quality monitoring site** on Trinity Bay, which is currently nonexistent.

Overall Impact

During the two-year project, GBF plans to reach **4000 students and teachers** via environmental education programming and approximately **1000 family/community members** via community engagement events.

Latitude/Longitude (Optional):

Trinity Bay Discovery Center: 29°42'50.56"N, 94°51'17.47"W

Location:

1. Channelview ISD schools:

Crenshaw Elementary	16204 Wood Dr, Channelview, TX 77530
De Zavala Elementary	16150 2nd St, Channelview, TX 77530
Aguirre Junior High	15726 Wallisville Rd, Houston, TX 77049
Alice Johnson Junior High	15500 Proctor St, Channelview, TX 77530
Channelview High School	1100 Sheldon Rd, Channelview, TX 77530

2. Trinity Bay Discovery Center: 12106 Cedar Gully Rd, Beach City, TX

Other Plans Implemented:

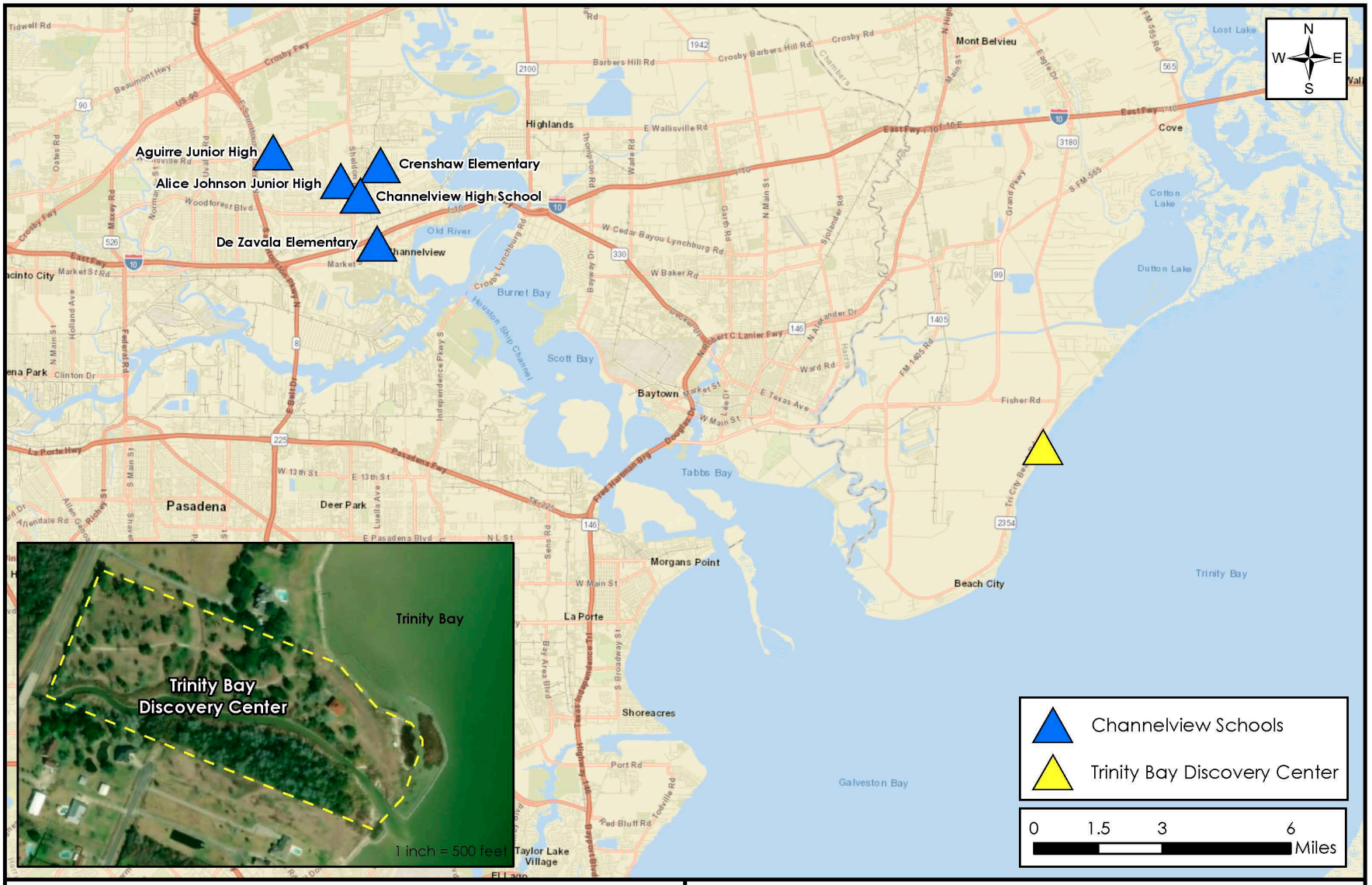
Other plans include:
Next Generation Science Standards:

- MS-LS2-1
- MS-LS2-4
- MS-LS2-5
- MS-ESS3-1
- MS-ESS3-3

Texas Essential Knowledge and Skills:

- 1st grade: Science: 1ABC, 7B, 9C, 10AB
- 2nd grade: Science: 1ABC, 7B, 9AC
- 3rd grade: Science: 1A, 3D, 4AB, 9ABC
- 4th grade: Science: 1A, 3D, 4AB, 10A,
- 5th grade: Science: 1A, 3D, 4AB; 9ACD
- 6th grade: Science: 1A; 2ACE; 3BD; 4AB
- 7th grade: Science: 1A; 2ACE; 3BD; 4AB; 8ABC
- Environmental Systems: 1AB; 2EFG; 4BDFG; 5BE; 8AC; 9EF

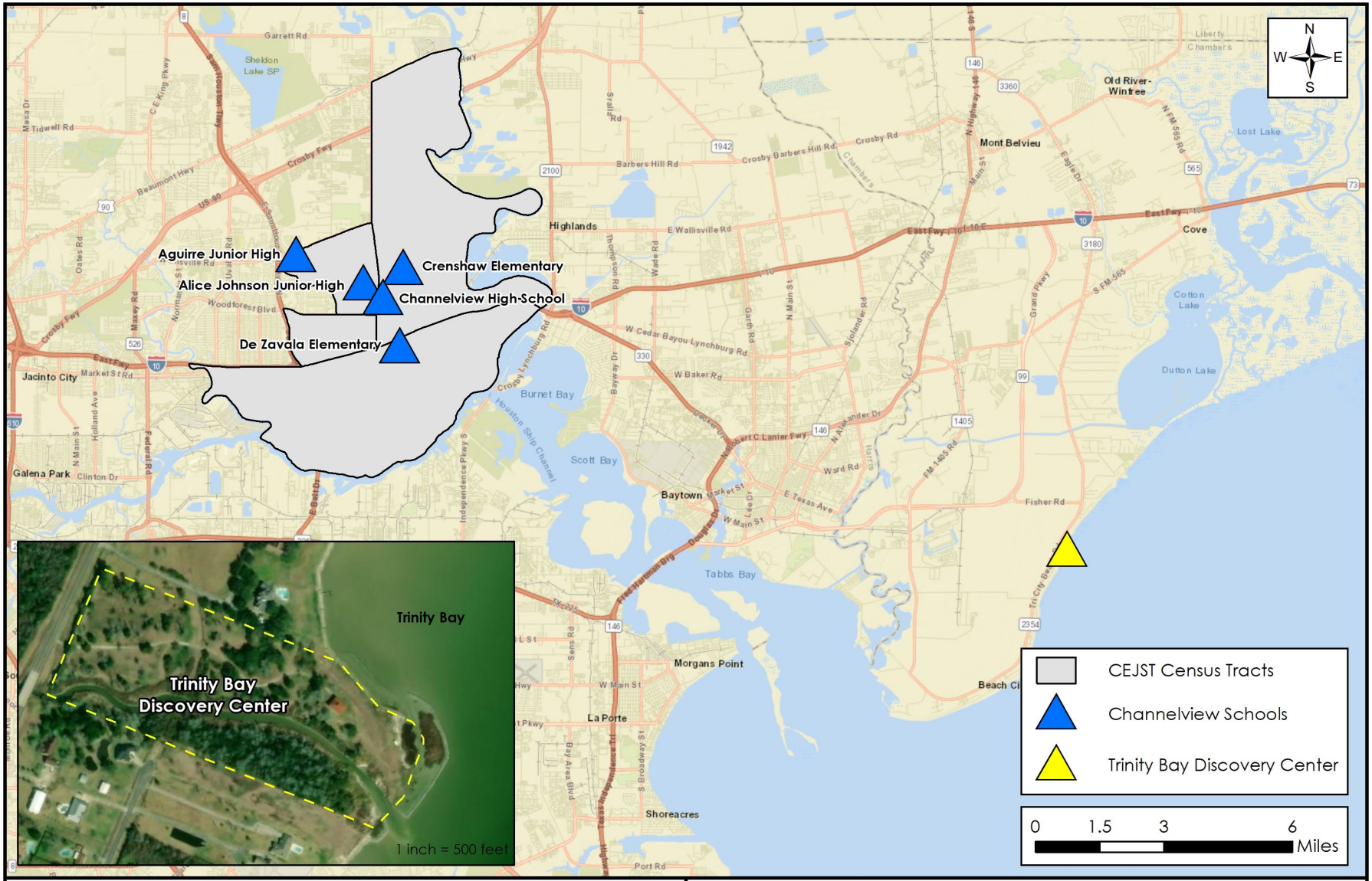
The Texas Education Agency states that in grades 6-8, students should conduct laboratory and field investigations for at least 40% of instructional time. Districts are encouraged to facilitate classroom and outdoor investigations for at least 80% of instructional time in K-12 science classrooms.



PROJECT LOCATION MAP

Project Name: Building Community Resilience with Green Infrastructure & Education	
Project Location: Channelview ISD & Trinity Bay Discovery Center	
Image Source: ESRI World Imagery & World Street Map	
Projection: NAD 1983, UTM Zone 15N	
Date Drawn: 8/23/2023	Drawn by: H.Leija

GALVESTON BAY FOUNDATION
1725 Highway 146, Kemah, TX; (281) 332-3381

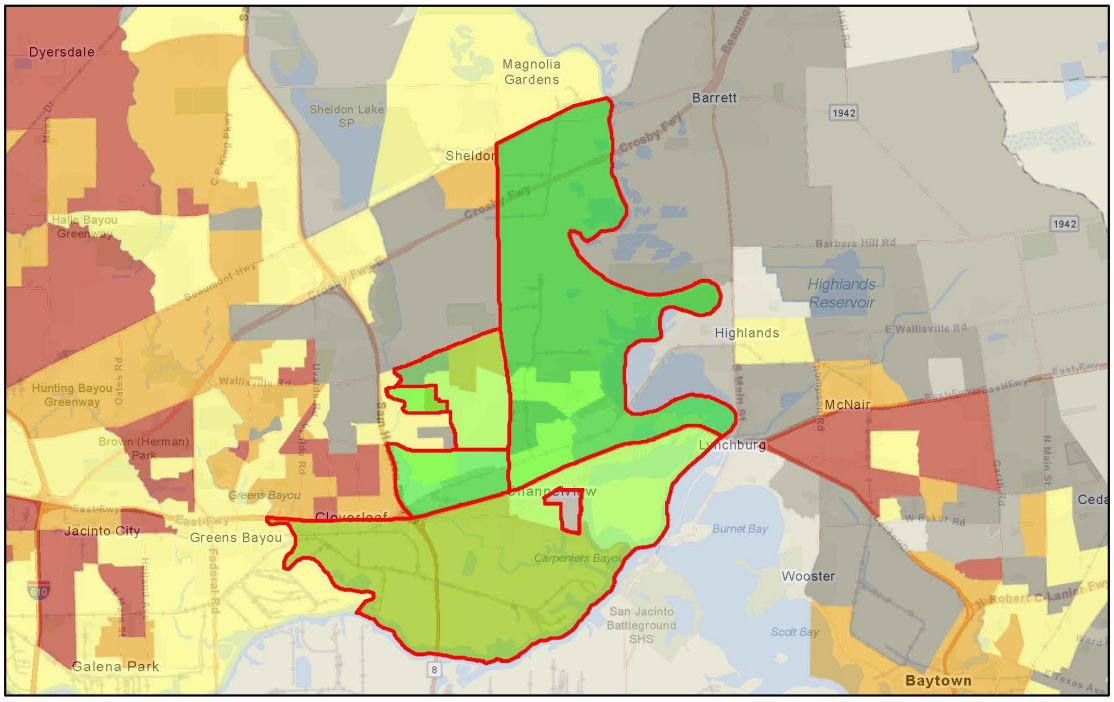


Climate & Economic Justice Screening Tool Results

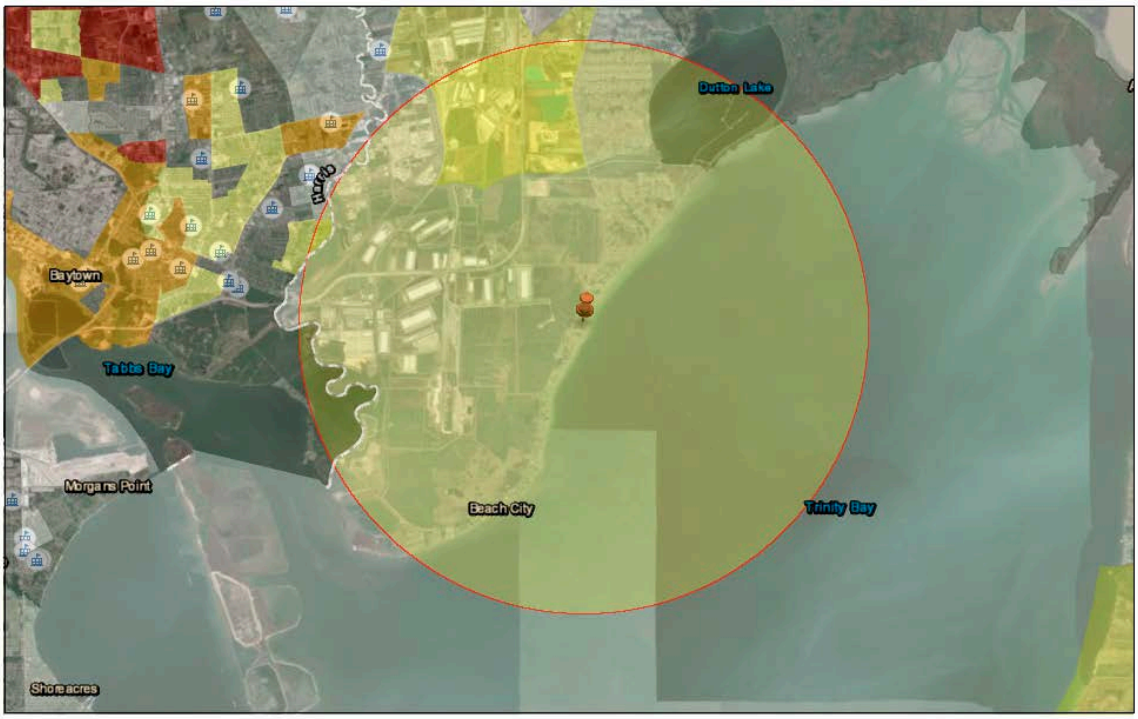
Project Name: Building Community Resilience with Green Infrastructure & Education	
Project Location: Channelview ISD & Trinity Bay Discovery Center	
Image Source: ESRI World Imagery & World Street Map; CEJST	
Projection: NAD 1983, UTM Zone 15N	
Date Drawn: 8/25/2023	Drawn by: H.Leija

GALVESTON BAY FOUNDATION
1725 Highway 146, Kemah, TX; (281) 332-3381

EJ Screen Demographic Index - CEJST



EJ Screen Demographic Index



SECTION SEVEN: BUDGET DETAILS
Please note, the full contractual cost is included in the proposed budget but can be reduced by $200,000.00 if funds are limited. Refer to the "Total Project Cost" section for additional information.

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	$111,500
b.	Fringe Benefits	$20,070
c.	Travel	$6,320
d.	Supplies	$17,000
e.	Equipment	$0
f.	Contractual**	$323,500
g.	Construction	$0
h.	Other*	$13,000
i.	Total Direct Costs (Sum a - h)	$491,390
j.	Indirect Costs	$44,734
k.	Total (Sum of i & j)	$536,124

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:

Living shoreline construction: $190,000
Green infrastructure and facility improvements: $112,500
Upland Habitat Restoration: $10,000
Teacher workshop van rentals: $3,000
Teacher workshop regional partner contracts: $4,000

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 34% of (check one):

☒ salary and fringe benefits
☐ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

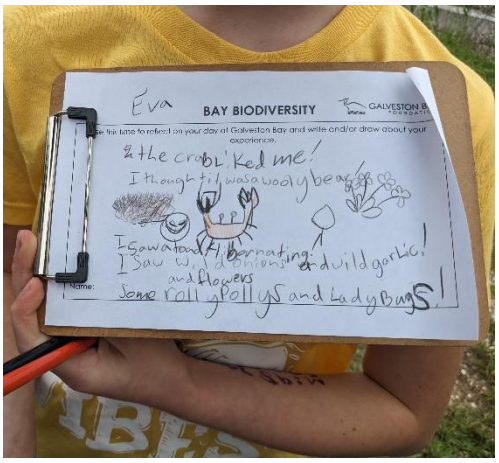
This rate is less than or equal to (check one):
☒ Predetermined Rate—an audited rate that is not subject to adjustment.
☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable]

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

Supplemental Photos/Graphics (Optional):

A) K-12 Environmental Education
Field Experiences



Classroom Workshops

Teacher Professional Development

B) Rain Barrel Workshops

C) Living Shoreline

December 2019

April 2023

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

A PROGRAM OF TCEQ

SECTION ONE: GENERAL INFORMATION

Project Name:

Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

Houston Advanced Research Center/Geotechnology Research Institute

☒ Federal, State, or Local Government ☐ Council of Government ☐ Public University
☐ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Stephanie Glenn
Project Representative Phone	281-364-6042
Project Representative Email	sglenn@HARCresearch.org

Partners and Their Roles:

United States Geological Survey – Monitoring and Data Collection
Galveston Bay Foundation – Stakeholder Communication and Outreach

Amount Requested (minimum budgeted cost of $150,000):

$548,608

Is the project scalable? ☒

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$152,989
FY 2026 (09/01/2025-08/31/2026)	$128,923
FY 2027 (09/01/2026-05/31/2027)	$131,603
FY 2028 (09/01/2027-05/31/2027)	$135,093
Total	$548,608

Total Project Cost:

@ $200,000 leveraged plus $548,608 = $748,608 total project costs over four years

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

Leveraging existing monitoring programs and partnerships with Texas Water Development Board and Texas General Land Office. (@$200,000). Leveraging existing workgroup connections and meetings with Texas Parks and Wildlife.

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

September 1, 2024-August 31, 2028

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☐	NPS-3 ☐	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☐	HC-3 ☐
SC-1 ☒	SC-2 ☐	
FWI-1 ☐	FWI-2 ☒	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☐	SPO-2 ☒	SPO-3 ☒	SPO-4 ☐
PEA-1 ☐	PEA-2 ☐	PEA-3 ☐	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☐	RES-2 ☒	RES-3 ☒	RES-4 ☐
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☒
ACS-1 ☒	ACS-2 ☒	ACS-3 ☐	

Priority Area Actions Detail:

SC-1 Native Species Management
The proposed project will inform on species needs, an important part of the outputs of SC-1. The native eastern oyster, shrimp, and crab populations will be impacted by ocean and coastal acidification; the results of the project can be used to inform on what/how much capacity the species will need to develop for buffering the decreased pH to maintain critical habitat.

FWI-2 Freshwater Inflows Research and Management
This project will supply critical information, which up until now is a gap in knowledge, on activities for FWI-2, which is to support research to understand the freshwater inflow needs for Galveston Bay. Increasing freshwater inflows may be needed to help with decreasing pH; understanding the current and future ocean and coastal acidification state of Galveston Bay is critical to projecting these inflow needs.

SPO-2 Workshops and Events
SPO-3 Support Regional Initiatives
This project will implement a variety of workshops and events with oystermen and community members at the request of community partners established through the Galveston Bay Report Card and Galveston Bay Foundation oyster outreach. Workshops may include in-person or virtual presentations for oystermen and community action groups, at conferences, or in partnership with schools, businesses, and other stakeholders to encourage individual behavior change and/or community program development. Some examples of interactive community events that could be requested by oystermen and community groups include presentations addressing local environmental topics of concern, presentations on restored reefs and restoration programs, presentations on oyster harvesting from Texas or Gulf of Mexico groups (like Tampa Bay), or much more.

Implementation will be based on Galveston Bay Foundation oyster outreach and the Galveston Bay Report Card, which itself is built on and supportive of existing campaigns, data from partner research efforts, and collaborative outreach opportunities that include information on water quality (including acidification), oyster reef habitat, and oyster populations. Additionally, programs implemented will partially be based on actions recommended in the What You Can Do tool, almost all of which support a Regional Initiative. For example,

GBF's Galveston Bay Action Network pollution reporting tool is offered as a way for the public to be involved in improving pollution's impact on the bay, links to GBF's oyster gardening program, and oyster shell recycling.

RES-2 Conduct Geochemical Stressor Monitoring and Research
RES-3 Conduct Physical Stressor Monitoring and Research
ACS-1 Tracking Ecosystem Health Indicators
ACS-2 Access to Monitoring and Research Data
A lack of available applied research and monitoring data can prevent the understanding of Galveston Bay ecosystem components, addressing limits to human uses, and implementing estuary preservation initiatives. The foundation of this project is to initiate a long-term, continuous acidification monitoring and research program to further our understanding of carbonate system variability in the Galveston Bay estuary and provide a robust dataset of both continuously monitored physical properties and discrete measurements for geochemical and biological stressors at multiple locations throughout the Galveston Bay complex. This monitoring can help determine the environmental conditions in bays, estuaries and near shore regions, forming the basis for many management decisions. All data from this project will be made available on a publicly accessible website. Multiple local, state, federal, and academic entities can use the data collected from this project, including trends and characterization of spatial variability, to support management, planning, and research programs beyond this project alone.

RES-8 Complete Coastal Resiliency and Acclimation Studies
Acidification monitoring in Galveston Bay will support the efforts of multiple local and regional partners. The information from this project will provide the baseline to Galveston Bay shellfish ability to adapt and acclimate to changing environmental conditions and provide insight into the factors that impact resilience of this valuable resource to the community that depends on it. This project will provide scientific information that can assist with shellfish adaptive management practices to ensure resilience such as siting for oyster mariculture or reef restoration.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☒ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☐ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☐ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☒ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☐ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☐ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☒ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

[Please explain in detail how project addresses priorities selected. Attachments may be submitted via email in conjunction with this application.]

BIL Action Priority: Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

The proposed project will identify the current and future status of ocean and coastal acidification in the Bay. Should Galveston Bay become too acidic without the knowledge needed for proper management of this natural resource, critical shellfish such as oysters will be lost. The information from this project will provide the baseline for Galveston Bay current coastal acidification status, and project estuary stressor scenarios for future assessments on the shellfish communities' ability to adapt and acclimate to changing environmental conditions. The results will provide insight into the factors that impact resilience of this valuable resource to the community that depends on it. This project will provide scientific information that can assist with shellfish adaptive management practices to ensure resilience such as siting for oyster mariculture or reef restoration.

BIL Action Priority: Habitat protection and enhancement

The proposed project will offer new insight and data on OCA and resilience stressors on shellfish habitat. Critical bay habitats such as oyster reefs, saltwater marshes, etc. are vulnerable to changes in OCA patterns. Estuary conditions that threaten oysters also impact oyster habitat. Unlike most sea creatures, oysters don't just live in the water – they specifically need to live on other oyster shells. By gaining a better understanding of the environmental conditions affecting current Eastern oyster populations, the availability of habitat for future oyster populations is also protected and enhanced.

BIL Support Priority: *Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.*

Galveston Bay Foundation will work with Texas Parks and Wildlife Department and/or commercial oystermen to confirm best location for monitoring, and to identify and develop relationships with key members in the commercial and recreational oyster fishing communities. These communities are often underserved communities that rely on the shellfish industry; these areas would be the focus areas for stakeholder community meetings, depending on stakeholder input and accessibility. Bay (see EJScreen question below). The Galveston Bay Report Card's mission is based on collaboration with communities, and it is seeking out opportunities to collaborate with underrepresented communities in meaningful partnerships that create resources and opportunities for the community partners; through the proposed project, the GBRC will highlight the communities impacted by project results and actions community members can take to protect valuable oyster fisheries.

BIL Support Priority*: Monitoring and Research that:*

- *captures a meaningful, quantifiable measure of a response action taken;*
- *produces data applicable and transferable to multiple programs; or*
- *produce meaningful data that can be used for future implementation and management decisions.*

The foundation of this project is to initiate a long-term, continuous acidification monitoring and research program to further our understanding of carbonate system variability in the Galveston Bay estuary and provide a robust dataset of both continuously monitored physical properties and discrete measurements for geochemical and biological stressors at multiple locations throughout the Galveston Bay complex. This type of monitoring will be the first for long-term carbonate parameters in Galveston Bay, filling in a much-needed data gap. This monitoring can help determine the environmental conditions in bays, estuaries, and near shore regions, forming the basis for future habitat protection and resource management decisions.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?
☐ Reduction in nutrient pollution
☒ Water reuse and conservation
☐ Marine litter reduction
☐ Green infrastructure and resiliency

[If yes, please summarize how the proposal addresses EPA Areas of Special Interest.]

Water conservation in Galveston Bay includes the protection and preservation of our estuarine waters as a critical habitat for native species. The proposed project will identify the current and future status of ocean and coastal acidification in the Bay. Should Galveston Bay become too acidic without the knowledge needed for proper management of this natural resource, critical shellfish such as oysters will be lost. These filter feeders act as natural filters that help maintain and preserve the waters and of Galveston Bay. It is critical to determine how much water will be needed to help buffer shellfish habitat in the face of coastal acidification. Knowing how much water to plan for will be vital to success of water conservation plans for adaptive management to mitigate possible impacts of coastal acidification.

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application? Yes ☐ No ☒
If yes, will you comply with the law or submit a waiver? Yes ☐ No ☐
Comments (if any):

[If yes, please summarize how the proposal complies with BABA, as applicable.]

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

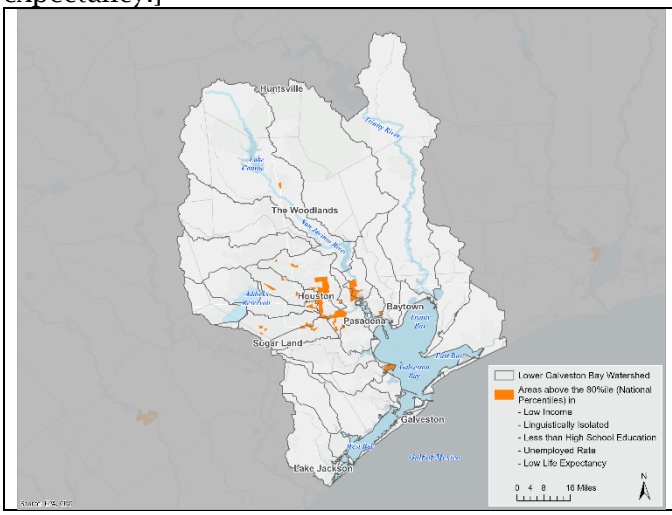
Yes ☐ No ☒

[If yes, please summarize how the proposal addresses the Justice40 initiative.]

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?

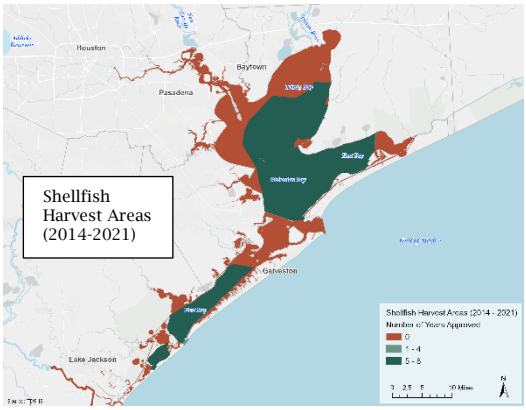
Yes ☒ No ☐

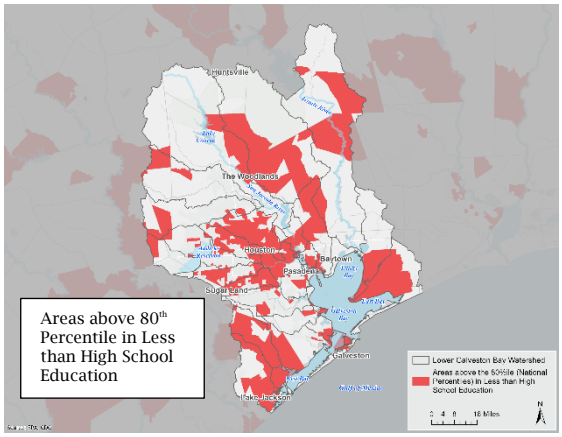
[If yes, please identify geographies and summarize how the proposal addresses the selected demographics (% Low income, % Linguistically isolated, % Less than high school education, % Unemployed, % Low life expectancy.]

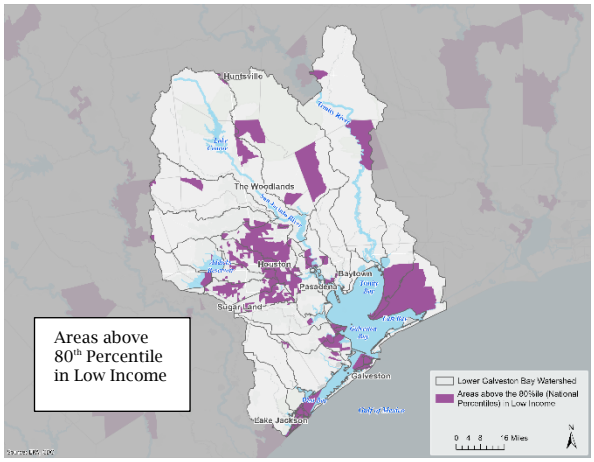


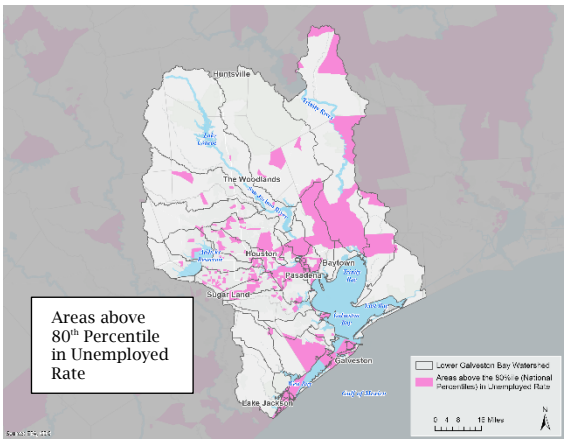
The map shows in orange the areas around the Bay that exceed the 80th percentile for all five of the indicated EJ Screen demographic indexes. One area that stands out is Eagle Point. This area would be considered for prioritizing site selection, depending on stakeholder input and accessibility. In addition, the project team plans on coordinating with stakeholders who rely on the shellfish industry in underserved communities.

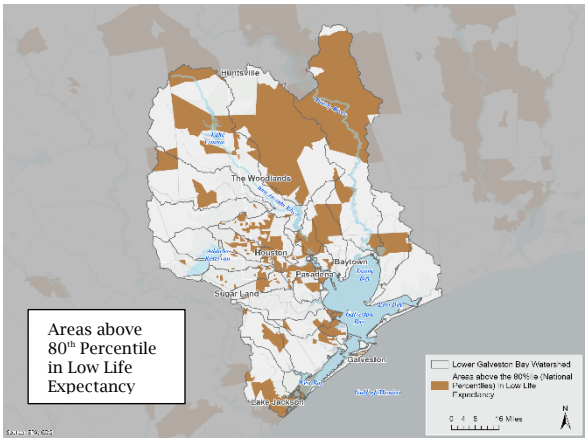
The additional maps show each demographic index separately, as well as shellfish harvest areas in the Bay. The Low Income, Linguistically Isolated, and Less than high school education demographics exceed the 80% EJ Screen in a large portion of the areas around the Bay where there are communities that rely on the shellfish industry. These areas would be the focus areas for stakeholder community meetings, depending on stakeholder input and accessibility.

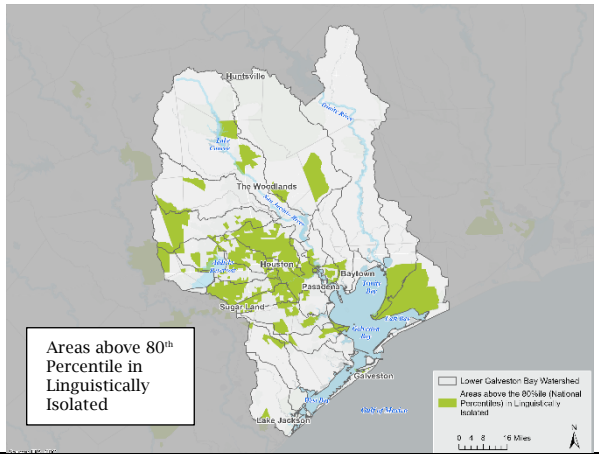












SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?

☐ Yes

☒ No

Does the Project work with new, smaller communities/partnerships?

☒ Yes

☐ No

We will be working with Texas SeaGrant to share this information with new audiences, including recreational and charter fishermen, commercial crabbers and finfish fishermen, many of whom fall within J40 communities.

SECTION SIX: PROPOSAL DETAILS

Project Summary:

A strong collaboration between the United States Geological Survey (USGS), the Houston Advanced Research Center (HARC) and the Galveston Bay Foundation (GBF) will initiate a novel long-term, continuous monitoring program to establish baseline conditions and analyze estuary stressor scenarios for carbonate system stressors to develop a framework for coastal acidification in Galveston Bay. The framework will guide implementation of ocean and coastal acidification planning to build Galveston Bay's resilience; we will collaborate with stakeholders and coastal managers in vulnerable fishing communities who rely on critical shellfish habitat for economic stability and the health of the Bay in site selection, study design and outreach of outcomes.

Full Project Description (1,000 words or less):
please note – references are below in Appendix B)

Need

Ocean acidification is driven by elevated atmospheric CO_2. Coastal acidification is primarily driven by regional factors such as inflows (high CO_2, low pH water) and eutrophication and is exacerbated by ocean acidification. Ocean and coastal acidification (OCA) is a threat to our oceans and estuaries and to life forms that rely on carbonate-based shells and skeletons, such as oysters, shrimp, and crab. In Galveston Bay, one economically and ecologically important marine calcifying organism - the Eastern oyster (*Crassostrea virginica*) – has been negatively impacted in recent years by sedimentation, flooding, increased fishing, and other stressors[1]. Oysters provide ecosystem services, including creating and providing habitat, enhancing nutrient sequestration, and stabilizing shorelines[2]. From 2010 to 2017, white and brown shrimp accounted for 27% of the total commercial shellfish harvest in Galveston Bay waters, with an annual average value of $2.4 million. Commercial harvest data shows that 30% of Texas' commercial blue crab harvest came from Galveston Bay during 2010–2017[3]. OCA could add another significant stressor to these critical Galveston Bay shellfish.

Although there is continuous monitoring of some variables that may influence shellfish health in Galveston Bay such as water temperature, salinity, freshwater inflows, and water levels, there is no continuous monitoring of carbonate system parameters such as pH, DO, or the partial pressure of carbon dioxide (pCO_2). According to a trends analysis from the 1960s to 2010, pH has significantly decreased in most sub-bays of Galveston Bay[4]. Continuous collection of acidification data will help us better understand fine and broad scale variation of carbonate system parameters in the Bay. OCA is projected to increase with the continued impacts of climate stressors. Under predicted future OCA conditions (IPCC scenarios through 2100), studies have found *Crassostrea virginica* to exhibit significant shell weakening and reduced tolerance to salinity fluctuation[5]. Current stressors have been shown to impact pH in the Bay. For example, ongoing research shows the massive amounts of freshwater inflows received during Hurricane Harvey caused the Bay to be two to four times more acidic than normal[6].

In the Galveston Bay Estuary Resilience Action Plan, a workgroup of stakeholder subject matter experts developed a vulnerability assessment of the Bay focused on coastal resilience. Stakeholders identified eleven estuary stressors that Galveston Bay is facing now and/or in the future. OCA was one of the estuary resilience stressors identified as both high risk and high consequence. The group noted that OCA in the context of Galveston Bay has not been well studied, the threat of the unknown impacts on shellfish posed a significant risk, and that research was critical to determine and mitigate the possible impacts.

Task Outline

USGS, HARC and GBF propose to initiate the first long-term, continuous acidification monitoring project for the Bay and analyze projected scenarios for pH, temperature, and other stressors to develop a framework for current and future OCA conditions in Galveston Bay, and collaborate with stakeholders for site selection, study design and outreach of outcomes.

A primary monitoring location will be identified, in coordination with GBEP partners, that best represents OCA conditions associated with typical shellfish growing regions in Galveston Bay. Site determination will also be guided by locations of disadvantaged communities to address vulnerable populations that depend on a resilient shellfish industry. Instrumentation deployed at this site will continuously monitor pCO_2, pH, specific conductance, temperature, and dissolved oxygen concentration. Secondary monitoring stations would leverage existing partnerships with Texas Water Development Board and continuously measure pH, specific conductance, and temperature at multiple locations in Galveston Bay to assess spatial variability. To validate sensor data and provide a basis of comparison between all continuous monitoring locations, discrete water samples will be collected and processed for pH, total dissolved CO_2, and alkalinity in the Bay to better understand temporal and spatial variation of carbonate system parameters in Galveston Bay and to help guide the placement of potential future acidification monitoring sites.

To better understand projected resilience stressors on OCA and shellfish habitat, we will incorporate high-resolution, localized, downscaled projected data indicators such as temperature, precipitation, and drought. Geospatial analysis techniques will overlay the estuary stressor data with the monitored pH, total dissolved CO_2 and alkalinity data and critical bay habitats such as oyster reefs, saltwater marshes, etc. to determine a) patterns of OCA stressors in the Bay, b) where "hot spot" areas of pH, CO_2 and alkalinity align with critical habitat and c) how estuary stressors such as projected temperature and drought will impact these findings. Using the monitored and projected data sets, we will analyze pH, CO_2 and DO for correlations, including seasonal, temporal, and spatial patterns. Results from the current and projected OCA assessment will help answer questions such as: Does Galveston Bay have buffering capacity to help its response to low pH? Are there areas in the Bay more resilient to coastal acidification - such as Trinity Bay – because of factors such as inflows or projected estuary stressor impacts?

Outcomes
Data and results from the project will be made publicly available through a website portal that will have project results and resources as well as data downloads, including three years of continuous water quality. GBF will work with stakeholder workgroups to identify key members in the commercial & recreational oyster fishing communities to solicit input on project objectives, and then communicate project findings during additional workgroup meetings to conceptualize ways to address OCA and impacts to oyster reefs in Galveston Bay. Results from this project will bring together multiple indicators from The Galveston Bay Report Card (GBRC), providing context and broader impacts that will be communicated through collaboration with community partners and through outreach and a GBRC cover story, that will highlight the communities impacted by the results and actions community members can take to protect valuable oyster fisheries. The collected data can also inform the next State of the Bay Report released by GBEP. This work will build off acidification research completed in other Gulf of Mexico estuaries such as Tampa Bay and will allow for comparisons of carbonate system variability and effects on shellfish communities.

Latitude/Longitude (Optional):

[degrees, minutes, and seconds format]

Location:

The Galveston Bay Complex, including shellfish harvesting communities

Other Plans Implemented:

GBEP Estuary Resilience Assessment
GLO Coastal Resiliency Management Plan

Projects Map

[Insert Map Here or Attach as an Appendix if Applicable]

Supplemental Photos/Graphics (Optional):

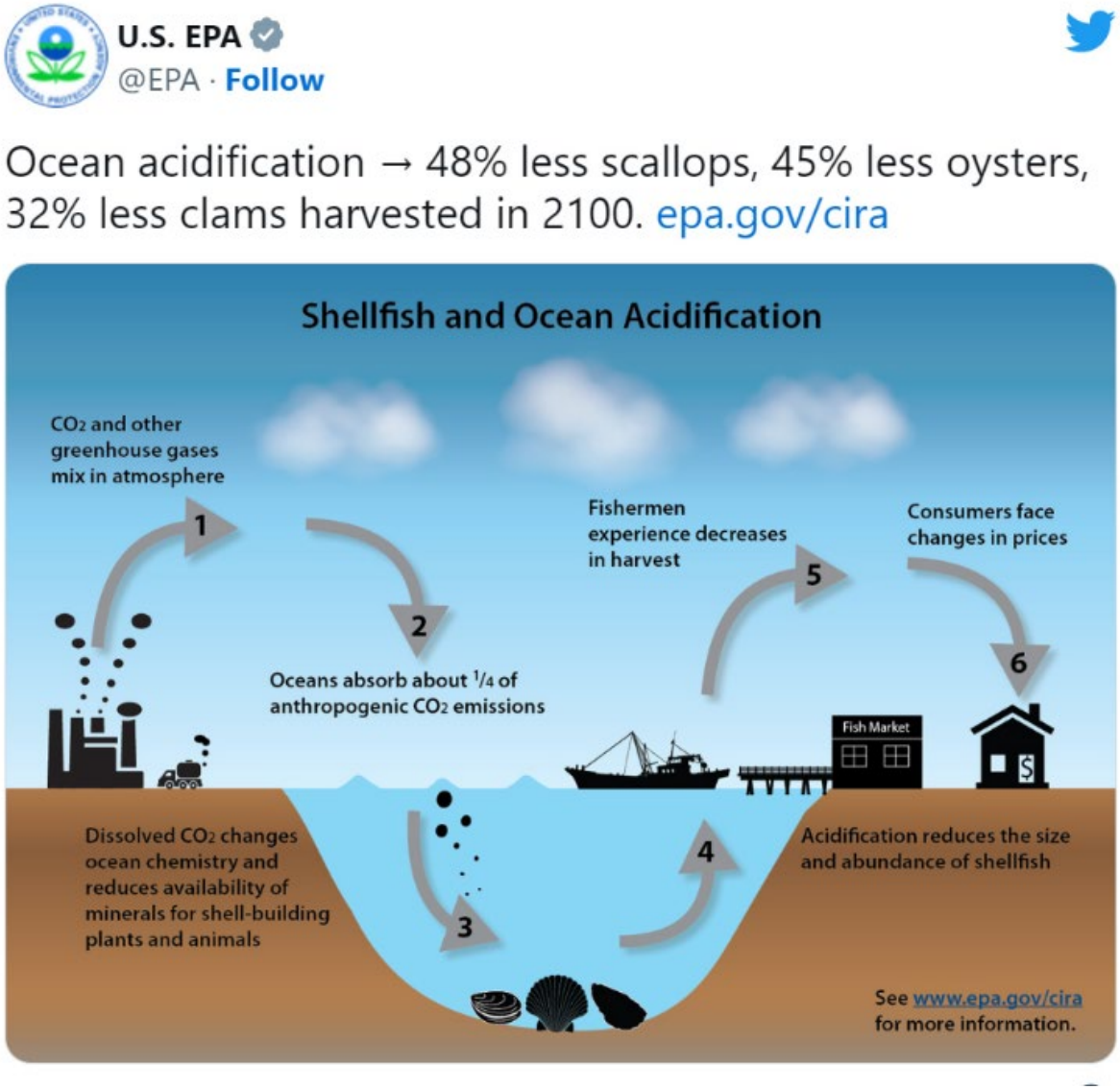
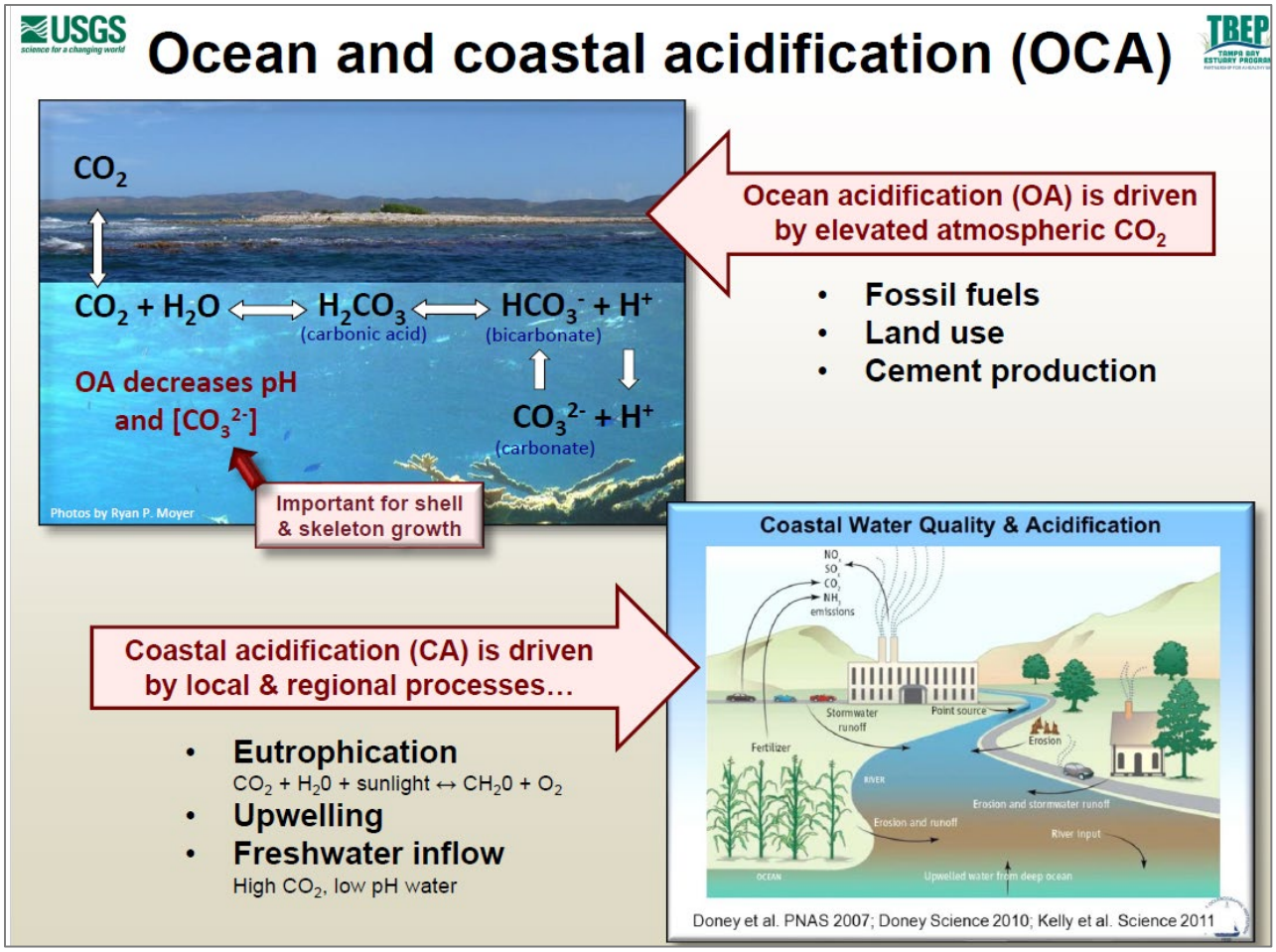
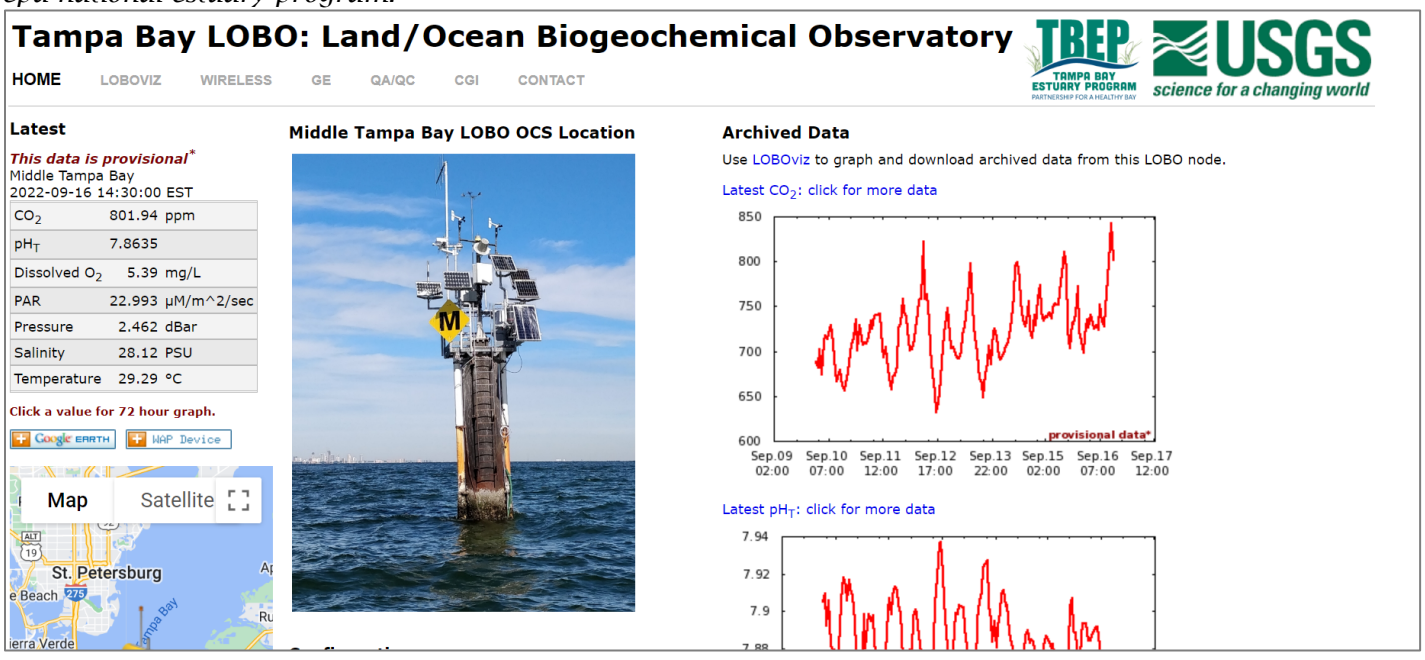


Image originally from Twitter, shown in "Hurricane Harvey More Than Doubled The Acidity Of Texas' Galveston Bay, Threatening Oyster Reefs" [6]



From: "Coastal Acidification: Potential Mitigation" from Seagrass Recovery in Tampa Bay, FL Kimberly K. Yates, U.S. Geological Survey, St. Petersburg, FL, kyates@usgs.gov, Tampa Bay. For more information, see https://www.usgs.gov/centers/spcmsc/news/tampa-bay-coastal-acidification-research-featured-epa-national-estuary-program.



From http://tampabay.loboviz.com/. OCA program established by Tampa Bay Estuary Program and USGS.

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	$127,408
b.	Fringe Benefits	$ 61,156
c.	Travel	$ 1,133
d.	Supplies	
e.	Equipment	
f.	Contractual	$310,500
g.	Construction	
h.	Other*	$ 11,419
i.	Total Direct Costs (Sum a - h)	$511,616
j.	Indirect Costs	$ 36,992
k.	Total (Sum of i & j)	$548,608

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 15% of (check one):

☐ salary and fringe benefits
☒ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

This rate is less than or equal to (check one):
☒ Predetermined Rate—an audited rate that is not subject to adjustment.
☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable]

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401-3393

NEGOTIATED INDIRECT COST RATE AGREEMENT

July 15, 2021

Houston Advanced Research Center
ATTN: Robert Travis
8801 Gosling Road
The Woodlands, TX 77381

PREAMBLE

The purpose of this Agreement is to establish indirect cost rates for use in award and management of Federal contracts, grants, and other assistance arrangements to which Code of Federal Regulations (CFR) 2 CFR 200 applies. It consists of four parts: I -Rates and Bases; II - Particulars; III -Special Remarks; and IV - Approvals. This Agreement has been negotiated by the Department of Energy on behalf of the Federal Government pursuant to the authority granted to the Cognizant Agency.

BILLING RATE: FRINGE

	EFFECTIVE PERIOD			ALLOCATION
TYPE	FROM	TO	RATE (%)	BASE *
FINAL	01/01/20	12/31/20	47.4	(a)
PRED	01/01/21	12/31/21	48.0	(a)
PRED	01/01/22	12/31/26	48.0	(a)

INDIRECT BILLING RATE: Overhead

	EFFECTIVE PERIOD			ALLOCATION
TYPE	FROM	TO	RATE (%)	BASE *
FINAL	01/01/20	12/31/20	69.7	(b)
PRED	01/01/21	12/31/21	69.7	(b)
PRED	01/01/22	12/31/26	53.0	(b)

* BASIS FOR ALLOCATION:
(a) Total Labor Costs
(b) Modified Total Direct Costs

The following fringe elements are included in the fringe benefit pool:
Medical and Dental Insurance, Paid Leave, Workers Compensation Insurance, Payroll Taxes, Retirement, Severance and Other Insurance Benefits.

SECTION II -PARTICULARS

SCOPE:

The indirect cost rates contained herein are for use with grants, and other financial assistance agreements awarded by the Federal Government to the above department or agency and subject to the rules and regulations under 2 CFR 200. Due to legal constraints, predetermined rates are not permitted for contracts which are governed by the Federal Acquisition Regulations unless 48 CFR § 52.216-15 is an applicable clause. The billing rates may be used for Agency grants and/or cooperative agreements.

LIMITATIONS:

Application of the rates contained in this agreement is subject to all statutory or administrative limitations on the use of funds, and payments of costs hereunder, are subject to the availability of appropriations applicable to a given grant or contract. Acceptance of the rates agreed to herein is predicated on the following conditions: (a) no costs other than those incurred by the Recipient were included in the entity's indirect cost pools as finally accepted, and that such costs are legal obligations of the Recipient and allowable under the governing cost principles; (b) the same costs that have been treated as indirect costs are not claimed as direct costs; (c) similar types of costs have been accorded consistent accounting treatment; and (d) the information which was provided by the agency, and which was used as a basis for acceptance of rates agreed to herein, is not subsequently found to be materially incomplete or inaccurate.

CHANGES:

Final and Predetermined rates contained in this agreement are based on the accounting system in effect at the time the agreement was negotiated. When changes to the method of accounting for cost affect the amount of reimbursement resulting from the use of this rate, the change will require the prior approval of the authorized representative of the Cognizant negotiation agency. Such changes include, but are not limited to, changing a particular type of cost from an indirect to a direct charge. Failure to obtain such approval may result in subsequent cost disallowances. The Cognizant negotiating agency must also be notified of any changes to the State's or Locality's organizational structure, which affect the amount of reimbursement resulting from the use of the rates.

RATE(S):

FINAL: The Final rate(s) contained in this Agreement are based on the actual, allowable costs incurred for a preceding fiscal period. In accordance with applicable Federal regulations under 2 CFR 200 governing indirect cost rates for your award(s), provisional rates are not to be construed as determinative of the indirect costs to be distributed or of the bases of distribution to be used in the final settlement of your award(s).

PREDETERMINED: Public Law 87-638 (76 Stat. 437) as amended (41 U.S.C. 4708) authorizes the use of predetermined rates in determining the "indirect costs" applicable under research agreements. The stated objectives of the law are to simplify the administration of cost-type research and development contracts (including grants), to facilitate the preparation of budgets, and to permit more expeditious closeout of such contracts when the work is completed. Predetermined rates are not subject to adjustment during the time period which this agreement covers.

NOTIFICATION TO OTHER FEDERAL AGENCIES:

Copies of this document may be provided to other Federal agencies as means of notifying them of the Agreement contained herein.

ADJUSTMENTS TO REIMBURSEMENTS:

Current reimbursements for indirect costs to the above department or agency by means other than the rates set forth in this agreement should be adjusted to reflect the use of these approved rates within 30 days of the effective date of this agreement. These rates shall be applied to the appropriate base to identify the proper amount of indirect costs allocable to the Federal awards covered by this agreement.

SECTION III -SPECIAL REMARKS

1. This agreement is effective on the date of approval by the Federal Government.
2. Questions regarding this agreement should be directed to the Federal Government negotiator referenced in Section IV.

SECTION IV –APPROVALS

For the Organization:	For the Cognizant Negotiation Agency on Behalf of the Federal Government:
Houston Advanced Research Center, LLC	**U.S. Department of Energy**
Mustapha Beydoun Signature	 Signature
Mustapha Beydoun Name	Pamela T. Lavergne Name
VP/COO Title	Contracting Officer Title
8/4/2021 Date	July 15, 2021 Date
	240-562-1474 Telephone

Appendix A: Letters of Support

GALVESTON BAY FOUNDATION

August 8, 2023

Lisa Marshall
Program Manager
Galveston Bay Estuary Program
17041 El Camino Real, Suite 210
Houston, TX 77058

Re: GBEP BIL Proposal - Letter of Support
Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification

Dear Lisa Marshall,

I am pleased to write this letter of support for the proposed project titled "Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification" submitted by Geotechnology Research Institute (GTRI)/Houston Advanced Research Center (HARC).

This study aligns with the Galveston Bay Foundation's (GBF) mission and commitment to the Bay's health, in particular the health of the native oyster population. GBF's habitat restoration efforts rely heavily on sound data and best management practices developed by academic and governmental partners. The proposed study will improve our understanding of the pH risks to native Galveston Bay oysters as well as crustaceans, finfish, and their associated habitat. The results will also help inform future project site selection and subsequent restoration success.

Outreach and education are at the core of GBF's mission. GBF has partnered with HARC for nine years to educate the public on Galveston Bay through the Galveston Bay Report Card (GBRC). GBF will work with HARC to incorporate the proposed study in GBRC outreach initiatives. GBF also plans to engage the local oyster fishery community to build relationships and gather feedback on the impacts of coastal acidification on Galveston Bay oysters and the associated commercial and recreational industries.

GBF is in support of the proposed project and looks forward to continuing our partnership with HARC.

Sincerely,

Haille Leija

Haille Leija
Director of Program Operations
Galveston Bay Foundation
hleija@galvbay.org

1725 N Hwy 146, Kemah, TX 77565 • Phone 281-332-3381 • Website https://galvbay.org/

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

August 24, 2023

Lisa Marshall
Program Manager, Galveston Bay Estuary Program
17041 El Camino Real, Suite 210
Houston, TX 77058

Dear Ms. Marshall,

I am writing in support of the proposal, *Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification,* submitted by the Geotechnology Research Institute (GTRI)/Houston Advanced Research Center (HARC) with the United States Geological Survey (USGS) and the Galveston Bay Foundation (GBF) as partners.

As the designated water resources planning agency in the State of Texas, the Texas Water Development Board's (TWDB) mission is to lead efforts in ensuring a secure water future for Texans. For nearly 50 years, the TWDB has maintained a scientific study program to evaluate the freshwater inflow requirements necessary to maintain the health of Texas bays and estuaries. A cornerstone element of this program is the coastwide monitoring network, which was established in 1986 to measure basic water quality parameters at strategic locations within the state's estuaries including Galveston Bay. While the network has primarily focused on providing temperature and salinity data, there has been a lack data for the parameters needed to monitor conditions associated with coastal acidification.

The proposed project leverages a strong collaboration between the USGS, HARC, and GBF to initiate a novel long-term, continuous ocean and coastal acidification monitoring program to establish baseline conditions and evaluate carbonate system stressors in Galveston Bay. The data collected will guide implementation of mitigation and adaptation actions for ocean and coastal acidification to build Galveston Bay's resilience. Collaboration with stakeholders and coastal managers who rely on critical shellfish habitat for economic stability and the health of the bay will be vital in site selection, study design, and outreach of outcomes. Additionally, leveraging the ongoing continuous monitoring activities at TWDB stations enhances science for all researchers.

I strongly encourage the Galveston Bay Estuary Program's consideration to fund the proposal. By working together with committed partners, we can create a resilient future that ensures the vitality of Galveston Bay for generations to come.

Respectfully,

Caimee Schoenbaechler

Digitally signed by Caimee Schoenbaechler
Date: 2023.08.24 10:39:08 -05'00'

Caimee A. Schoenbaechler, M.E.M.
Manager, Coastal Science Program
Water Science & Conservation

TEXAS PARKS & WILDLIFE

Life's better outside.

Commissioners

Arch "Beaver" Aplin, III
Chairman
Lake Jackson

Dick Scott
Vice-Chairman
Wimberley

James E. Abell
Kilgore

Oliver J. Bell
Cleveland

Paul L. Foster
El Paso

Anna B. Galo
Laredo

Jeffery D. Hildebrand
Houston

Robert L. "Bobby" Patton, Jr.
Fort Worth

Travis B. "Blake" Rowling
Dallas

Lee M. Bass
Chairman-Emeritus
Fort Worth

T. Dan Friedkin
Chairman-Emeritus
Houston

David Yoskowitz, Ph.D.
Executive Director

August 25, 2023

Lisa Marshall
Program Manager
Galveston Bay Estuary Program
17041 El Camino Real, Suite 210
Houston, TX 77058

Re: GBEP BIL Proposal: Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification

Dear Lisa Marshall,

I am writing in support of the proposal "Evaluating Galveston Bay's Resilience to Ocean and Coastal Acidification" submitted by Geotechnology Research Institute (GTRI)/Houston Advanced Research Center's (HARC) with partners United States Geological Survey (USGS) and the Galveston Bay Foundation (GBF). This study aligns with the Texas Parks and Wildlife's (TPWD) goals for the conservation and management of estuarine resources, and the development of this research will be instrumental for a resilient Galveston Bay.

The proposed work will implement a strong collaboration between the USGS, HARC, and GBF to initiate a novel long-term, continuous monitoring program to establish baseline conditions and analyze projected climate scenarios for carbonate system stressors to develop a framework for current and future coastal acidification scenarios in Galveston Bay. The framework will guide implementation of ocean and coastal acidification mitigation and adaptation actions to build Galveston Bay's resilience.

TPWD is actively involved in oyster reef restoration and is responsible for the management of oyster resources in Texas. The questions posed by this study could help direct future oyster reef restoration as well as understand risks to wild oyster populations. It is our hope that results from this study will help us better understand the pH risks to valuable oysters and oyster reef habitats in Galveston Bay.

We wholeheartedly endorse this proposal and strongly urge the Galveston Bay Estuary Program to consider it favorably. By working together, we can create a resilient future that ensures the vitality of our Bay for generations to come.

Sincerely,

Emma Clarkson, Ph.D.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

Program Director, Ecosystem Resources Program
Coastal Fisheries Division
Texas Parks and Wildlife Department

Appendix B: References

References:

(1) Du J, Park K, Jensen C, Dellapenna TM, Zhang WG, Shi Y. 2021. Massive oyster kill in Galveston Bay caused by prolonged low-salinity exposure after Hurricane Harvey. Science of the Total Environment 774:145132.; Federal Emergency Management Agency. 2008. Hurricane Ike impact report. U.S. Department of Homeland Security. 64 pp

(2) Grabowski JH, Brumbaugh RD, Conrad RF, Keeler AG, Opaluch JJ, Peterson CH, Piehler MF, Powers SP, Smyth AR. 2012. Economic valuation of ecosystem services provided by oyster reefs. BioScience 62:900-909.; Kellogg ML, Cornwell JC, Owens MS, Paynter KT. 2013. Denitrification and nutrient assimilation on a restored oyster reef. Marine Ecology Progress Series 480:1-19.; Pollack J, Yoskowitz D, Kim H-C, Montagna PA. 2013. Role and value of nitrogen regulation provided by oysters (Crassostrea virginica) in the Mission-Aransas Estuary, Texas, USA. PloS One 8:e65314.

(3) Houston Advanced Research Center. 2020. State of the Bay: A characterization of the Galveston Bay ecosystem. 4th Edition. Texas Commission on Environmental Quality. stateofgalvbay.org.

(4) Hu X, Pollack JB, McCutcheon MR, Montagna PA, Ouyang Z. 2015. Long-term alkalinity decrease and acidification of estuaries in northwestern Gulf of Mexico. Environmental Science & Technology 49:3401-3409.

(5) Dickinson, Gary & Ivanina, Anna & Matoo, Omera & Pörtner, Hans-Otto & Lannig, Gisela & Bock, Christian & Beniash, Elia & Sokolova, Inna. (2012). Interactive effects of salinity and elevated CO2 levels on juvenile eastern oysters, Crassostrea virginica. The Journal of experimental biology. 215. 29-43. 10.1242/jeb.061481.

(6) Hicks, Tacey and Shamberger, Kathryn Texas A&M. 2023. Hurricane Harvey More Than Doubled The Acidity Of Texas' Galveston Bay, Threatening Oyster Reefs. https://theconversation.com/hurricane-harvey-more-than-doubled-the-acidity-of-texas-galveston-bay-threatening-oyster-reefs-196470

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

A PROGRAM OF TCEQ

SECTION ONE: GENERAL INFORMATION

Project Name:

Application of Rapid Methods of Microbial Source Tracking to Assess the Source of Fecal Contamination to Western Galveston Bay, Basin 24

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

Houston-Galveston Area Council

☐ Federal, State, or Local Government ☒ Council of Government ☐ Public University
☐ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Steven Johnston
Project Representative Phone	832.681.2579
Project Representative Email	Steven.Johnston@h-gac.com

Partners and Their Roles:

Co-PIs are:
Environmental Institute of Houston – Jenny Wrast-Oakley Ph.D. – will be responsible for targeted monitoring and sample collection.

University of Houston Clear Lake (UHCL) – Michael G. LaMontagne Ph.D. – will provide laboratory processing and analysis of samples run using standard methods and through matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS).

University of North Texas Health Science Center (UNTHSC) - Michael S. Allen, Ph.D. - will provide laboratory processing and analysis using digital polymerase chain reaction and next generation sequencing (dPCR and NGS) services using methods developed and optimized in a previous EPA project.

Amount Requested (minimum budgeted cost of $150,000):

$552,018.96

Is the project scalable? ☐

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$222,341.06
FY 2026 (09/01/2025-08/31/2026)	$173,321.95
FY 2027 (09/01/2026-05/31/2027)	$156,355.95
Total	$552,018.96

Total Project Cost:

$552,018.96

Is this an estimate? ☐

Leveraging (in-kind and/or cash):

This project will leverage research conducted by undergraduate students in Microbiology laboratory courses taught by CoPI-LaMontagne at UHCL. We anticipate one section of 15 students in the fall of 2024 to work on this project. These students pay lab fees ($100/semester) to support purchasing of materials and supplies.

This project will also receive indirect support from two federal grants to CoPI-LaMontagne. These grants are not to be considered in-kind or cash, but this support makes this work feasible.

An EPA grant to CoPIs-LaMontagne and Allen ($465,016) currently supports a project to track the source of fecal contamination of two watersheds that feed into Clear Creek and Dickinson Bayou. In the work proposed herein, we propose to expand the scope of sampling to include tributaries that feed into Chocolate Bay. By collecting samples in these two projects in parallel, we can leverage resources for molecular analysis. In particular, realizing the throughput of dPCR and next-generation sequencing (NGS) requires pooling of multiple samples and running them together. In other words, the major cost is per run not per sample. It costs about the same to run one sample as it does to run a hundred.

This project will leverage support from the NSF. Co-PI LaMontagne recently received a grant ($349,549) from the Major Research Instrumentation program at the NSF to obtain a MALDI-TOF/FTIR system. Bringing MALDI-TOF/FTIR analysis in-house will greatly increase the throughput, and lower the cost per isolate, of identification of the source of FIB.

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

This project has been scoped for a three-year duration once the contract is executed.

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☒	NPS-2 ☒	NPS-3 ☐	NPS-4 ☒	
PS-1 ☒	PS-2 ☒	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☒	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☐	HC-3 ☐
SC-1 ☐	SC-2 ☐	
FWI-1 ☐	FWI-2 ☐	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☐	SPO-2 ☒	SPO-3 ☐	SPO-4 ☒
PEA-1 ☐	PEA-2 ☐	PEA-3 ☐	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☐	RES-2 ☐	RES-3 ☐	RES-4 ☒
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☐
ACS-1 ☐	ACS-2 ☒	ACS-3 ☐	

Priority Area Actions Detail:

This proposed work directly addresses priority area actions NPS-1 (Support Watershed-Based Plan Development and Implementation) and NPS-4 (Host Nonpoint Source Workshops); PS-1 (Support Stormwater Education Programs), PS-2 (Achieve Sanitary Sewer System Capacity and Integrity), and PS-3 (Increase Wastewater Treatment Facility Compliance); and PHA-3 (Improve Contact Recreation Safety Through Watershed-Based Plans).

NPS-1. The Chocolate Bay I-Plan is in development. Project results will assist implementation goals and help assist identification of human sources of fecal indicator bacteria (FIB). The overall objective of this project is to develop, implement and support three emerging methods of indicating the presence of pathogens in recreational waters. Matrix-assisted laser desorption ionization – time of flight mass spectrometry (MALDI-TOF MS) and Fourier-transform infrared spectroscopy (FTIR) will be used for library-dependent microbial source tracking (MST). Metagenomics and dPCR will be used for library-independent MST. These two approaches complement each other and will help managers identify the sources of fecal contamination. This will inform science-based decision-making.

NPS-4. We will host a workshop to teach managers and stakeholders the science behind MST methods and provide attendees hands-on experience with MST methods and interpretation of the corresponding data.

PS-1. Project results are expected to define sources of fecal bacteria and assist local stormwater managers improve stormwater management.

PS-**2.** Project will be shared with local jurisdictions highlighting sanitary sewer system sources of fecal bacteria.

PS-3. Project results will be shared with local wastewater operators. The TMDL reports identified assessment units that might be influenced by wastewater. This project will assist in identifying contributions from human sources that were not available during prior studies. Results should support discussions and inform future actions.

Project will focus on a watershed impaired for contact recreation. An existing TMDL project is ongoing, and stakeholders are developing an implementation plan to address the impairment. Project results are expected to assist implementation.

The proposed project directly addresses plan priorities PPE (Engage Communities) and M&R (Inform Science-Based Decision Making).

PPE. This project specifically implements SPO-2 in hosting a workshop that will share project results and encourage implementation of fecal bacteria reduction strategies. The project also implements SPO-4 by targeting local governments within the Chocolate Bay watershed. Outreach initiatives in addition to the workshop, include meetings and one-on-one consultations. This outreach will convey project results and, if the hypothesis is correct, quantify human sources of fecal bacteria.

M&R. This project implements RES-4 by conducting monitoring and research to address limits to contact recreation. This project will conduct applied research to improve methods of monitoring water quality. Most water quality managers rely on cultivation of FIB to assess microbial contamination of waters. These protocols take at least 24 hours and do not assess the source of the contamination, or the risk posed to the public. Molecular techniques can be integrated to provide rapid results, which can be deployed to the point-of-sampling protocols and provide definitive microbial source tracking. Additionally, the project implements ACS-2 in that all data and research will be made public and will more importantly be shared directly with watershed stakeholders who live and/or work in the impaired watersheds.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☐ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☒ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☐ Habitat protection and enhancement

☐ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☒ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☐ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☒ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☒ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

Action Priorities: This project directly addresses watershed health. Target watersheds are impaired for contact recreation due to elevated levels of FIB. The receiving waterbody, Chocolate Bay, contains restrictions to recreation shellfish harvest due to elevated levels of FIB. Identifying and addressing fecal bacteria sources will assist in maintaining and improving watershed health.

Support Priorities: The target watershed contains underrepresented and under-resourced communities. The goal of this project is to identify and reduce effluent sources of bacteria within these communities. Outreach efforts will be investing in the community and target partners to assist in engaging the community to identify limitations and remove impediments.

Additionally, this project will leverage an existing program Co-PI-LaMontagne developed that engages hundreds of students at UHCL – a Hispanic Serving Institution – in authentic research on environmental microbiology topics related to this MST project. As a regional university, UHCL serves communities where we propose to work. The majority of students who enroll in UHCL live in this area and have strong connections, through their families, to the community. Educating these students will engage their families [4].

Finally, this project will produce data with the expressed goal to share with the community and other agencies. The goal is to increase and make available the low-cost rapid identification methodology. This project, hypothetically, will demonstrate a real-world defensible example of this method use within a watershed identified as likely impaired with human sources of FIB.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?
☒ Reduction in nutrient pollution
☐ Water reuse and conservation
☐ Marine litter reduction
☐ Green infrastructure and resiliency

Reducing nutrient loading is not the focus of this project, however, addressing human sources of FIB can have a secondary result of lowering nutrients. Identifying failing onsite sewage facilities (OSSFs) or untreated or partially treated effluent from wastewater collections systems are known nutrient loads that will be identified in this project. To directly assess nutrient loading, we will measure dissolved inorganic nutrients in the samples we collect.

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☐	No ☒
If yes, will you comply with the law or submit a waiver?	Yes ☐	No ☒

Comments (if any):

[If yes, please summarize how the proposal complies with BABA, as applicable.]

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

Yes ☒ No ☐

Mustang Bayou, the target watershed for this project, flows through the City of Alvin. The CFJST ranks two areas of the city for climate risk factors above the 90th percentile (ranked the same unless noted): Expected Building Loss Rate (99th), Expected Population Loss (95th), and Projected Flood Risk (98th and 97th). For income the two areas are ranked above the 65th percentile at 86th and 77th, respectively. This project will target the portion of Mustang Bayou that flows directly through these two identified areas of the city.

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

Yes, portions of the City of Alvin, specific to the Mustang Bayou watershed, are included in the EJScreen tool's Supplemental Demographic Index are above the 80th percentile for: Particulate Matter, Ozone, Toxic Releases to the Air, Traffic Proximity, Lead Paint, RMP Facility Proximity, Hazardous Waste Proximity, Underground Storage Tanks, and Wastewater Discharge.

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☒ Yes
☐ No

Alvin ISD contains several schools within the Mustang Bayou watershed that are considered Title I schools, including Alvin and Bill Hasse elementary schools and Alvin Junior High school.

Does the Project work with new, smaller communities/partnerships?
☒ Yes
☐ No

In addition to proposed outreach and consultations with the City of Alvin, the project will conduct similar work with the City of Hillcrest, another city in the target watershed. Work will also target other communities within the Chocolate Bay watershed, including the cities of Santa Fe, Hitchcock, Liverpool, and Manvel. Additionally, this project is proposing two additional watersheds that will serve as controls, one in a rural area, Halls Bayou, and another in a suburban area, Cow Bayou. This will offer the opportunity to provide outreach in those communities and build additional partners.

SECTION SIX: PROPOSAL DETAILS

Project Summary:

This project will apply two practices, one, recent method improvements in bacteria source identification and two, targeted monitoring, to identify contributing bacteria sources to the assessment unit (AU) 2432A_02 of the Mustang Bayou watershed. This AU has been identified as impaired for contact recreation according to the Texas Commission for Environmental Quality (TCEQ) for elevated levels of bacteria. Results of this project aim to identify and address these sources in coordination with the local communities as part of the Chocolate Bay Implementation Plan, currently in development.

Full Project Description (1,000 words or less):

Communities along the coast of Galveston Bay depend on the health of this system for their livelihood [24]. Several locations in this estuary have chronically high levels of fecal indicator bacteria (FIB) [7, 12] and this metric of fecal contamination is increasing with sea-level rise and population growth [13]. Human waste in receiving waters presents a particular health threat because it is laden with host-specific pathogens and high levels of antibiotic-resistant bacteria (ARB) [14, 16, 17]. In urban, northern regions of Galveston Bay, high levels of FIB appear linked to runoff of stormwater [3]. In suburban, southwestern regions of the bay, high levels of FIB may reflect failing OSSFs [25].

Interestingly, one segment within the Chocolate Bay watershed (segment 2432A), Mustang Bayou (Figure 1) presents an opportunity to evaluate and improve on new methods for identifying sources of fecal bacteria. Specifically, the concentration of bacteria in Mustang Bayou's assessment unit (AU) 2432A_02 exhibits significantly elevated levels when compared to upstream and downstream AUs (Table 1) [27]. This AU falls within the heart of the cities of Alvin and Hillcrest, suggesting a hypothetical influence of human sources.

Managers assess fecal contamination by culturing FIB. This older technology reliably indicates gross contamination; however, counts of FIB do not indicate the source of contamination and culturing requires at least a day to generate results. Recent advances in microbial source tracking (MST) methods have been developed that quickly and reliably indicate the source of fecal contamination.

Library-dependent MST offers the advantage of directly identifying the source responsible for FIB. This provides managers with actionable data. The approach involves generating libraries of isolates from microbial sources and field samples [19]. This is expensive and time-consuming. For example, Ahmed and Katouli [2] typed 1,853 *Enterococcus* sp. and 905 *E. coli* isolates to identify failing OSSF. MALDI-TOF MS shows potential as a high-throughput method for MST [20]. MALDI-TOF MS systems provide strain-level identification of microbes for pennies per isolate [1, 18, 21] at a throughput of hundreds per day [9]. These systems can accurately identify the source of FIB [6] and with funding from the EPA, undergraduates in microbiology courses PI-LaMontagne teaches at UHCL are building a library of reference isolates for this MST approach. FTIR has a higher resolution than MALDI-TOF MS and provides discriminatory power comparable to whole genome sequencing [8]. This emerging platform has been applied to tracking clinical outbreaks [23] and food contamination [15], but has not been applied, to our knowledge, to MST of FIB.

Library-independent MST with primers specific for crAssphage is a reliable indicator of human waste contamination [5, 22] and NGS [11] can accurately quantify contamination of waterways with human waste. PIs-LaMontagne and Allen validated that dPCR targeting crAssphages is specific for human waste (Fig. 2) and used dPCR to show that Mustang Bayou is likely contaminated from human sources (Fig. 3).

These MST methods are applied sporadically to investigate a particular hotspot or event. They are not used routinely. This reflects logistical challenges and lack of resources. Specifically, MST protocols can require extensive training and specialized equipment.

This project will address this by achieving these specific aims:

1. Validate rapid MST protocols by applying them to an impaired system.
2. Host a workshop on the application of MST for quantifying non-point sources of human waste.
3. Testing the ability to produce bacteria source identification and success in implementing the Chocolate Bay I-Plan.

Aim 1 will leverage ongoing research, supported by an EPA grant to PI-LaMontagne, to develop culture-dependent and -independent MST approaches (Fig. 4). We propose to expand the scope of that ongoing project to sample Mustang Bayou's AU 2432A_02 (Fig. 1). Sample runs of the AU's reach will be conducted three times over the project's duration, once per year, collecting 20-40 samples per run. Collection will follow the methodology developed for targeted monitoring and will be consistent with a quality assurance project plan approved by the EPA for current work conducted by CoPIs LaMontagne and Allen. FIB will be counted with IDEXX kits and dissolved inorganic nutrients (ammonium, phosphate, nitrate/nitrite, and silicate) will be analyzed with a flow injection system. MST will be conducted with the library-dependent and -independent methods described above.

An initial targeted monitoring investigation was completed for AU 2432A_02 in 2021 [28]. A recommendation from that initial work was to conduct additional investigations to confirm sources. Collection at dry weather sources, pipes, outfalls, and other running water, will be gathered and analyzed and two control waterbodies, Halls Bayou (2432C_01) and Cow Bayou (1101C_01), will be sampled using the same protocols to confirm that Mustang Bayou is contaminated with human waste. This validation will include bacterial community analysis with dPCR and NGS sequencing to establish a microbial community signal associated with contamination by human waste. For example, we expect Mustang Bayou to show a relatively high ratio of Bacilli, Bacteroides, and Clostridia to alpha proteobacteria [26], and an overall structure similar to communities observed in samples collected following Hurricane Harvey [10].

Aim 2, through a workshop, will provide training and resources to encourage adoption of these MST protocols. We will target organizations, including members of Bacterial Implementation Group and the Clean Rivers Program, that routinely monitor water quality in the Houston-Galveston area with support from the TCEQ. Attendees at this workshop will receive hands-on experience with MALDI-TOF MS, FTIR, nucleic acid extraction, dPCR and NGS.

Aim 3 will work directly with stakeholders and community members in the target watershed to convey project results. Capitalizing on prior work with these new methods, along with project results, the PIs will work with wastewater and stormwater practitioners in 2432A_02 to identify solutions and funding options to address what is believed to be higher than referenced human sources.

Latitude/Longitude (Optional):

29.261833, -95.182158 (station 18554, Fig. 1)

Location:

Project is being carried out in Basin 24, specifically 2432, Chocolate Bay and its subwatershed, 2432A, Mustang Bayou (Fig. 1).

Other Plans Implemented:

The Chocolate Bay Plan (in draft), Upper Texas Gulf Coast Oyster Waters I-Plan, Texas Coastal Management Plan

Projects Map

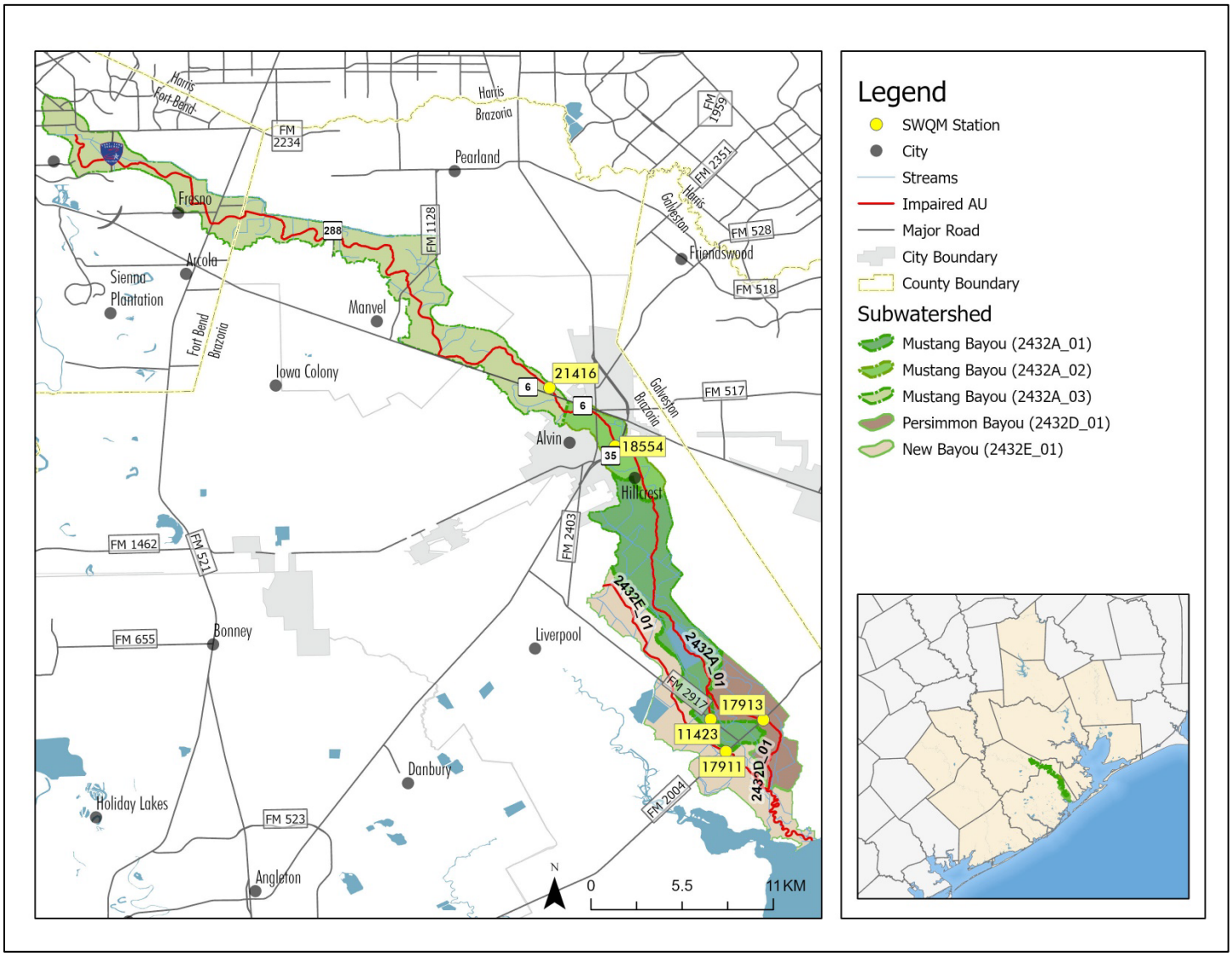


Figure 1. Map of study area. Proposed sampling stations (21416 – 17911) are indicated in yellow. Mustang Bayou station in 2432A_02 is identified as 18554.

Supplemental Photos/Graphics (Optional):

Table 1. Historic geometric FIB means for the Mustang Bayou watershed (Figure 1)

Waterbody	AU	Parameter	Station	No. of Samples	Data Date Range	Station Geometric Mean (cfu/100 mL)
Mustang Bayou	2432A_01	*E. coli*	11423	38	11/30/2011 - 04/29/2021	252.9
Mustang Bayou	2432A_02	*E. coli*	18554	37	11/28/2011 - 04/15/2021	1,520
Mustang Bayou	2432A_03	*E. coli*	20011 / 21416	36	03/28/07 – 04/15/21	241.91
Persimmon Bayou	2432D_01	Enterococci	17913	57	11/19/2004 – 04/29/2021	127.03
New Bayou	2432E_01	Enterococci	17911	57	03/24/2004 – 04/29/2021	108.82

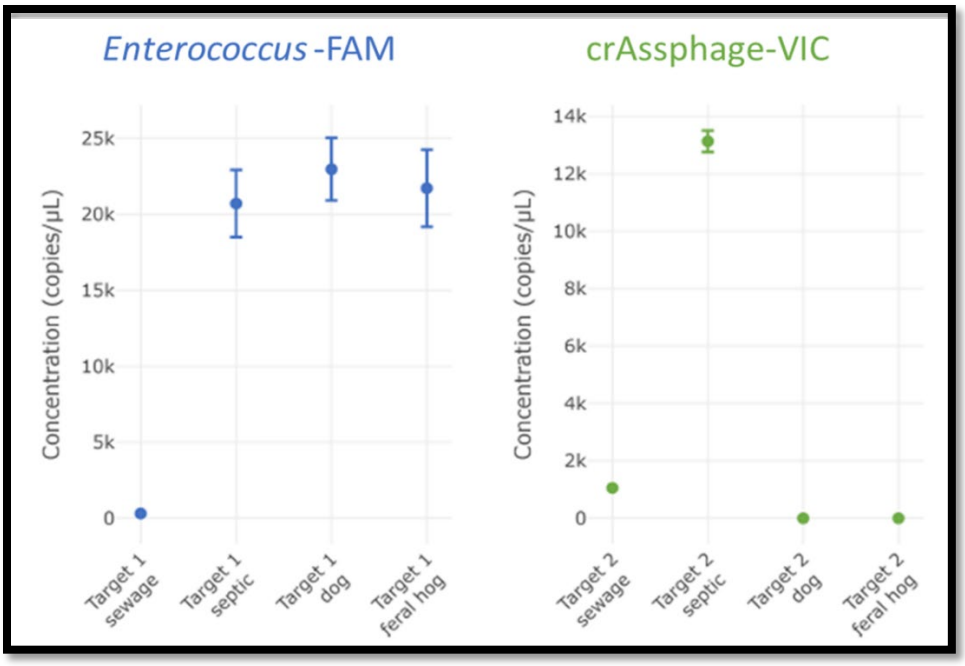


Figure 2. Quantification of *Enterococcus* spp. (FAM) and crAssphage (VIC) DNA copies in sewage (serially diluted), septic tank waste, dog feces, and wild hog scat by digital PCR. A) Absolute quantification of *Enterococcus* spp. (FAM) and crAssphage (VIC). DNA copies reveal presence of *Enterococcus* spp. in all samples tested. CrAssphage were present in human associated samples (sewage, septic) but undetected (i.e., below detection limits) for dog feces and hog scat. Figure is reproduced from a poster presented by PI-LaMontagne at ASM Microbe (June 2023).

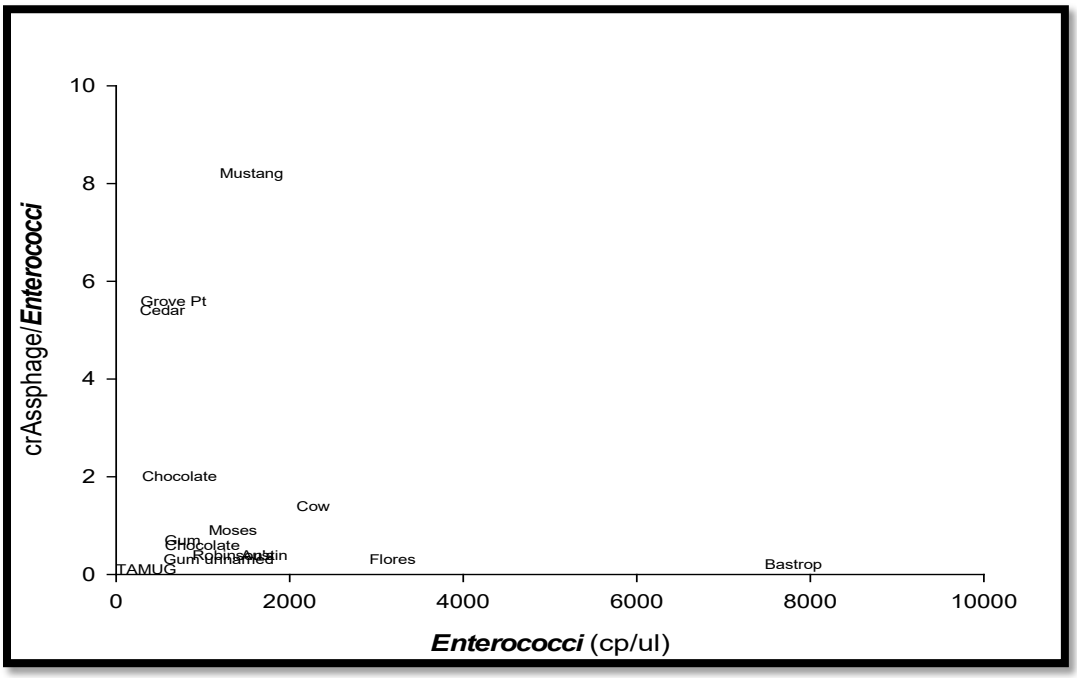


Figure 3. Ratio of crAssphage to *Enterococcus* spp. in water samples collected in tributaries to Galveston Bay. Water body (bay or bayou) is indicated. Methods are as in Figure 4. High ratios of crAssphage to Enterococcus may indicate contamination with human waste.

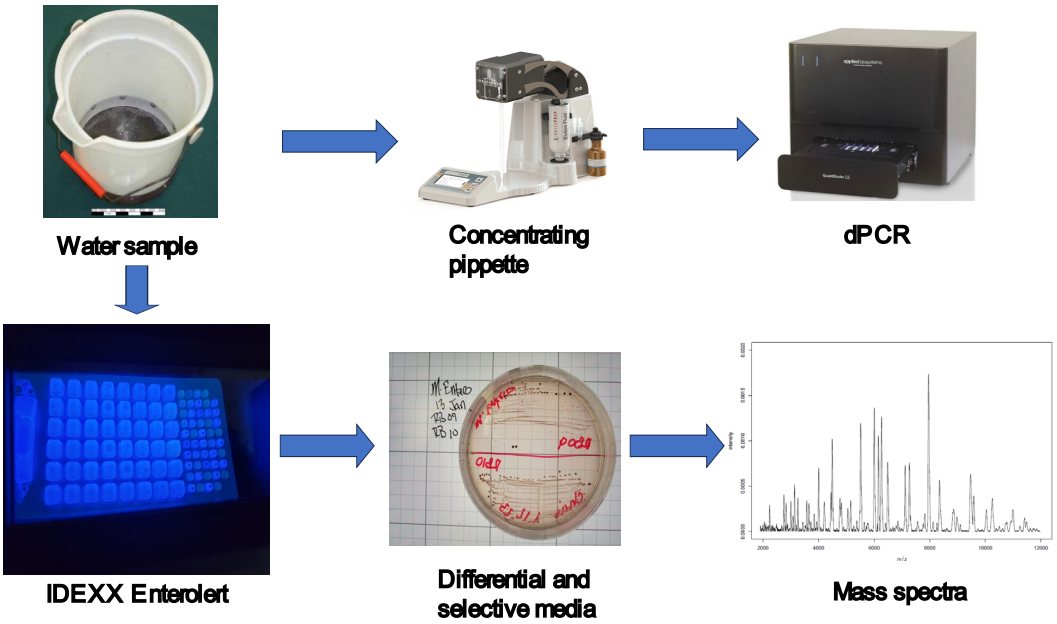


Figure 4. Conceptual map of combined culture-independent (top) and -dependent (bottom) microbial source tracking protocols.

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	84,140.00
b.	Fringe Benefits (46.51%)	39,133.51
c.	Travel	3,000.00
d.	Supplies	1,500.00
e.	Equipment	0.00
f.	Contractual	376,281.00
g.	Construction	0.00
h.	Other*	33,837.30
i.	Total Direct Costs (Sum a - h)	537,891.81
j.	Indirect Costs (11.46%)	14,127.14
k.	Total (Sum of i & j)	552,018.96

*Other: If Budget Category “Other” is greater than $25,000 or more than 10% of budget total, identify the main constituents: rent, internal services, data services

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 11.46% of (check one):

☒ salary and fringe benefits
☐ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

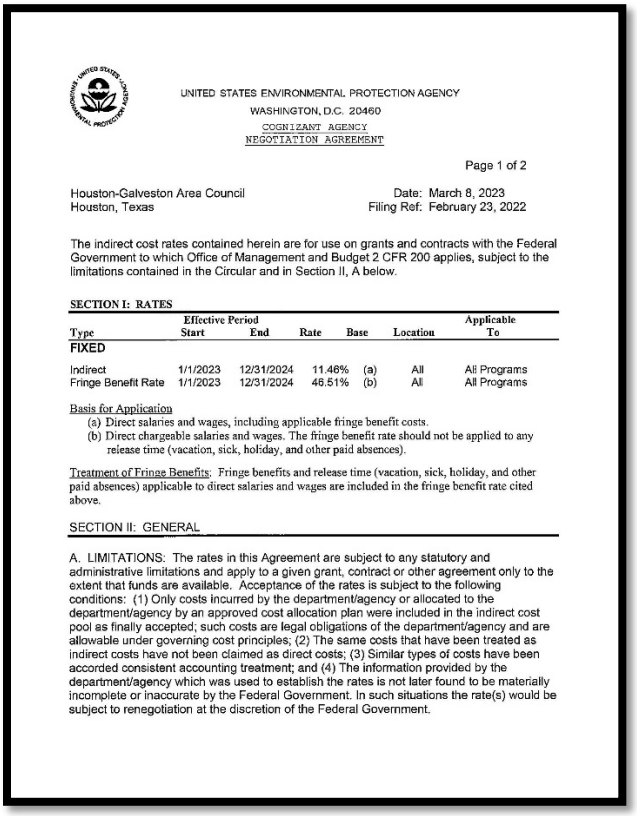
This rate is less than or equal to (check one):

☒ Predetermined Rate—an audited rate that is not subject to adjustment.

☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.

☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

Indirect Cost Agreement



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
COGNIZANT AGENCY
NEGOTIATION AGREEMENT

Page 1 of 2

Houston-Galveston Area Council
Houston, Texas

Date: March 8, 2023
Filing Ref: February 23, 2022

The indirect cost rates contained herein are for use on grants and contracts with the Federal Government to which Office of Management and Budget 2 CFR 200 applies, subject to the limitations contained in the Circular and in Section II, A below.

SECTION I: RATES

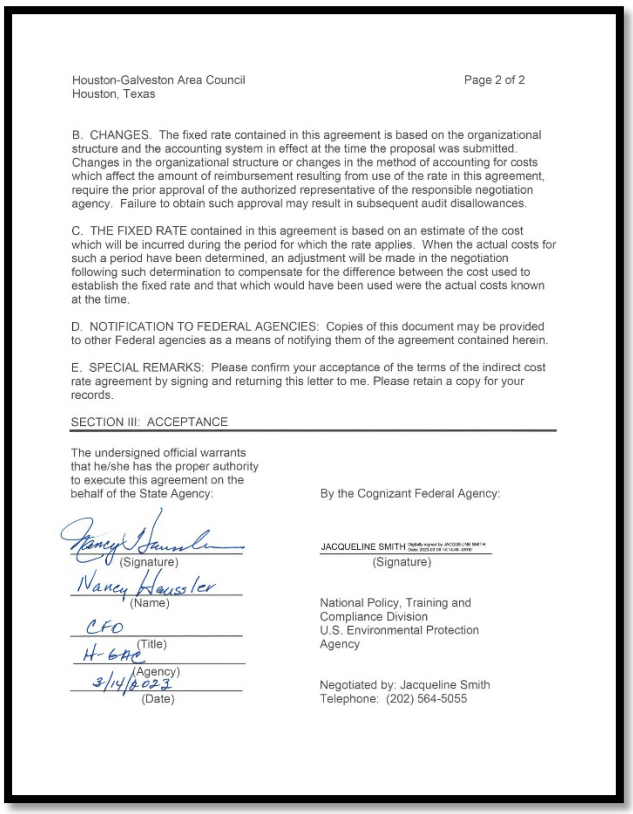
Type	Effective Period Start	End	Rate	Base	Location	Applicable To
FIXED						
Indirect	1/1/2023	12/31/2024	11.46%	(a)	All	All Programs
Fringe Benefit Rate	1/1/2023	12/31/2024	46.51%	(b)	All	All Programs

Basis for Application
(a) Direct salaries and wages, including applicable fringe benefit costs.
(b) Direct chargeable salaries and wages. The fringe benefit rate should not be applied to any release time (vacation, sick, holiday, and other paid absences).

Treatment of Fringe Benefits: Fringe benefits and release time (vacation, sick, holiday, and other paid absences) applicable to direct salaries and wages are included in the fringe benefit rate cited above.

SECTION II: GENERAL

A. LIMITATIONS: The rates in this Agreement are subject to any statutory and administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the department/agency or allocated to the department/agency by an approved cost allocation plan were included in the indirect cost pool as finally accepted; such costs are legal obligations of the department/agency and are allowable under governing cost principles; (2) The same costs that have been treated as indirect costs have not been claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the department/agency which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.



Houston-Galveston Area Council
Houston, Texas

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B. CHANGES. The fixed rate contained in this agreement is based on the organizational structure and the accounting system in effect at the time the proposal was submitted. Changes in the organizational structure or changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rate in this agreement, require the prior approval of the authorized representative of the responsible negotiation agency. Failure to obtain such approval may result in subsequent audit disallowances.

C. THE FIXED RATE contained in this agreement is based on an estimate of the cost which will be incurred during the period for which the rate applies. When the actual costs for such a period have been determined, an adjustment will be made in the negotiation following such determination to compensate for the difference between the cost used to establish the fixed rate and that which would have been used were the actual costs known at the time.

D. NOTIFICATION TO FEDERAL AGENCIES: Copies of this document may be provided to other Federal agencies as a means of notifying them of the agreement contained herein.

E. SPECIAL REMARKS: Please confirm your acceptance of the terms of the indirect cost rate agreement by signing and returning this letter to me. Please retain a copy for your records.

SECTION III: ACCEPTANCE

The undersigned official warrants that he/she has the proper authority to execute this agreement on the behalf of the State Agency:

Nancy Haussler
(Signature)
Nancy Haussler
(Name)
CFO
(Title)
H-GAC
(Agency)
3/14/2023
(Date)

By the Cognizant Federal Agency:

JACQUELINE SMITH
(Signature)

National Policy, Training and Compliance Division
U.S. Environmental Protection Agency

Negotiated by: Jacqueline Smith
Telephone: (202) 564-5055

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Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

A PROGRAM OF TCEQ

SECTION ONE: GENERAL INFORMATION

Project Name:

Supporting Equity-focused Conservation Efforts in the Lower Galveston Bay Watershed

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

Houston-Galveston Area Council

☐ Federal, State, or Local Government ☒ Council of Government ☐ Public University
☐ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Justin Bower
Project Representative Phone	713-499-6653
Project Representative Email	Justin/bower@h-gac.com

Partners and Their Roles:

H-GAC, as part of their ongoing role in promoting and supporting conservation through the Regional Conservation Initiative, will work with local governments and partners to provide direct services (technical and data support, facilitation and matchmaking, funding development, etc.) and make strategic local investments for conservation projects. The focus of this effort will be to engage and support traditionally underserved communities, including existing priority projects, in the Lower Galveston Bay watershed communities. In doing so, H-GAC will coordinate with GBEP's subcommittees and other existing community and conservation efforts for guidance and work directly with a variety of local partners.

Amount Requested (minimum budgeted cost of $150,000):

$450,000

Is the project scalable? ☒ *H-GAC can scale all elements, especially the amount for strategic investments ($225,000), and can easily scale the relative amount per year.*

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$150,000.00
FY 2026 (09/01/2025-08/31/2026)	$150,000.00
FY 2027 (09/01/2026-05/31/2027)	$150,000.00
Total	$450,000.00

Total Project Cost:

$475,000.00

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

H-GAC anticipates supplementing this effort with $25,000-$50,000 in staff time and resources funded under other existing sources as part of our broader Regional Conservation Initiative. While it is not included in this estimate, it is assumed that there will be identifiable staff time as in-kind match from local partners.

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

3 years.

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☒	NPS-2 ☐	NPS-3 ☒	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☒	HC-3 ☒
SC-1 ☐	SC-2 ☐	
FWI-1 ☐	FWI-2 ☐	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☐	SPO-2 ☐	SPO-3 ☐	SPO-4 ☒
PEA-1 ☐	PEA-2 ☐	PEA-3 ☐	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☐	RES-2 ☐	RES-3 ☐	RES-4 ☐
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☐
ACS-1 ☐	ACS-2 ☐	ACS-3 ☐	

Priority Area Actions Detail:

Priority 1:

- NPS1 – Multiple existing watershed protection plans (and I-Plans) within the watershed (including Clear Creek WPP, the Bacteria Implementation Group, et al.) specifically identify conservation elements (riparian buffers, urban forestry, LID, etc.) as implementation activities.
- NPS3 – H-GAC is identified as a potential implementer of BMPs for NPS-3. Conservation activities identified by local partners and through H-GAC regional priority list are anticipated to have quantifiable pollutant load reductions.

Priority 2:

- HC2 – Among the existing priority projects or likely partner projects H-GAC will support, habitat restoration through practices like reforestation/planting, riparian buffers, etc. is a focus.
- HC3 – As per the note for HC2, potential projects may include addition of natural function to developed coastal areas.

Priority 3:

- SPO4- A key focus of this proposal is direct outreach and needs identification with local governments and underserved communities, specific to identifying needed resources and services to support conservation efforts in and by these areas.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☐ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☒ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☒ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☒ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☐ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☒ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☐ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

The proposed project would seek to support local partners in implementing conservation elements that maintain, restore, or enhance natural function through technical/data support, coordination/facilitation, funding identification/development, planning services, and direct funding for priority projects. The primary focus of the effort would be on underserved communities within the Lower Galveston Bay watershed. This proposal would serve the following priorities:

Action Priorities: The scope of conservation elements to be implemented/supported under this proposal include elements that:

- Are specifically identified in **Watershed-based Plans** in the area (e.g., riparian restoration, tree planting, park natural areas enhancement, etc.);
- that will likewise **enhance and protect habitat**; and
- will support existing projects, including those previously identified as part of coordination with local partners under H-GAC's Regional Conservation Initiative's priority project list. Many of the identified projects or potential new projects are looking for supplemental resources for existing projects, to expand conservation elements.

Support Priorities:

- The primary focus of this proposal is supporting conservation activities that benefit **underserved communities,** and seek to actively engage local governments, community leaders, and organizations in the communities where projects are located, either directly or through local partners.
- The primary focus of implementation under this proposal is through H-GAC support of **a variety of local organizations**, with specific focus on local government and underserved community organizations. Examples of current priority project sponsors can be found here.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?

☐ Reduction in nutrient pollution
☐ Water reuse and conservation
☐ Marine litter reduction
☒ Green infrastructure and resiliency

The proposal focused on conservation, with a definition that includes both traditional maintaining and restoring habitat, but also the expansion of natural function to developed areas (more information can be found as part of H-GAC's broader Regional Conservation Initiative, accessible here.) Among the many BMPs identified in local WBPs are elements that focus on the use of green infrastructure and natural function to deal with water quality. Additionally, natural infrastructure in various forms is identified in many leading resilience planning efforts for the area (e.g., tree planting goals in Resilient Houston and Houston's Climate Action Plan). Providing staff and strategic small/matching funds support for conservation efforts in the area will generally benefit stormwater mitigation and community resilience, even for those projects which do not specifically include flood mitigation in their intended focus.

Build America, Buy America Act (BABA)

Build America, Buy America provisions only apply to awards over $225,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☒	No ☐
If yes, will you comply with the law or submit a waiver?	Yes ☒	No ☐

Comments (if any): We have selected yes to the first question as a conservative answer, not knowing the final allocation of funds that may include construction materials.

We have selected yes to the first question as a conservative answer, not knowing the final allocation of funds that may include construction materials. Any procurement made my H-GAC on behalf of local partners will full incorporate or comply with BABA. Any provision of funding to local partners will include in its agreement, a clause that BABA compliance will be met.

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☒ No ☐

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

Yes ☒ No ☐

The focus of this proposal is to support conservation activities in, or substantively benefitting, underserved communities. H-GAC will include appropriate criteria into selection criteria for funding arrangements made with local partners, and focus staff support time and effort, to ensure at least 40% of the benefits of the investments benefit disadvantaged communities. The goal of the proposal is to be in excess of that percentage, as underserved communities are the primary focus of the effort.

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

The final demographics will depend on the selection of projects for direct funding, and the number and impact of local partners supported through staff services There are many communities/areas in the overall focus area (Lower Galveston Bay watershed) that meet the 80% or greater criteria. For example, block group 482013412011 (Webster) in the Clear Creek Watershed would potentially be benefitted by conservation projects in its area and in the greater watershed; it is akin to many similar areas in the broader Galveston Bay watershed, with over 83% low income. Geographies in excess of 80% on one or more of the supplemental demographic index factors will be given priority under this effort.

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☐ Yes
☒ No

[TBD.]

Does the Project work with new, smaller communities/partnerships?

☒ Yes
☐ No

The proposed effort would provide services to a broad range of local communities, organizations, and governments, with an emphasis on community representation from underserved areas and populations. Funding support will be limited to otherwise eligible communities and procurement requirements, but will seek, through small-scale strategic investment and general support services, to benefit communities without access to substantive resources.

SECTION SIX: PROPOSAL DETAILS

Project Summary:

This proposal would expand and refocus the work of H-GAC's Regional Conservation Initiative to provide direct support to local partners implementing conservation projects, with a strong focus on underserved communities. H-GAC will provide direct services (funding development, technical/data support, facilitation, outreach support, etc.) and strategic small-scale investments for locally-meaningful conservation efforts, especially where lack of natural function disproportionately impacts underserved communities. .

Full Project Description (1,000 words or less):

Background and Focus of the Initiative
Through its current Regional Conservation Initiative, with a specific focus on supporting underserved communities in the lower Galveston Bay watershed, H-GAC will provide direct support services and strategic investment for local partners. The intent of the support is to enhance their capacity to implement conservation practices to preserve natural areas, restore natural function, or enhance the built environment with addition of natural function (e.g., green infrastructure projects).

As part of the effort, H-GAC would provide, free of charge, the following support services:

- **funding development support** through identifying and/or pursuing funding opportunities for local partners;
- **technical services** through data analysis, spatial data and field data systems development (including an online regional conservation planning tool);
- **coordination** through representing local governments in regional conservation efforts and organizations, developing, and facilitating local partnerships, and leveraging H-GAC's existing role in large scale planning efforts (transportation, economic development, etc.);
- **outreach support** in developing outreach plans and individualized outreach materials for local partners and maintaining online resources (e.g., conservation funding guide, unbranded outreach materials, etc.); and
- **general staff support** for conservation project development.

Additionally, H-GAC will allocate $225,000 of the project total to **small-scale, strategic investments** in local priority projects, drawn from either H-GAC's existing regional priority projects list or identified as critical projects supporting underserved communities in the area. Investments may fully fund, or supplement projects depending on local need and will seek to leverage new or existing resources.

Proposed Project Description
In collaborating with local communities across the region under H-GAC's Regional Conservation Initiative, and in a variety of local studies (heat mapping, tree equity, etc.), it is abundantly clear that there are equity gaps for disadvantaged communities in:

- traditional accessibility to natural function and systems in their communities (e.g., tree equity in comparison to other areas of the region, historical disparities in parks investment, etc.)
- capacity to address the disproportionate impact from resilience, environmental quality, and other challenges benefitting from ecosystem services; and

- access to resources and support that would enable them to consider conservation practices for their communities.

Because natural systems and natural function offer direct benefits to communities, including improved health outcomes, increased disaster resilience, increased environmental quality, and increased community cohesiveness, H-GAC proposes to focus this next phase of the Initiative on disadvantaged communities where enhanced capacity for conservation projects would have a disproportionate benefit.

The proposed project:

- focus this same currently offered suite of free services on disadvantaged communities in the broader Galveston Bay Watershed; and
- include the addition of a series of gap analyses to support project prioritization and steer future conservation investment in disadvantaged communities, in support of the goals of the Galveston Bay Plan.

The following Tasks would be completed under the proposal.

Task 1 – Partner Identification
H-GAC will use the existing EJScreen tool, H-GAC's proprietary Regional Equity Tool, assessment of Low-to-Moderate Income (LMI) and Social Vulnerability Index (SVI) data, and/or other tool as preferred by GBEP, to identify and prioritize disadvantaged communities in the Galveston Bay Watershed. Considerations may include income levels, portions of the communities already existing as conserved land, existing tree canopy, populations in the floodplain, past storm damage, and other assessments that may indicate areas of greatest need. From these evaluations, H-GAC will conduct a targeted outreach campaign to build or extend relationships with local governments and key organizations partners in these communities. Specific emphasis will be given to identifying resource needs and potential projects. Existing projects on H-GAC's regional priority list that have received multijurisdictional approval will also be included as existing partners.

Task 2 – Partner Project Support Services
H-GAC will collaborate with local partners to support their efforts through the suite of services described in *"Background and focus of the Initiative"*. H-GAC will update its existing priority project list to prioritize projects and H-GAC capacity. H-GAC will coordinate with GBEP, other regional and state governmental agencies and partners, and other regional conservation efforts to ensure against redundancy and promote its prioritized projects for increased visibility. Based on prior efforts, H-GAC anticipates providing substantial support for 5-10 projects a year, and less substantial support to an additional 5-10 projects a year. H-GAC will seek to support all interested parties but will prioritize its time to underserved communities.

Task 3 – Strategic Investments
H-GAC will allocate at least $225,000 of the budget to make small-scale, strategic, and locally meaningful investments in conservation projects or supplemental activities to existing projects with elements increasing natural function. Investments will prioritize projects with multiple benefits (e.g., habitat restoration, flood mitigation, etc.) and underserved communities meeting Justice 40/EJScreen criteria. The investments will include only eligible activities or expenditures. H-GAC will enter into appropriate sub agreements with participants ensuring all procurement and other programmatic requirements and priorities are met. H-GAC will oversee the disposition and reporting for the funds.

Task 4 – Gap Analyses
H-GAC will develop spatially-based gap analyses for the identified project areas to identify levels of need for prioritizing efforts and future investment. H-GAC will incorporate specific goals of the Galveston Bay Plan to provide additional information for broader efforts of the GBEP. H-GAC will collaborate with local communities and GBEP to identify desired analyses, but potential applications may include tree equity, investment potential, protected green spaces, ratios of income to projected benefits, etc.

Latitude/Longitude (Optional):

(Communities within the broader Lower Galveston Bay watershed)

Location:

(Communities within the broader Lower Galveston Bay watershed)

Other Plans Implemented:

This proposal specifically seeks to implement aspects of the Regional Conservation Framework and H-GAC led WBPs in the area, as well as elements in other existing WBPs. Depending on the local partners served, it is expected it will also implement aspects of, or benefit state coastal management plans, specific municipal planning efforts (e.g., Resilient Houston, etc.), and will at least coordinate with other large conservation efforts in the area (e.g., Coastal Prairie Conservancy's prairie and proposed grassland initiatives).

Projects Map

NA (lower Galveston Bay watershed.)

Supplemental Photos/Graphics (Optional):

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	$109,000
b.	Fringe Benefits (46.51%)	$50,696
c.	Travel	$2,000
d.	Supplies	$1,000
e.	Equipment	$0
f.	Contractual	$225,000
g.	Construction	$0
h.	Other*	$44,003
i.	Total Direct Costs (Sum a - h)	$431,699
j.	Indirect Costs	$18,301
k.	Total (Sum of i & j)	$450,000

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:
The primary constituents are rent, internal services, data services, and other staff-hour based allocations for services. More information is available upon request.

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 11.46% of (check one):

☒ salary and fringe benefits
☐ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

This rate is less than or equal to (check one):
☒ Predetermined Rate—an audited rate that is not subject to adjustment.
☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable] – The rate is included as an attachment with this submittal.

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

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SECTION ONE: GENERAL INFORMATION

Project Name:

Herman Brown Park Riparian Restoration and Community Engagement Project- Phase I

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

Houston Parks and Recreation Department (HPARD)

☒ Federal, State, or Local Government ☐ Council of Government ☐ Public University
☐ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Kelli Ondracek
Project Representative Phone	(832) 395-7090
Project Representative Email	Kelli.Ondracek@houstontx.gov

Partners and Their Roles:

Student Conservation Association: Provide a summer crew of high school students recruited from local schools, provide interns.
U.S. Fish and Wildlife Service: Host and train education interns that will provide outreach and education in the local community.
Furr High School: Promote youth employment and professional development opportunities to engage surrounding communities.
Bayou Preservation Association: Provide training to certify interns and crews as Certified Interpretive Guides (CIG).

Amount Requested (minimum budgeted cost of $150,000):

$350,000.00

Is the project scalable? ☒

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$350,000.00
FY 2026 (09/01/2025-08/31/2026)	$0.00
FY 2027 (09/01/2026-05/31/2027)	$0.00
Total	$350,000.00

Total Project Cost:

$1,260,000 for all three phases plus in-kind match

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

All HPARD staff time spent as in-kind contributions:

- Grant and funds management
- Field work

- Hosting volunteer events
- Hiring and overseeing contractors
- Habitat assessment

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

Four years

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☐	NPS-3 ☐	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☐	HC-3 ☒
SC-1 ☒	SC-2 ☒	
FWI-1 ☐	FWI-2 ☐	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☒	SPO-2 ☐	SPO-3 ☐	SPO-4 ☐
PEA-1 ☐	PEA-2 ☐	PEA-3 ☒	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☐	RES-2 ☐	RES-3 ☐	RES-4 ☐
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☐
ACS-1 ☐	ACS-2 ☐	ACS-3 ☐	

Priority Area Actions Detail:

HC-3- Habitat Enhancement:
The proposed project will enhance riparian habitat along Hunting Bayou through the removal of existing non-native trees and replacement with a diverse mix of native canopy and understory species.

SC1- Native Species Management:
The proposed project will install a diverse mix of canopy, understory, and shrub species into the riparian restoration site. The restored areas will provide habitat for many species of native wildlife, including many that are listed as Species of Greatest Conservation Need due to the loss of habitat along the upper Texas coast.

SC-2: Invasive Species Control:
The proposed project will remove invasive species, including Chinese Tallow (*Triadica sebifera*) and Privet species (*Ligustrum* sp.).

SPO-1: Stewardship Programs and Volunteer Opportunities:
The proposed project will provide volunteer opportunities for the surrounding community to participate in the habitat restoration activities.

PEA-3: Kindergarten to 12th grade (k-12) Education Efforts:
The proposed project will recruit internship positions and summer jobs on a habitat restoration crew from the local high school. These opportunities will provide training and green job experience.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☐ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☐ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☐ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☒ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☒ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☒ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☐ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities:

The habitat restoration project will occur within an underrepresented and under-resourced community. Additionally, SCA crews and interns will be recruited from that community. SCA's mission is to build the next generation of conservation leaders and inspire lifelong stewardship of the environment and communities by engaging young people in hands-on service to the land by providing paid green jobs and teaching communities to be environmental stewards.

The U.S. Fish and Wildlife Service's Houston Community Partnership and Engagement program (HCPE) is committed to helping implement the environmental education (EE) and outreach component to engage communities and ensure long-term support for this important conservation project. HCPE will provide oversight and training to individual SCA interns and ensure they are prepared to approach communities with cultural humility. Working with Furr HS students and the surrounding community, SCA interns will design and develop nature-related programs/projects that reflect the communities' values and priorities.

Engages K-12 students and/or adults in hands-on, place-based environmental education

The SCA crews and interns will receive training and education (depending on age requirements) in tool use, equipment maintenance, trail maintenance and construction, professional development, JEDI training, CPR/First Aid, plant identification, financial literacy, resume building, and more in support of their hands-on conservation projects and environmental education activities. In addition, SCA Interns and Team Members will experience nature safely with peers of similar backgrounds and struggles in a space free from mainstream stereotypes and marginalization. These elements create a productive environment for youth and young adults to envision future job opportunities and make positive environmental and community impact.

HCPE staff and SCA interns will provide EE programs at nearby community centers in East Houston, including at Houston Parks and Recreation Department's (HPARD) Clinton, Manchester, and Eastwood Parks. These community centers will be prioritized as they are the young people (6-13 years) that fall within the Furr High School feeder pattern. SCA interns will deliver monthly 45-minute programs during after school programs. Topics will include native habitats, wetlands, migratory birds, litter, Galveston Bay, and more.

In addition, HCPE will provide professional development opportunities and introduce students to careers in conservation. SCA crew members will undergo at least one full day of training in careers in conservation with an emphasis on becoming a Park Ranger. Crew members will learn how to design and deliver their own environmental education program.

Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

SCA builds the next generation of conservation leaders by creating equitable access to nature, providing paid green jobs to young adults, and teaching communities to be stewards to the environment. SCA believes underrepresentation of Black, Indigenous, and People of Color (BIPOC) and underserved young adults in conservation is not due to lack of interest but due to lack of access.

SCA envisions a world in which conserving the environment is a commitment shared by all people, young and old. SCA does this through offering full-time, part-time, single day, and virtual programs of varying lengths (from a single day to a few weeks to several years) to build lifelong habits to help sustain our planet. SCA's continuum introduces young adults and citizens to a world of opportunities in conservation, sustainability, and natural resource management.

The Department of the Interior, including the U.S. Fish and Wildlife Service, plays a central role in how the United States stewards its public lands, increases environmental protections, pursues environmental justice, and honors our nation-to-nation relationship with Tribes. As reflected in the agency's Environmental Justice Strategic Plan, we are committed to engaging diverse partners with an emphasis on minority and low-income communities that suffer from disproportionate and adverse environmental impacts.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?
☒ Reduction in nutrient pollution
☐ Water reuse and conservation
☒ Marine litter reduction
☒ Green infrastructure and resiliency

Green Infrastructure project implementation is included in the EPA's efforts to reduce nutrient pollution. This project will reduce nutrient pollution in the adjacent waterway by enhancing the riparian forest to filter and treat non-point source runoff more effectively.

The EPA identifies marine litter as a significant problem impacting oceans and coasts. This project will reduce litter from entering the adjacent waterway, and ultimately Galveston Bay, through litter removal. During the project period, crews, interns, and community volunteers will hand-collect and remove litter from the project area. Additionally, education efforts will teach the community about the impacts of litter to waterways and natural environments.

The EPA recognizes the use of green infrastructure projects to manage flooding, reduce urban heat, prepare for drought, and reduce costs of managing water. This project will enhance a large, urban riparian forest to improve the function of the natural habitat and benefit adjacent and downstream communities.

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☐	No ☒
If yes, will you comply with the law or submit a waiver?	Yes ☐	No ☐

Comments (if any):

N/A

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

Yes ☒ No ☐

The project location falls within a disadvantaged community that has been marginalized, underserved, and overburdened by pollution. The Climate and Economic Justice Screening Tool (CEJST) identifies the project within a tract of land that is not only disadvantaged, but completely surrounded by tracts that are disadvantaged. In addition, it meets an adjusted low-income household threshold. Investment in this project will help meet the goal of prioritizing Federal investment in disadvantaged communities.

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

In a one-mile diameter centered in the middle of the project area, the Supplemental Demographic Index is in the 93rd percentile in the U.S. A total of 53% of the population is considered low income, which is the 83rd percentile in the U.S. The percent of the population with less than a high school education is 33%, which is the 93rd percentile in the U.S. The unemployment rate is 10%, which is the 82nd percentile in the U.S. Additionally, 20% of the population has a low life expectancy, which is 59th percentile for the U.S.

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☒ Yes
☐ No

Furr High School is Title I.

Does the Project work with new, smaller communities/partnerships?
☒ Yes
☐ No

This project involves outreach with local schools to recruit student interns and crews to support the restoration project. HPARD has an existing relationship with Furr High School, which is immediately adjacent to the project area, in the Community Garden at the park. This project proposes to extend that relationship by engaging the school in habitat restoration and interpretation at the park.

SECTION SIX: PROPOSAL DETAILS

Project Summary:

As part of Phase 1, the Houston Parks and Recreation Department will restore 230 acres of riparian forest habitat within Herman Brown Park, which is adjacent to Hunting Bayou. The habitat restoration will improve wildlife habitat, enhance the ecosystem services of these areas, and provide community engagement during the restoration process.

Full Project Description (1,000 words or less):

The first phase of the Herman Brown Park Riparian Restoration and Community Engagement Project will restore 230 acres of riparian forest within Herman Brown Park. Herman Brown Park contains 670 acres of riparian forest habitat along Hunting Bayou and is a Nature Preserve protected from development by city ordinance. Phase 1 of this project will enhance habitat in 230 acres of this forested habitat located on the southern side of the park.

The park contains historic riparian habitat along Hunting Bayou, as seen on aerial imagery from the 1940's, with disturbance throughout the park over the last century. The park now contains a mix of native and invasive trees and understory plants, with some areas containing high volumes of invasive species and poor habitat quality. Canopy loss caused by the 2011 drought is evident in the large number of downed trees on the forest floor (image 1). In the fall of 2022, HPARD conducted a habitat and vegetation communities survey to evaluate the current state of the park's natural resources. The goal of this survey was to determine baseline vegetation and habitat conditions for natural areas in the park in order to guide management needs of the restoration project.

The Houston Parks and Recreation Department (HPARD) is proposing to restore Herman Brown Park by removing non-native species and creating a forest composition of native canopy, understory, shrub and herbaceous species. This will enhance the riparian forest approximately 4,000 linear feet along Hunting Bayou.

This project is a component of the larger Houston Parks Riparian Restoration Initiative where all City of Houston parks that are adjacent to a waterway are targeted for creation or enhancement of forested riparian buffers. This initiative will restore and enhance Houston's historic riparian habitat in 70 parks by the year 2030.

The Riparian Restoration Initiative aims to reestablish this important habitat in parks where the trees have been completely removed, enhance riparian areas across the system through the targeted removal of invasive plants, and reestablish native canopy and understory trees. This initiative is focused on improving water quality in Houston's impaired waterways and supports a diverse mix of trees that support wildlife species. Since the reforestation projects are located adjacent to Houston's major bayou systems, the plantings help reduce nonpoint source pollution, prevent erosion, and mitigate flooding. For this specific project area, Hunting Bayou Above Tidal is impaired for bacteria, dissolved oxygen, and is "of concern" for nutrients. Additionally, the projected flood risk for communities within this area is in the 96th percentile.

This project incorporates partners from the U.S. Fish and Wildlife Service (FWS), Student Conservation Association (SCA), Bayou Preservation Association, and local schools. Two, six-month SCA restoration interns will work directly with HPARD to implement habitat restoration goals within the site. Two, six-month SCA education interns will work directly with FWS to assist HPARD in community outreach, engagement, and education goals. A four-week SCA summer crew recruited from Furr High School and other local schools will assist HPARD in the invasive specie removal efforts at the site. Bayou Preservation Association will provide training to certify interns and crews as Certified Interpretive Guides (CIG) certified by the National Association of Interpretation. The training will empower them to develop and lead guided interpretation activities and cultivate interest in conservation and environmental programs within their communities.

HPARD will work with an ecological consultant to analyze the existing habitat assessment data and create a Habitat Management Plan for the park. This plan will be a guide for HPARD in the future maintenance of the park.

HPARD will host one community planting event at the park to educate the community on the importance of riparian habitat and promote stewardship and appreciation of nature preserves in local communities.

Restoration areas will be monitored to measure changes in the composition and diversity of plant material and provide an indicator of future management needs.

Additionally, interpretive and wayfinding signage will be installed along the extensive trail system within the park to support the continued education of park visitors and encourage further exploration of the Nature Preserve area within the park.

Latitude/Longitude (Optional):

29°47'1.2264" N, 95°14'26.3436" W

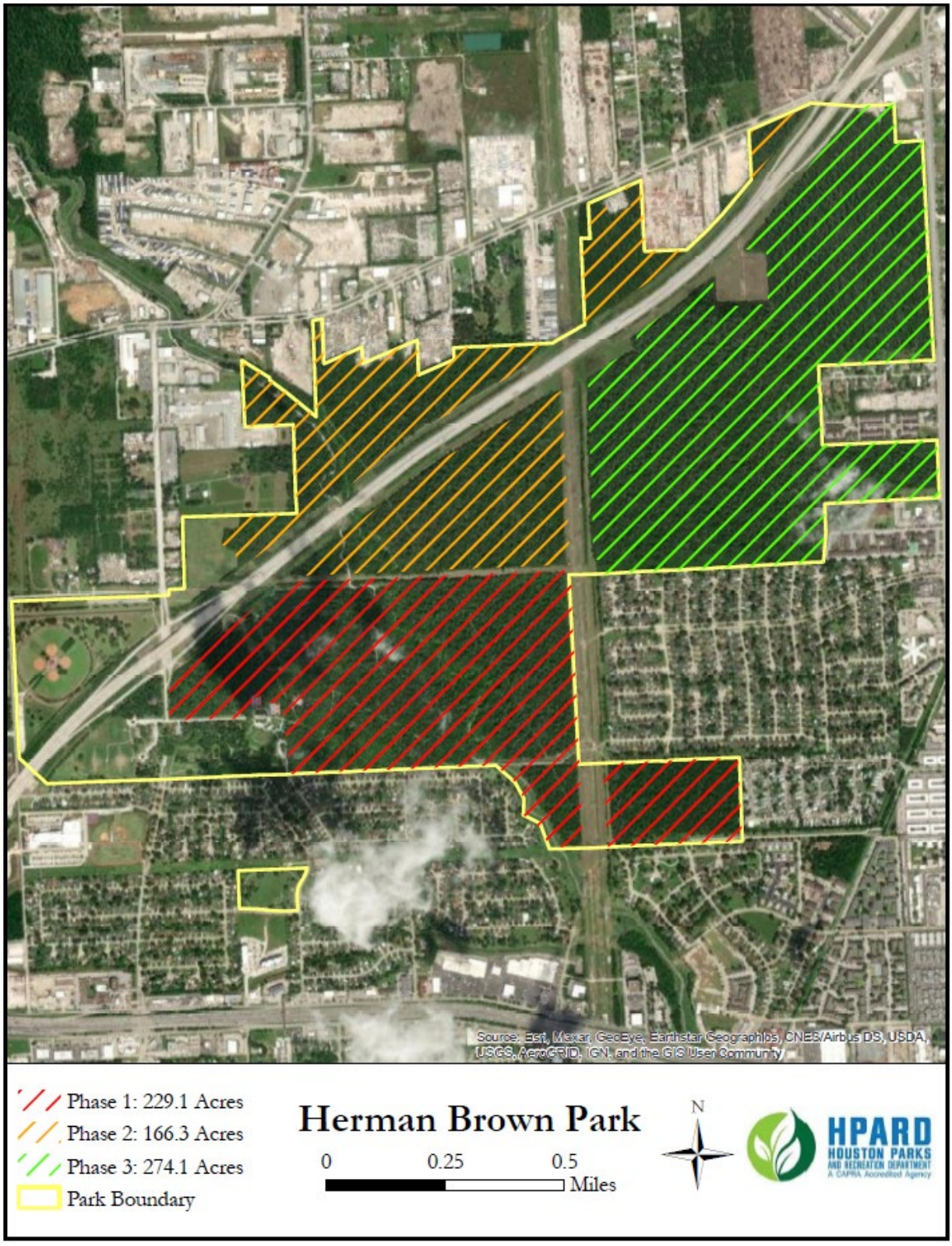
Location:

USGS HUC 12: Hunting Bayou watershed (HUC 120401040701)
TCEQ Stream Segment Assessment Unit 1007R_04: Hunting Bayou Above Tidal

Other Plans Implemented:

Resilient Houston, Houston Climate Action Plan, Texas Coastal Management Plan, Texas Coastal Resiliency Master Plan, Gulf Houston Regional Conservation Plan (RCP), City of Houston Riparian Restoration Initiative

Projects Map



Supplemental Photos/Graphics (Optional):

Image 1: Large numbers of downed trees on the forest floor caused by the 2011 drought.

Image 2: Hunting Bayou running through the project area.

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	
b.	Fringe Benefits	
c.	Travel	
d.	Supplies	$73,989.59
e.	Equipment	
f.	Contractual	$276,010.41
g.	Construction	
h.	Other*	
i.	Total Direct Costs (Sum a - h)	$350,000
j.	Indirect Costs	
k.	Total (Sum of i & j)	$350,000

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is % of (check one):

☐ salary and fringe benefits
☐ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

This rate is less than or equal to (check one):
☐ Predetermined Rate—an audited rate that is not subject to adjustment.
☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable]

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

United States Department of the Interior

FISH AND WILDLIFE SERVICE
5208 Harrisburg Blvd., Unit B
Houston, Texas 77011

Galveston Bay Estuary Program
17041 El Camino Real #210
Houston, TX 77058

August 11, 2023

Re: Houston Parks and Recreation Department's Proposal, *Herman Brown Park Riparian Restoration and Community Engagement Project- Phase Ito Galveston Bay Estuary Program.*

Dear Madam/Sir:
On behalf of the U.S. Fish and Wildlife Service's Houston Community Partnerships and Engagement program (HCPE), I would like to express our support for the Houston Parks and Recreation Department's Natural Resource Division proposal, *Herman Brown Park Riparian Restoration and Community Engagement Project- Phase Ito Galveston Bay Estuary Program*

Houston sits within an area of extreme ecological importance, a region that provides many opportunities for young people and families to benefit from nature. Unfortunately, Houston is also at the forefront of the climate change crisis resulting in a significant portion of the population dealing with social and environmental injustice (EJ). This proposal's scope of work will directly benefit some of Houston's EJ communities by building resilience on the landscape and in communities. HCPE's role will be to train and oversee day-to-day activities of Student Conservation Association (SCA) environmental education (EE) interns. EE interns will design and deliver after school nature programming at HPARD community centers and conduct outreach and interpretation in the community and at special events. They will be provided professional development and networking opportunities in order to build their skills and confidence toward becoming conservation leaders.

The agencies and organizations involved in this proposal have worked together since 2014 and we are looking forward to further building on our important partnership. We are pleased to support HPARD's proposal as it strongly reflects the U.S. Fish and Wildlife Service's commitment to supporting and empowering youth from EJ communities.

Sincerely,

Nancy C. Brown

Nancy C. Brown
Program Lead
Houston Community Partnerships & Engagement
Nancy_Brown@fws.gov

NATIONAL WILDLIFE REFUGE SYSTEM

August 2, 2023

Galveston Bay Estuary Program
17401 El Camino Real #210
Houston, TX 77058

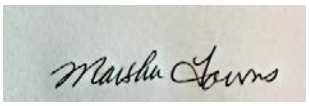
Dear Madam/Sir:

On behalf of the Student Conservation Association (SCA), it is my pleasure to provide this letter of support for the our longtime partner Houston Parks and Recreation Department's application to Galveston Bay Estuary BIL funding for the project as described in the Galveston Bay Estuary Program Project Proposal. As a Partnership Director for SCA, I have had the pleasure of collaborating with colleagues at the Houston Parks and Recreation Department on both hands-on conservation service and environmental education and engagement projects with Texas young people and community members.

If supported by this grant and in support of this project, SCA will field two, six-month, restoration focused conservation interns supervised by the Natural Resources Division of the Houston Parks and Recreation Department, two, six-month Environmental Education focused Conservation Interns supervised by the USFWS Southwest Region National Wildlife Refuge System, Houston (also, a significant local partner of SCA), and one 8-person, summer crew for three weeks (2 local young adult leaders and 6 high school crew members recruited from Ebert L. Furr High School, a school on Houston's East Side with which SCA has been in partnership with for a number of years in hands-on conservation leadership programming) all to be fielded starting calendar year 2026. These interns and the crew will be paid and will serve full time.

We look forward to working with Houston Parks and Recreation Department, the US Fish & Wildlife Service and other community partners on this important project to conducting meaningful conservation work, developing leadership and workforce skills in our local youth and young adults, and engaging the community I uplifting these efforts.

Sincerely,



Marsha Towns, Partnership Director, Gulf
Student Conservation Association, SCA Houston
5208 Harrisburg Blvd., Unit B, Houston TX 77011
Mobile: 802-296-1213

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

SECTION ONE: GENERAL INFORMATION

Project Name:

Implementing a high-frequency framework for monitoring and assessment of ecosystem status subjected to climate related natural disasters in Galveston Bay

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

Texas A&M University at Galveston

☐ Federal, State, or Local Government ☐ Council of Government ☒ Public University
☐ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Hui Liu
Project Representative Phone	(409)740-4716
Project Representative Email	liuh@tamug.edu

Partners and Their Roles:

Texas A&M University Corpus Christi, collecting data on carbonate chemistry characterization in the bay
The University of Maryland, technical support on providing and deploying imaging systems sampling target organisms

Amount Requested (minimum budgeted cost of $150,000):

$745,838

Is the project scalable? ☒

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$260,493
FY 2026 (09/01/2025-08/31/2026)	$304,440
FY 2027 (09/01/2026-05/31/2027)	$180,905
Total	$745,838

Total Project Cost:

$745,838

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

[Please indicate source, amount, and status (secured, potential, etc.)]

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

September 1, 2024 to May 31, 2027

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☐	NPS-3 ☐	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☐	HC-3 ☐
SC-1 ☐	SC-2 ☐	
FWI-1 ☐	FWI-2 ☐	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☐	SPO-2 ☐	SPO-3 ☐	SPO-4 ☐
PEA-1 ☐	PEA-2 ☐	PEA-3 ☐	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☒	RES-2 ☐	RES-3 ☒	RES-4 ☐
RES-5 ☐	RES-6 ☐	RES-7 ☒	RES-8 ☐
ACS-1 ☒	ACS-2 ☒	ACS-3 ☐	

Priority Area Actions Detail:

[Please explain in detail how project addresses priorities selected. Attachments may be submitted via email in conjunction with this application.]

Ecosystem based management requires high-quality data of ecosystem components being consistently collected through carefully designed monitoring programs, which is often insufficient in reality, but highly needed for managers and stakeholders. This project is designed to generate high-frequency and long-term data of key indicators to inform science-based decision making on Galveston Bay ecosystems. Integrated ecosystem assessment (IEA) has become an important framework to formulate policies for ecosystem management and restoration of estuaries in light of climate change. A crucial step in IEA is to develop indicators as proxies for monitoring physical and biological processes and evaluation of the ecosystem status. The action to be taken in this project is to apply a high-frequency sampling framework simultaneously generate key indicators in Galveston Bay from September 2024 to May 2027 (30 sampling cruises) onboard R/V Trident of Texas A&M University using a PlanktonScope system and an underway CO_2 partial pressure (pCO_2) system coupled with discrete water sampling for carbonate chemistry characterization to monitor climate resilience of estuaries. The suite of ecosystem indicators simultaneously collected with broad coverage in time and space in the bay will provide a timely complete view of pelagic ecosystem status along with key species of oysters to managers and stakeholders (GBEP/TCEQ) for future implementation and management decision making on Galveston Bay ecosystems.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☒ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☐ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☐ Habitat protection and enhancement

☐ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☒ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☐ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☐ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☐ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☒ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

[Please explain in detail how project addresses priorities selected. Attachments may be submitted via email in conjunction with this application.]

Climate-driven events (e.g. hurricanes and droughts) combined with increasing Ocean Acidification (OA) impose unprecedented threats to estuarine ecosystems. To sufficiently monitor ephemeral signals of climate/human related disturbance (hurricanes, droughts and oil spills etc.) in estuaries, there is an urgent need of novel monitoring programs of sensitive indicators to track the ecosystem status informing stakeholders (i.e., GBEP/TCEQ) for making applicable management decisions and prudent assessment of resilience and adaptation of estuaries in the context of climate change. Compared to other indicators, a big data gap on pelagic indicators exists currently in the **State of the Bay** (TCEQ/GBEP) in general, and on fragile and calcifying organisms in particular.

Calcifying species such as oyster larvae along with fragile species such as ctenophores and larvaceans competing with larval fish for food resources are sensitive indicators for ecosystem status and subjected to climate-induced disturbance as well as the threat of increasing OA. Traditional sampling is expensive, and especially destructive for fragile organisms, which often underestimate the role and importance of these species in estuaries. Applying novel monitoring approaches of high-frequency sampling framework for pelagic indicator species including fragile and calcifying organisms in response to increasing climate related threats in Galveston Bay is in good alignment with the **BIL Action Priority** that *support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability*, and the **BIL Support Priority** of *monitoring and research on data collection* to assess the function and status of estuaries in the face of climate impacts.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?
☐ Reduction in nutrient pollution
☐ Water reuse and conservation
☐ Marine litter reduction
☐ Green infrastructure and resiliency

[If yes, please summarize how the proposal addresses EPA Areas of Special Interest.]

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☐	No ☒
If yes, will you comply with the law or submit a waiver?	Yes ☐	No ☐

Comments (if any):

[If yes, please summarize how the proposal complies with BABA, as applicable.]

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?

Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

Yes ☐ No ☒

[If yes, please summarize how the proposal addresses the Justice40 initiative.]

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☐ No ☒

[If yes, please identify geographies and summarize how the proposal addresses the selected demographics (% Low income, % Linguistically isolated, % Less than high school education, % Unemployed, % Low life expectancy.]

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☐ Yes
☒ No

Does the Project work with new, smaller communities/partnerships?
☒ Yes
☐ No

Bob Kosar, City of El Lago

SECTION SIX: PROPOSAL DETAILS

Project Summary:

Applying a suite of high-frequency sampling techniques with a broad coverage in time and space to generate data of key ecosystem indicators applicable and transferable to multiple programs of GBEP/TCEQ on Galveston Bay ecosystems. Focusing on key indicators including fragile and calcifying organisms currently overlooked, but highly needed by stakeholders, this project will provide high quality real-time data to assess the impacts of ocean acidification and other biophysical processes on Galveston Bay ecosystems to inform science-based decision making in light of climate impacts.

Full Project Description (1,000 words or less):

Climate-driven events (e.g. hurricanes and droughts etc.) combined with increasing Ocean Acidification (OA) to estuaries (Hu & Cai 2013) impose unprecedented threats to estuarine ecosystems. There is a clear need for novel, continuous, real-time high-frequency monitoring programs to track the ecosystem status informing stakeholders for estuarine management decision making. While assessing these impacts is challenging, an integrated approach of monitoring estuarine ecosystems is promising through the development of relatively sensitive and broadly applicable ecosystem indicators. Species of pelagic communities are sensitive to disturbances induced by hurricanes (Liu et al. 2017&2021) and human activities (Li & Liu 2023), meanwhile they are subjected to the threat of increasing OA (Hammill et al. 2017). Thus, monitoring these key indicators in an acidifying environment is essential for decision making ecosystem management regarding climate/human related disturbance (i.e., hurricanes, droughts and oil spills etc.), which is in good alignment with the need of GBEP/TCEQ through generating meaningful data for future implementation and management decision.

Traditional sampling of pelagic organisms is expensive and labor-intensive, and in particular this approach is destructive to fragile organisms such as ctenophores and larvaceans commonly residing in estuaries. In addition, it is time consuming to process samples resulting in a delay between sampling and data availability, which make it difficult to provide real-time data of key indicators to stakeholders for decision making. In addition, OA often causes adverse consequences on calcifying organisms (Doney et al. 2009), especially larval stage calcifiers, such as oysters, because their shell minerals contain more soluble aragonite. However, relevant information on fragile and calcifying organisms subjected to increasing climate related threats in Galveston Bay ecosystems remains scarce.

Recent advances in imaging technologies have enabled in situ high-frequency long-term observations of ecosystem indicators using PlanktonScope in coastal waters (Bi et al. 2022). High frequency time series of indicators have provided valuable information on the relevant physical and biological processes. In this project, a multidisciplinary approach will be used to generate advanced biological and chemical data applicable and transferable to multiple programs that support commercial and recreational finfish and shellfish monitoring for sustainability, habitat and species assessment for future implementation and management decisions. The proposed work is built upon the proven relevant research that has been conducted by the team (Liu et al. 2021; Hu et al. 2020) and the established collaboration between the PIs during an NSF RAPID project after Hurricane Harvey. In this project we will apply a suite of high-frequency sampling framework to simultaneously collect key ecosystem indicators in Galveston Bay (Fig.1) from September 2024 to May 2027 (30 sampling cruises) onboard R/V Trident of Texas A&M University using PlanktonScope (Fig.2) and an underway CO_2 partial pressure (pCO_2) system (Fig. 3) coupled with discrete water sampling for carbonate chemistry characterization to inform science-based decision-making on management of Galveston Bay ecosystems.

At sea as boat is moving we will deploy PlanktonScope to continuously collect imagines of pelagic indicators plus ambient hydrographic factors (**Liu**) and simultaneously deploy the pCO_2 system (**Hu**) along with classical net tows (100 μm) and water sampling for lab-based characterization of carbonate chemistry and validation of imaginary data. PlanktonScope will be rented from the University of Maryland (project partner). Later imaging files will be processed using high-speed computers with sophisticated algorithms of machine learning to automatically identify and count items (Fig. 4). We will further analyze high frequency data collected from PlanktonScope to examine the impacts of pCO_2 and carbonate chemistry plus physical and biological processes on ecosystem dynamics at different temporal scales. Logistic regression models will be developed to examine the impacts of carbonate chemistry, temperature, and salinity on the occurrence of different pelagic groups. We will synthesize the impacts of various processes across spatial and temporal scales on pelagic indicator species in the bay. The suite of ecosystem indicators simultaneously generated during the project will provide a full view of pelagic ecosystem status, and is promising to understand estuarine dynamics and identify the underlying mechanisms.

Our objectives are: (1) to fill the data/knowledge gap on monitoring estuarine ecosystems by focusing on pelagic indicators including fragile and calcifying species currently overlooked, but highly needed by stakeholders, (2) applying novel approaches using a suite of high-frequency sampling techniques to improve the coverage of data collection in time and space to provide early warning of swarms of ctenophores, which compete with larval fish for food resources, (3) quantify the impacts of acidification and biophysical processes on seasonal and spatial patterns of pelagic indicators, particularly for fragile and calcifying organisms such as oyster larvae.

References:

Bi H., Song J., Zhao J., **Liu H** et al., (2022) Temporal characteristics of plankton indicators in coastal waters: A continuum framework for high frequency data from plankton imaging systems. *Journal of Sea Research* 189: 102283

Doney SC, Balch WM, Fabry VJ, Feely RA (2009) Ocean Acidification: a critical emerging problem for the ocean sciences. *Oceanography* 22:16–25

Emanuel K (2005) Increasing destructiveness of tropical cyclones over the past 30 years. *Nature* 436, 686–688.

Hu X, Cai W-J (2013) Estuarine acidification and minimum buffer zone—A conceptual study. *Geophysical Research Letter* 40:5176-5181
Hu X, Yao H, Staryk KJ, et al. (2020) Disparate responses of carbonate system in two adjacent subtropical estuaries to the influence of Hurricane Harvey - A case study. *Frontier in Marine Science* 7:26. doi: 10.3389/fmars.2020.00026
Liu H, Zhang X, Yang Q, Zuo T, Quigg A (2017) Mesozooplankton dynamics in relation to environmental factors and juvenile fish in a subtropical estuary of the Gulf of Mexico. *Journal of Coastal Research* 33:5, 1038–1050.
Liu H, Gilmartin J, Li C, Li K. (2021) Detection of time-varying pulsed event effects on estuarine pelagic communities with ecological indicators after catastrophic hurricanes. *Ecological Indicators* 123, 107327.
Li C, **Liu H** (2023) Comparative ecosystem modeling of dynamics and stability of subtropical estuaries under external perturbation in the Gulf of Mexico. *ICES Journal of Marine Science* 80:5 1303–1318.
Hammill E, Johnson E, Atwood TB, et al. (2017) Ocean acidification alters zooplankton communities and increases top-down pressure of a cubozoan predator. *Global Change Biology* https://doi.org/10.1111/gcb.13849.

Latitude/Longitude (Optional):

[degrees, minutes, and seconds format]

Location:

Galveston Bay Systems

Other Plans Implemented:

[Texas Coastal Management Plan, Texas Wetland Conservation Plan, GCJV Conservation Plans, etc.]

Projects Map

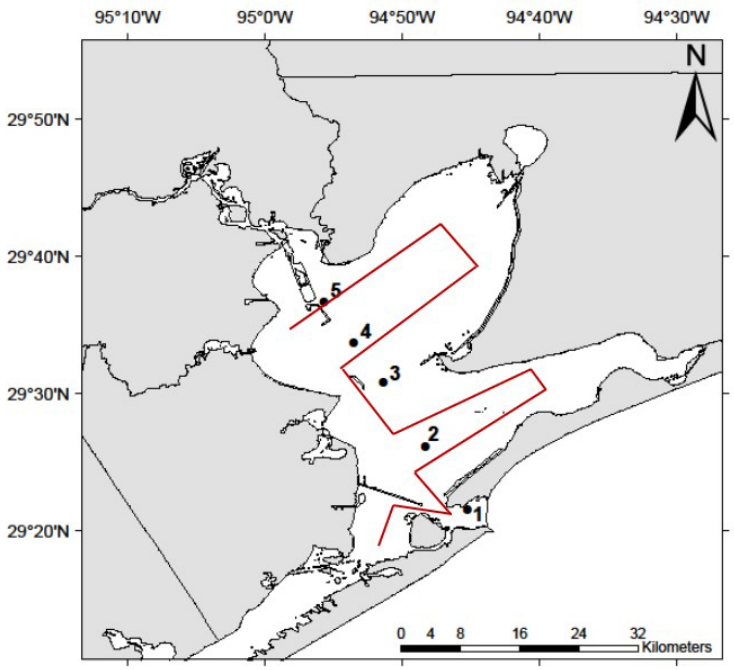


Figure 1 Proposed high-frequency continuous sampling transects in Galveston Bay (numbered dots are regular monitoring stations).

Supplemental Photos/Graphics (Optional):

[Insert Here or Attach as an Appendix]

Figure 2 PlanktonScope to be leased from the University of Maryland and deployed in Galveston Bay during the project.

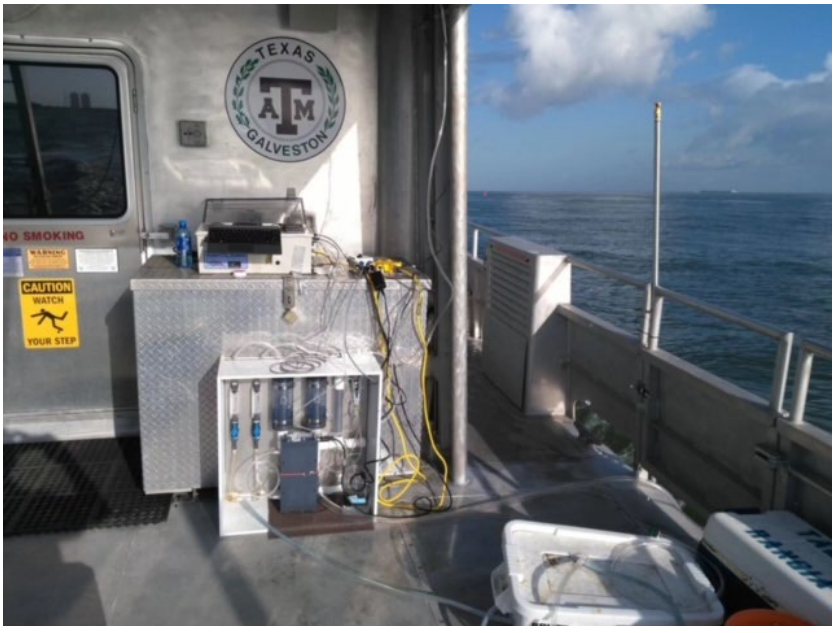


Figure 3 an underway CO_2 partial pressure (pCO_2) system deployed on a sampling cruise in Galveston Bay during the NSF RAPID project.

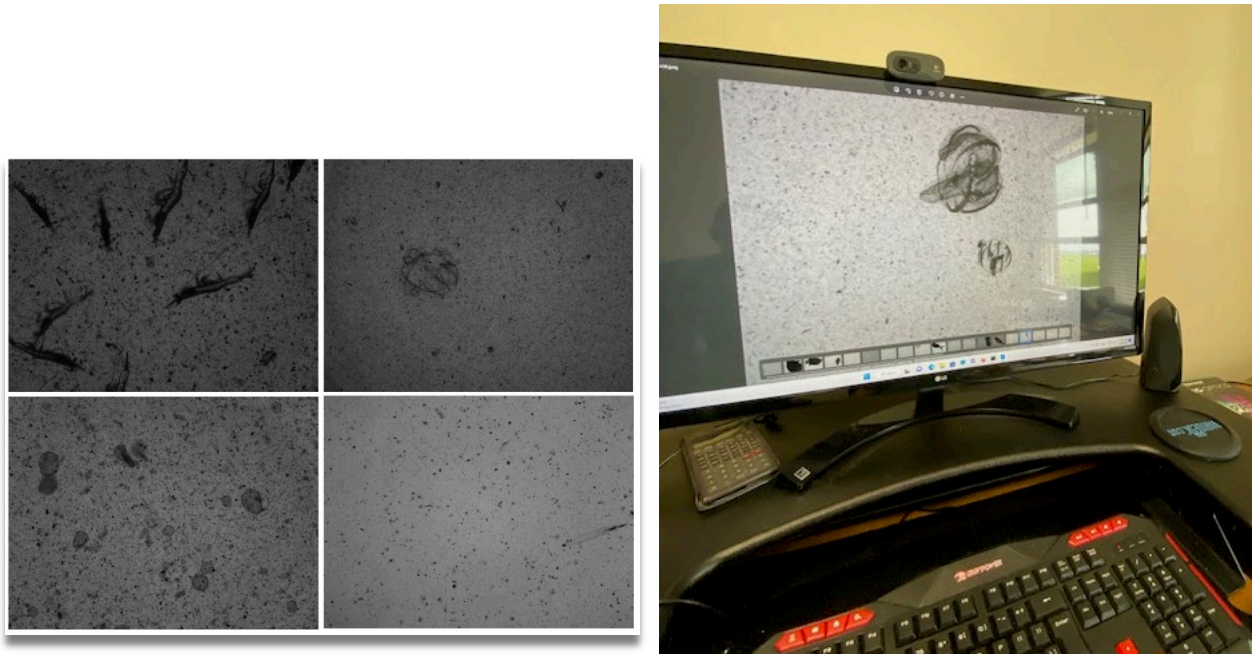


Figure 4 Illustration of imagines of pelagic indicators collected using PlanktonScope.
(Photo-left: “Bi H., Song J., Zhao J., **Liu H** et al., Temporal characteristics of plankton indicators in coastal waters: A continuum framework for high frequency data from plankton imaging systems, published by *Journal of Sea Research*, Photo-right: computer-based automatic processing of imaginary files)

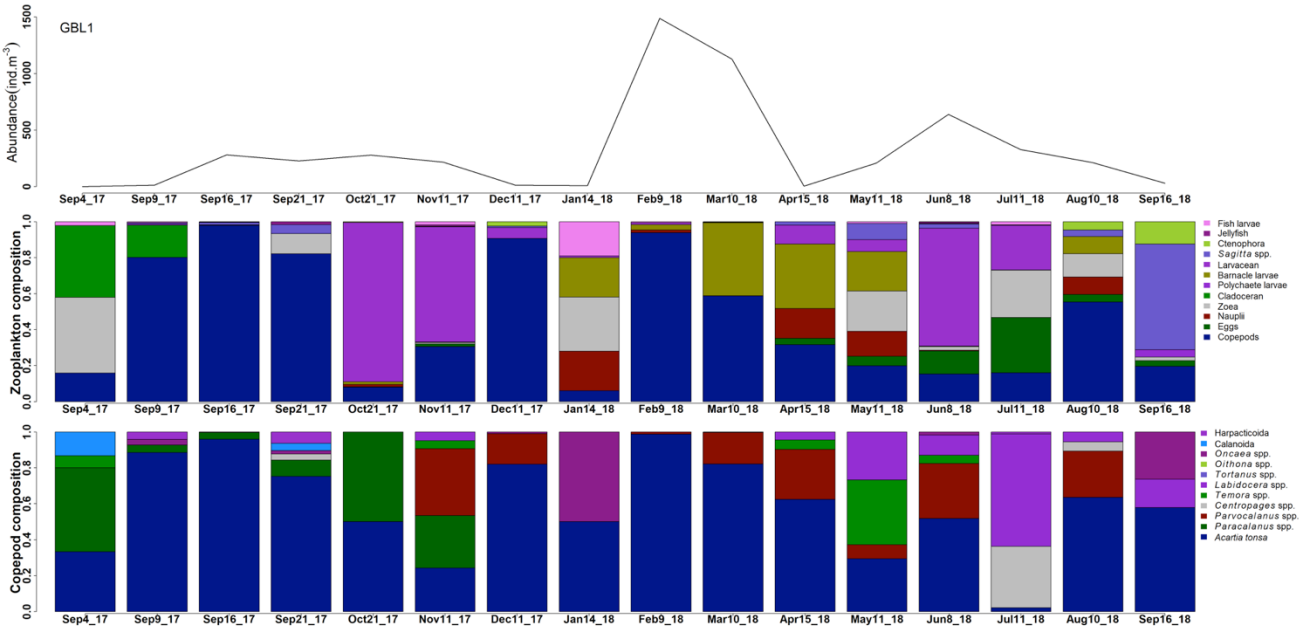


Figure 5 Exhibit of monitoring zooplankton after Hurricane (data published in Liu et al. 2021).

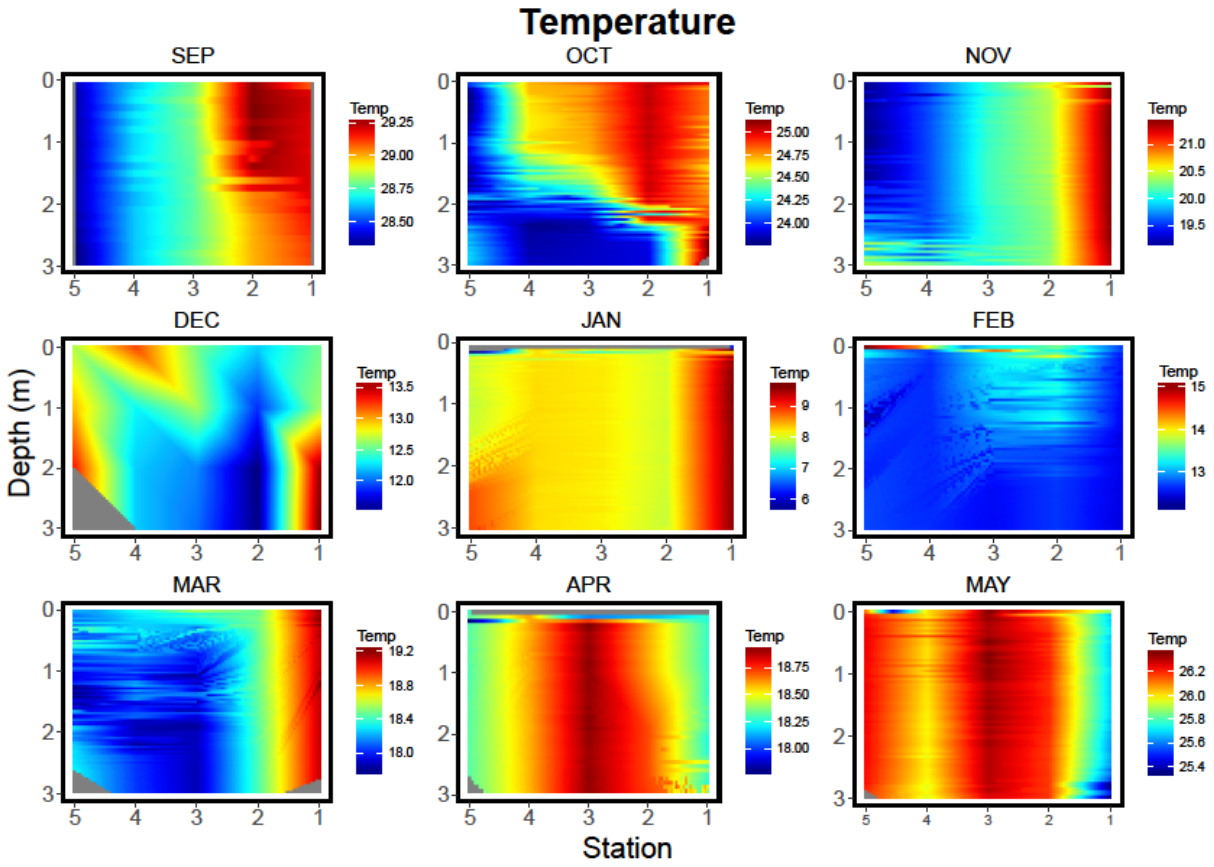


Figure 6 Exhibit of monitoring water temperature in Galveston Bay after Hurricane Harvey.

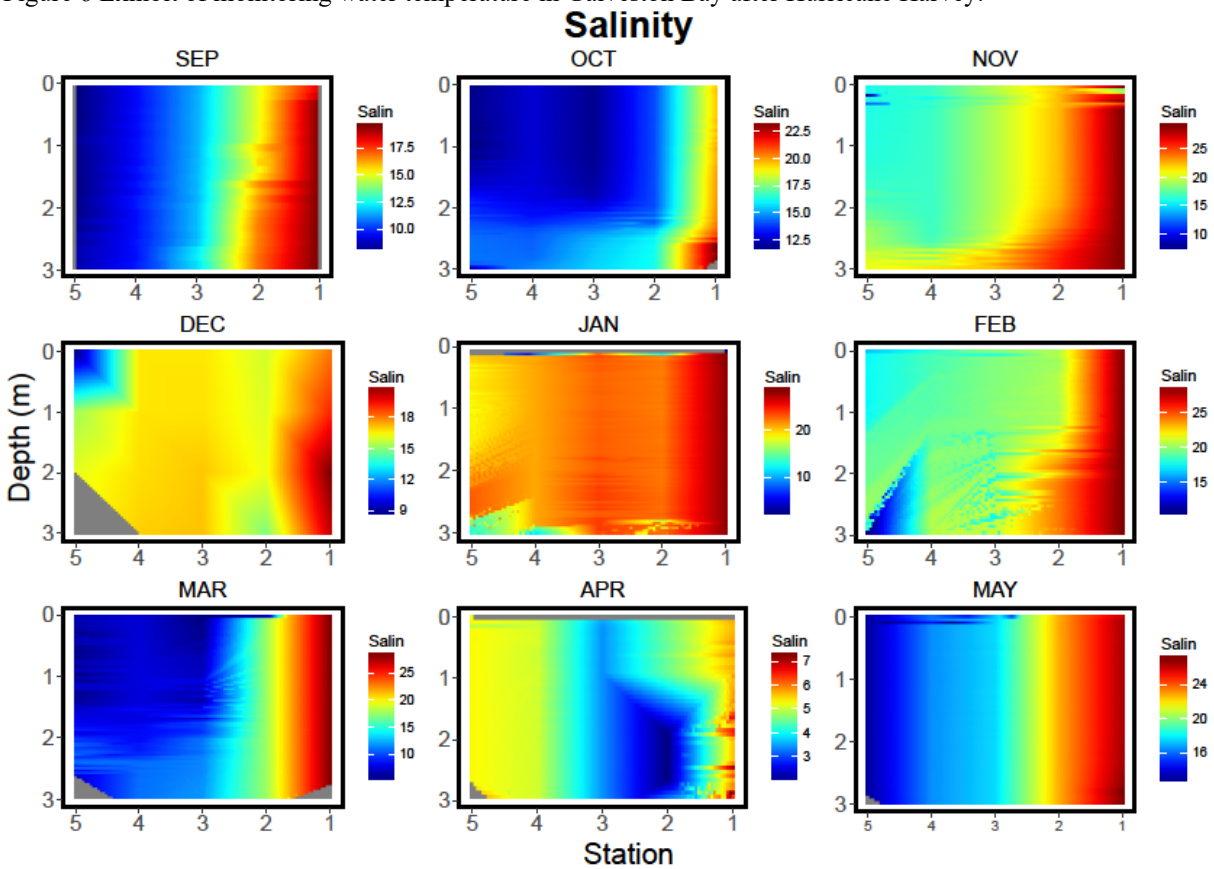


Figure 7 Exhibit of monitoring salinity in Galveston Bay after Hurricane Harvey.

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	$122,344
b.	Fringe Benefits	$27,435
c.	Travel	$6,000
d.	Supplies	$9,000
e.	Equipment	$0
f.	Contractual	$265,181
g.	Construction	$0
h.	Other*	$150,528
i.	Total Direct Costs (Sum a - h)	$580,488
j.	Indirect Costs	$165,350
k.	Total (Sum of i & j)	$745,838

***Other**: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:

-*Conference Registration Fee ($1,500 total):* $500 per year is requested for conference (TBD) registration fees for Dr. Liu to disseminate research results.

-*Graduate Student Tuition ($30,528 total):* Tuition for one graduate student is budgeted at $489 per credit for 24 credits per year in Years 1&2, and 12 credit hours in Year 3 with a 5% escalation annually.

-*PlanktonScope Rental Fees ($30,000 total):* We will rent the imaging system PlanktonScope from the University of Maryland. The rental cost is budgeted $500/cruise for 12 cruises per year plus 4 times per year of shipping between Houston, TX and Baltimore, MD budgeted as $1,000/time. The rental and shipping cost is $10,000 per year and the total cost is $30,000 over 3 years.

-*Professional Services ($15,000 total):* $5,000 per year is budgeted for professional service on sampling gear and technical consultant and software for processing of imaging files. The total is $15,000 for 3 years.

-*Maintenance Fee ($6,000 total):* $2,000 /per year for 4 years is required for annual maintenance of the high-tech sampling equipment, and the total is $6,000 for 3 years.

-*Ship time ($67,500 total):* Ship time is budgeted for sample collections. We request support for 12 daily cruises (up to 10 hours per trip) per year in Years 1&2, 6 cruises in Year 3. The current rate for the TAMUG R/V Trident is $225/hour. $27,000 is budgeted for 12 cruises per year in Years 1&2, $13,500 in Year 3. The total cost for ship time is $67,500 during the 3-year project.

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is **52.5% in year 1 and 54% in years 2 & 3** of (check one):

☐ **salary and fringe benefits**
☒ **modified total direct costs**
☐ **other direct costs base**
If other direct cost base, identify:

This rate is less than or equal to (check one):
☒ **Predetermined Rate—an audited rate that is not subject to adjustment.**

☐ **Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.**

☐ **Default rate—**a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

Indirect Costs Rate Agreement is attached as an appendix.
Cognizant Federal Agency: Department of Health and Human Services; Denise Shirlee; 214-767-3261

Extended Budget Justification

Implementing a high-frequency framework for monitoring and assessment of ecosystem status subjected to climate related natural disasters in Galveston Bay

Project Period: 9/1/2024-5/31/2027
Investigator: Hui Liu
Texas A&M University Galveston, Marine Biology Department, Galveston, TX 77553
Contact: liuh@tamug.edu, 409-740-4716(phone), 409-740-5001(fax)

TAMUG Budget Justification:

Personnel

One month of salary per year over three years is budgeted for Dr. Liu. He will be responsible for overseeing and carrying out this project. Base monthly rate of pay=$9,539.02 with the following escalations applied at the beginning of each project year: 5% (year 1), 3% (year 2), 3% (year 3).

Dr. Liu requests 12 months at 50% effort (6 months FTE) of support per year for Years 1&2, and 6 months at 50% effort (3 months FTE) in Year 3 for one graduate student (TBD), who will participate in sampling cruises, sample sorting, imaging process and statistical analysis and draft project reports during the project. Base monthly rate of pay=$4,500/month FTE, with a 3% escalation applied in Year 2 and Year 3. Justification of tuition is listed under other costs.

Support for an hourly undergraduate research assistant is budgeted. The undergraduate student will assist Dr. Liu and his graduate student in completing the project. The undergraduate students will be the driving workforce behind field sampling and sample processing. The cost is budgeted starting at a rate of $12/hour for 20 hours per week over 30 weeks per year over 3 years, with a 3% escalation applied in Year 2 and Year 3.

Fringe Benefits

Fringe benefits for faculty: 19.7% of salary requested + $1,033/month for group medical insurance. Fringe benefits for graduate students: 10.7% of salary requested + $564/month FTE for group medical insurance. Fringe benefits for undergraduate students: 10.7% of wages requested.

Travel

Travel is budgeted at $2,000/trip once a year for Dr. Liu to participate in conferences (Locations TBD) to disseminate research results.

Materials & Supplies

We request support for supplies for sampling at sea budgeted at $3,000 per year for 3 years.

Other Cost

Conference Registration Fee ($1,500 total): $500 per year is requested for conference (TBD) registration fees for Dr. Liu to disseminate research results.

Graduate Student Tuition ($30,528 total): Tuition for one graduate student is budgeted at $489 per credit for 24 credits per year in Years 1&2, and 12 credit hours in Year 3 with a 5% escalation annually.

PlanktonScope Rental Fees ($30,000 total): We will rent the imaging system *PlanktonScope* from the University of Maryland. The rental cost is budgeted $500/cruise for 12 cruises per year plus 4 times per year of shipping between Houston, TX and Baltimore, MD budgeted as $1,000/time. The rental and shipping cost is $10,000 per year and the total cost is $30,000 over 3 years.

Professional Services ($15,000 total): $5,000 per year is budgeted for professional service on sampling gear and technical consultant and software for processing of imaging files. The total is $15,000 for 3 years.

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Ship time ($67,500 total): Ship time is budgeted for sample collections. We request support for 12 daily cruises (up to 10 hours per trip) per year in Years 1&2, 6 cruises in Year 3. The current rate for the TAMUG *R/V* Trident is $225/hour. $27,000 is budgeted for 12 cruises per year in Years 1&2, $13,500 in Year 3. The total cost for ship time is $67,500 during the 3-year project.

Subaward to TAMU-CC

$265,181 is budgeted for a subaward to Dr. Xinping Hu at TAMU-CC. Dr. Hu's group will conduct monthly cruises on board R/V Trident with Dr. Hui Liu's group in Galveston Bay. Hu's work includes water measurements (salinity, temperature, pH, carbon dioxide partial pressure, carbonate saturation states dissolved oxygen) using both discrete water collection and continuous underway data collection.

Hu will collaborate with Liu on furnishing the Quality Assurance Project Plan (QAPP). After each field trip, discrete water samples will be analyzed at Hu's TAMU-CC lab for total titration alkalinity, total dissolved inorganic carbon, and pH. A graduate student (6 months per year) and a mid-level technician will conduct these analyses and data reporting. Hu will join Liu on data interpretation, modeling, and writing manuscript for publication.

Indirect Charges

Indirect costs are requested at the rate of 52.5% in Year 1 and 54% in Years 2&3 of Modified Total Direct Costs (MTDC) including the cost of ship time.

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

A PROGRAM OF TCEQ

SECTION ONE: GENERAL INFORMATION

Project Name:

Water Quality, nutrient, and nekton community dynamics associated with managed freshwater deliveries to East Bay, Texas.

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

Texas Water Trade (TWT)

☐ Federal, State, or Local Government ☐ Council of Government ☐ Public University
☒ Nonprofit ☐ Other

Contact Information:

Project Representative Name	Kevin De Santiago
Project Representative Phone	361-695-0418
Project Representative Email	Desantiago@texaswatertrade.org

Partners and Their Roles:

Dr. Daniel Coffey from Texas A&M University-Corpus Christi will characterize seasonal nekton communities and contribute to the final analysis and report.

Amount Requested (minimum budgeted cost of $150,000):

$421,446.56

Is the project scalable? ☐

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$231,800.80
FY 2026 (09/01/2025-08/31/2026)	$88,092.74
FY 2027 (09/01/2026-08/31/2027)	$101,660.8*
Total	$421,446.56

*Extended to 08/31/2027 to include final summer monitoring.

Total Project Cost:

$631,446.56

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

TWT is leveraging the costs of annual freshwater purchases totaling $70,000 ($210,000 over the life of the proposal) of secured funds from corporate and private donors.

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

Three-year study duration beginning Fall 2024–Summer 2027 with final report submitted in Spring 2028.

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☐	NPS-3 ☒	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☐	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☒	HC-3 ☒
SC-1 ☐	SC-2 ☐	
FWI-1 ☐	FWI-2 ☒	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☐	SPO-2 ☐	SPO-3 ☐	SPO-4 ☐
PEA-1 ☐	PEA-2 ☐	PEA-3 ☐	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☒	RES-2 ☐	RES-3 ☒	RES-4 ☐
RES-5 ☐	RES-6 ☐	RES-7 ☐	RES-8 ☐
ACS-1 ☐	ACS-2 ☐	ACS-3 ☐	

Priority Area Actions Detail:

[Please explain in detail how project addresses priorities selected. Attachments may be submitted via email in conjunction with this application.]

NPS-3: The findings of this study could establish managed freshwater deliveries as an effective tool in managing nonpoint source pollution in tidal streams situated in rural watersheds that are impaired and fragmented by development (agricultural dams, roadways, dredged waterways, etc.).

HC-2/HC-3: Although this study focuses on enhancing tidal bayou function, there are two other components to these water deliveries including: 1) the delivery and retention of raw water in freshwater impoundments from late summer to the following spring to create freshwater wetland habitat for waterfowl and migratory birds, and 2) the subsequent arrival of this water in the upper estuary where flood events enhance estuarine habitat function. During exceptional drought conditions, the water delivery approach may be restorative in nature as these systems intrinsically rely on freshwater inflow as the delivered water may be the only freshwater received during that time.

FWI-2: The findings of this study will contribute to freshwater inflow management research aimed at benefiting multiple ecosystems in Galveston Bay (created freshwater wetlands, tidal bayous, upper estuary).

RES-1/RES-3: The study will focus on physical and biological stressors to better understand their impact on tidal bayou ecosystem function in Galveston Bay and their associated biological communities.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☒ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☐ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☐ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☒ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☐ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☐ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☐ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☒ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

The water delivery approach engages landowners and NGO partners of various backgrounds (agricultural, wildlife, fisheries, and sustainability) that have a shared interest in land management practices that benefit the region. The proposed study will quantify the water quality response to this approach in tidal bayous and evaluate its impact on restoring or enhancing its value for ecologically and economically important species. Moreover, although the study would focus on tidal stream function response, there are two other components to the water delivery approach including: 1) the delivery and retention of raw water in freshwater impoundments from late summer to the following spring to create freshwater wetland habitat for waterfowl and migratory birds, and 2) the subsequent arrival of this water in the upper estuary where freshwater inflows sustain estuarine wetlands.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?
☒ Reduction in nutrient pollution
☐ Water reuse and conservation
☐ Marine litter reduction
☐ Green infrastructure and resiliency

The findings of this study will provide: 1) development of a comprehensive, watershed-scale tool that engages landowners in the watershed to meet nutrient reduction goals in tidal streams, 2) a spatial and temporal context for this tool, and 3) a biological response component that involves species of ecological and economical value.

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application?	Yes ☐	No ☒
If yes, will you comply with the law or submit a waiver?	Yes ☐	No ☐

Comments (if any):

[If yes, please summarize how the proposal complies with BABA, as applicable.]

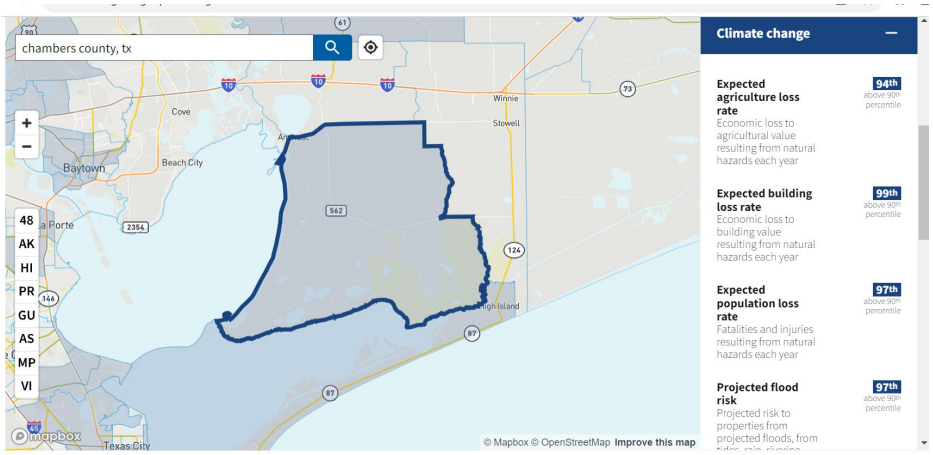
Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo

Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

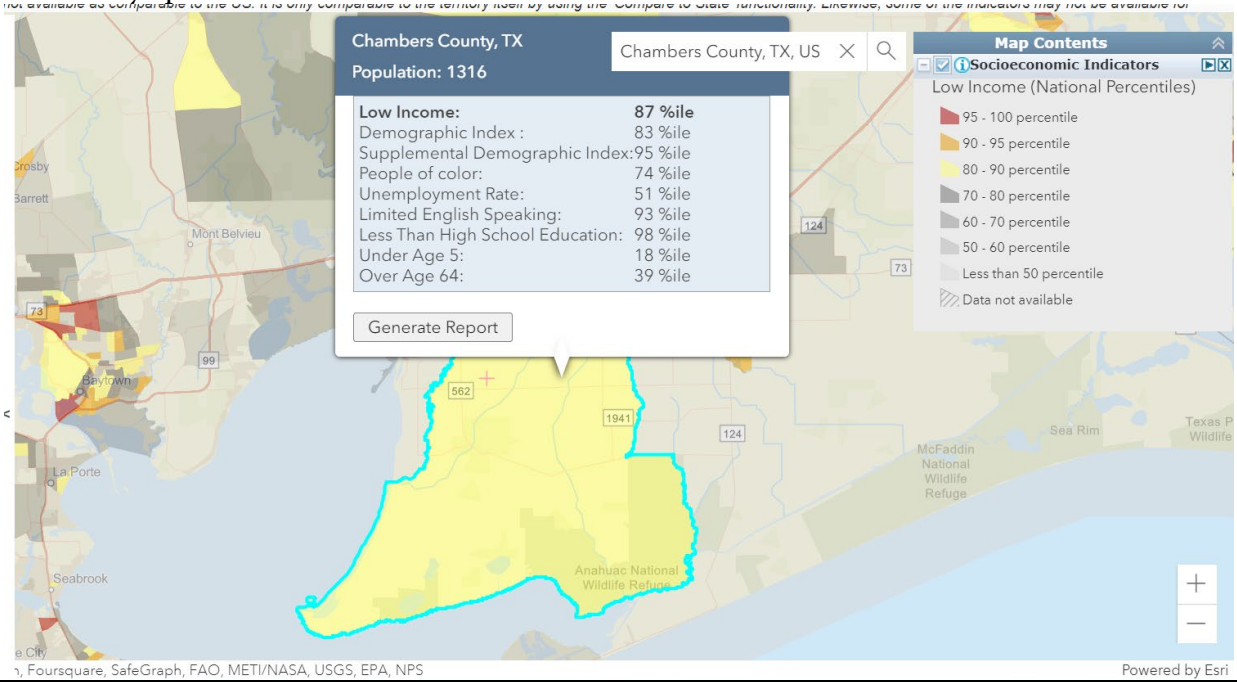
Yes ☒ No ☐



As evidenced by the Climate and Economic Justice Screening Tool, provided on the White House website, our proposed project addresses the Justice 40 Initiative. In the mapping tool, our project delivery area within Chambers County is identified as disadvantaged regarding the climate change category.

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

As evidenced by the EJScreen Tool, the project addresses geographies above the 80th percentile in several categories such as: Low Income, Limited English Speaking, and Less Than High School Education.
As outlined in the proposal, this project focuses on monitoring managed freshwater deliveries in the geography, however, there is reason to believe that this project will increase quality of habitat in the area, which may spur economic benefits that accrue to the residents.



SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?

☐ Yes

☒ No

[TBD.]

Does the Project work with new, smaller communities/partnerships?

☐ Yes

☒ No

[TBD.]

SECTION SIX: PROPOSAL DETAILS

Project Summary:

The proposed study aims to understanding the nekton, nutrient, and water quality dynamics in tidal bayous in response to freshwater deliveries to help inform best management practices (BMPs) for delivering water to the coastal systems. In conjunction with other ongoing monitoring efforts, the findings will underscore the importance of watershed-scale restoration approaches in restoring or enhancing freshwater and estuarine ecosystem function on the Texas Coast.

Full Project Description (1,000 words or less):

Tidal bayous are unique estuarine systems where freshwater lends to tidal influence giving rise to a dynamic, low salinity, productive, and diverse environment. However, eutrophication and diminished freshwater inflows due to factors such as watershed fragmentation, upstream freshwater utilization, and drought conditions minimize tidal bayou ecosystem function by degrading water quality and impacting salinity regimes.

Estuarine function is enhanced by freshwater inflows which deliver sediment, nutrients, and organic matter spurring primary production and nourishing wetlands, however, excess nutrients contribute to algal blooms that deplete dissolved oxygen in the water column via respiration and decomposition. Tidal bayous are at particular risk to such degradation due to their low flushing rates and increased human development within their watershed (Quigg et al., 2009). In sufficient quantities, freshwater inflows are capable of flushing phytoplankton biomass to other regions of the estuary (Roelke et al. 2013), potentially alleviating local water quality degradation resulting from eutrophication. However, freshwater inflow into estuarine habitats hinges on upstream returns and overland flow making these watersheds particularly vulnerable to heavy upstream water usage (reservoirs, cities, industry, and agriculture), droughts, and development.

The East Bay Watershed is largely rural distinguishing it from the western urbanized watersheds in the greater Galveston Bay Watershed. Nonetheless, development in this region (e.g., agricultural dams, roadways, waterway dredging) has contributed to significant loss of freshwater and estuarine wetland habitats via direct replacement and by hindering watershed connectivity and increasing their vulnerability to saltwater intrusion and erosion.

Funding from private and corporate donors to purchase water from the Chambers-Liberty Counties Navigation District (CLCND), and TWT's securement of a long-term contract with CLCND to deliver water has provided the opportunity for a multiyear study on the effect of water deliveries on estuarine systems including tidal bayous in East Bay.

TWT water deliveries involve a watershed-scale approach that harnesses freshwater's ability to uplift ecosystems along the coast through: 1) the delivery and retention of raw river water in freshwater impoundments from late summer to the following spring to create freshwater wetland habitat for waterfowl and migratory birds, 2) the springtime release of impounded water into the adjacent tidal bayous to enhance instream flows, and 3) the subsequent arrival of this water in the upper estuary where freshwater inflows are critical to estuarine function.

To study the value of the above approach in attenuating nutrient and water quality degradation in tidal bayous, the proposed three-year study will collect continuous water quality monitoring (conductivity,

temperature, pH, dissolved oxygen, chlorophyll-a) using deployed water quality instruments for two months prior to and after the release of water (anticipated late spring) into the bayous and concurrent monthly nutrient sampling at five strategic locations in Oyster Bayou and Onion Bayou (please see map). Water releases are timed to be congruent with private and public land management goals. Therefore, nekton will be sampled seasonally at these five sites to inform how water releases could target these communities at other times of the year.

We hypothesize that 1) the storage of water in upstream impoundments is expected to attenuate nutrient content of water prior to its release into Onion and Oyster Bayous, 2) the release of this water into the two bayous will improve water quality by diluting or flushing nutrients and phytoplankton biomass out of these systems. We expect seasonality and year-to-year variability to play a role on nekton communities, thereby allowing us to incorporate those findings into our adaptive management of water releases.

Understanding the nekton, nutrient, and water quality dynamics in tidal bayous in response to freshwater deliveries will help inform best management practices (BMPs) for delivering water to the coastal systems by: 1) identifying opportune seasons for water releases which may vary depending on seasonal climatic conditions (wet, dry, and normal conditions), 2) characterizing the spatial and temporal extent of study variables' response to freshwater deliveries, 3) quantifying the effect of impounding water on nutrient concentrations prior to releasing to tidal stream. The further development of these BMPs and water management and nutrient-reduction tools would be applicable to other historically rice-producing regions with similar land use (freshwater impoundments) near the Texas coast. In conjunction to separate monitoring efforts in East Bay (e.g., avian habitat utilization of freshwater impoundments), this study will underscore the importance of watershed-scale restoration approaches in restoring or enhancing freshwater and estuarine ecosystem function on the Texas Coast.

Latitude/Longitude (Optional):

Study sites may be slightly modified upon field reconnaissance.

Site	Latitude (DD)	Longitude (DD)
TCEQ Station 22033	29.64877	-94.52665
Onion Bayou West	29.586841	-94.482908
Jackson Ditch	29.589594	-94.433884
Onion Bayou	29.604742	-94.457645
Oyster Bayou Mouth	29.558817	-94.474453

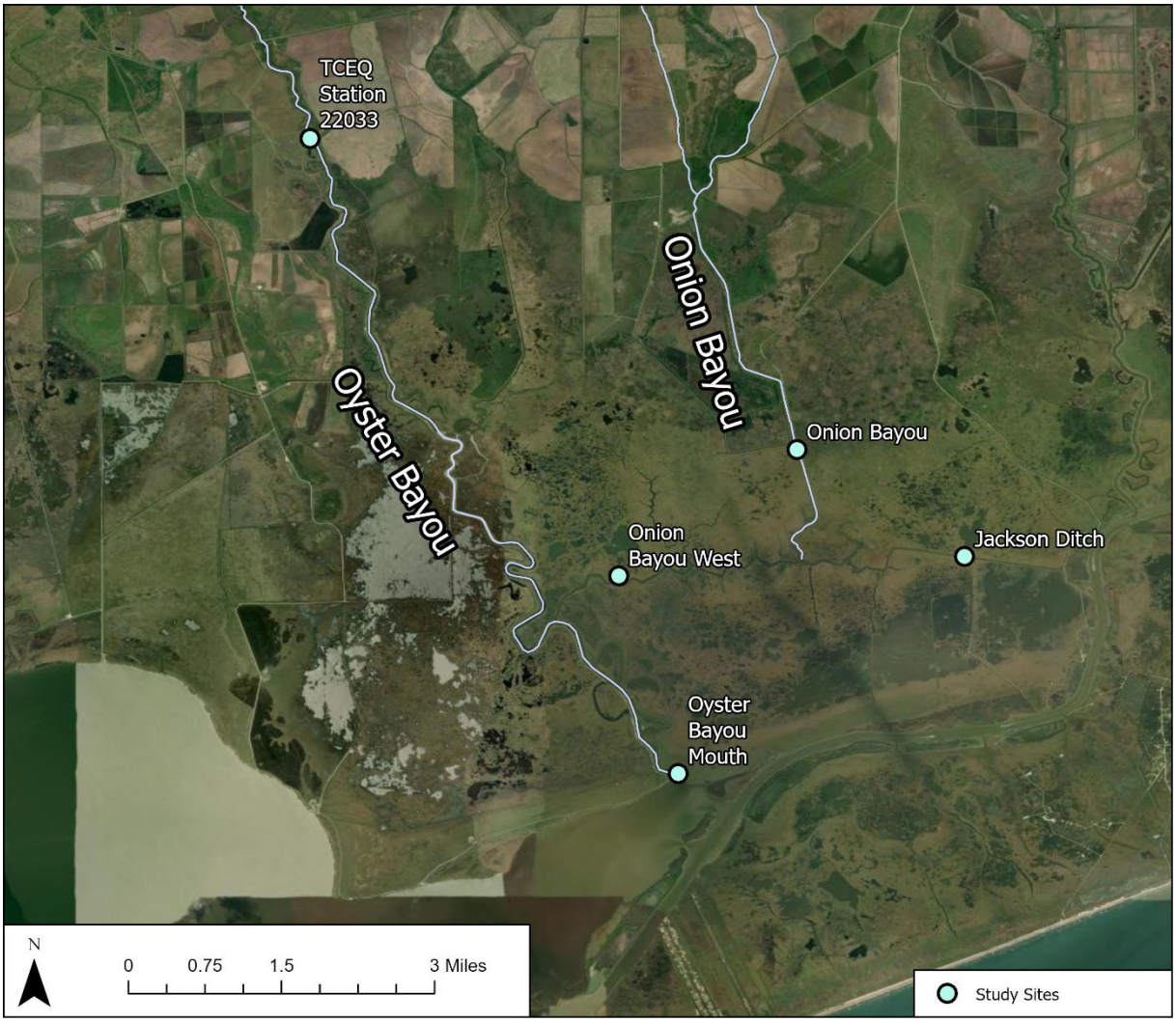
Location:

The study area will encompass the tidal segments of Oyster and Onion Bayou in the East Bay Watershed. Jackson Ditch is included as it is connected to Onion Bayou.

Other Plans Implemented:

Texas Coastal Master Plan, TCEQ, TWDB

Projects Map



Supplemental Photos/Graphics (Optional):

[Insert Here or Attach as an Appendix]

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	21,050.28
b.	Fringe Benefits	3,898.54
c.	Travel	13,293.75
d.	Supplies	129,748.39
e.	Equipment	
f.	Contractual	231,869.00
g.	Construction	
h.	Other*	
i.	Total Direct Costs (Sum a - h)	
j.	Indirect Costs	21,586.60
k.	Total (Sum of i & j)	421,446.56

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents:

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 10% of (check one):

☐ salary and fringe benefits
☒ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

This rate is less than or equal to (check one):
☐ Predetermined Rate—an audited rate that is not subject to adjustment.
☐ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☒ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable]

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

Galveston Bay Estuary Program Federal Bipartisan Infrastructure Law (BIL) Project Proposal – FFY 2024

Please complete the proposal form and submit to gbep@tceq.texas.gov by August 25, 2023. No late submittals will be considered for funding.

A PROGRAM OF TCEQ

SECTION ONE: GENERAL INFORMATION

Project Name:

Monitoring of Vibrio and Dermo in oysters in support of Natural Resource and Public Health Adaptive Management

Project Previously Funded by GBEP? Yes ☐ No ☒

Lead Implementer:

George Guillen – Environmental Institute of Houston

☐ Federal, State, or Local Government ☐ Council of Government ☒ Public University
☐ Nonprofit ☐ Other

Contact Information:

Project Representative Name	George Guillen
Project Representative Phone	281-283-3950
Project Representative Email	guillen@uhcl.edu

Partners and Their Roles:

Principal Investigator: George Guillen, Ph.D. – Guillen@uhcl.edu; Environmental Institute of Houston. Dr. Guillen is responsible for the management of the overall project and the Oyster sentinel reporting.

Co-Principal Investigator: Jenny Oakley, Ph.D. – Oakley@uhcl.edu; Environmental Institute of Houston will be responsible for management of Dermo monitoring of recycled oyster shell collected by GBF.

Co-Principal Investigator: Michael LaMontagne, Ph.D. - College of Science and Engineering. - Dr. LaMontagne and his students will utilize genetic methods to detect the presence of human pathogens (Vibrio species complex) on a subsample of oysters collected for Dermo examination.

Project Collaborator: Christine Jensen -christine.jensen@tpwd.texas.gov; TPWD Galveston Bay Ecosystem Leader – Dickinson Lab. Ms. Jensen will be assisting the project by providing staff and gear to collect oysters for use in Dermo monitoring while conducting during scheduled oyster surveys using TPWD standard randomized methodology. TPWD will share field data with the project team. He has also been invited to serve as co-author or project review team and on the thesis advisory committee of graduate students.

Project Collaborator: Joel Anderson- joel.anderson@tpwd.texas.gov; TPWD Facility Manager: Perry R. Bass Marine Fisheries Research Center; Palacios. Mr. Anderson and some of this staff will assist with validation of Dermo readings by using qPCR methods. Comparison of the methods will be conducted.as on of the goals of the project. He has also been invited to serve as co-author or on the project review team and on the thesis advisory committee of graduate students.

Project Collaborator: Ms. Lisa Halili, owner of Prestige Oysters, a commercial oysterman. She has agreed to provide opportunistic harvested oysters collected from public reefs and leases by their vessels. This may also provide access to oysters from a restoration reef "Retts Reef".

Shannon Batte, sbatte@galvbay.org, Galveston Bay Foundation (GBF), Habitat Restoration Coordinator – will provide recycled shell to assess risks of using shell for reef restoration work and develop recommended protocol.

Sally Clark, sclark@galvbay.org, GBF, Restoration Manager – GBF staff participating in shell recycling project

Haille Leija, hleija@galvbay.org, GBF, Director of Program Operations – management of overall GBF projects.

Amount Requested (minimum budgeted cost of $150,000):

$626,241

Is the project scalable? ☒

Amount Requested per year (if applicable):

FY 2025 (09/01/2024-08/31/2025)	$199,017
FY 2026 (09/01/2025-08/31/2026)	$171,568
FY 2027 (09/01/2026-05/31/2027)	$174,104
Total	$544,689

Total Project Cost:

$626,241

Is this an estimate? ☒

Leveraging (in-kind and/or cash):

Partial salary and fringe for the PI (Guillen) and Co-PI (Oakley) will not be requested in the enclosed proposal. The majority of their time spent on the project will be funded by the lead implementer institution (UHCL).

Additionally, the GBF's Oyster Shell Recycling Program (OSRP) has external funding that supports the collection of recycled shell and the sun-curing location where the proposed experiment will take place. The OSRP has secured funding through the following programs: Texas General Land Office - Costal Management Program ($80,000 NOAA funds), Restore America's Estuaries ($665,000 NOAA funds), and an estimated $90,000 in pending/tentative funds through private and corporate donations and fundraising through the Houston Oyster & SeaFest which is managed by the GBF to support these efforts.

TPWD will be providing their time (at least 2 employees per sampling trip, and use of their sampling vessel to dredge oysters).

The total value of the leveraged funds directly applicable to the proposed study is estimated at >$200,000.

Project Duration (beginning no earlier than September 1, 2024 - four-year maximum project length):

3 years (September 1, 2024 to August 31, 2027

SECTION TWO: *GALVESTON BAY PLAN, 2ND EDITION* IMPLEMENTATION

Galveston Bay Plan, 2nd Edition References
https://gbep.texas.gov/ensure-safe-human-and-aquatic-life-use/
https://gbep.texas.gov/protect-and-sustain-living-resources/
https://gbep.texas.gov/engage-communities/
https://gbep.texas.gov/inform-science-based-decision-making/

Galveston Bay Plan Priority Area Actions Addressed:

Plan Priority 1: Ensure Safe Human and Aquatic Life Use

NPS-1 ☐	NPS-2 ☐	NPS-3 ☐	NPS-4 ☐	
PS-1 ☐	PS-2 ☐	PS-3 ☐		
PHA-1 ☒	PHA-2 ☐	PHA-3 ☐	PHA-4 ☐	PHA-5 ☐

Plan Priority 2: Protect and Sustain Living Resources

HC-1 ☐	HC-2 ☐	HC-3 ☐
SC-1 ☒	SC-2 ☐	
FWI-1 ☒	FWI-2 ☒	FWI-3 ☐

Plan Priority 3: Engage Communities

SPO-1 ☐	SPO-2 ☒	SPO-3 ☐	SPO-4 ☒
PEA-1 ☐	PEA-2 ☒	PEA-3 ☒	

Plan Priority 4: Inform Science-based Decision Making

RES-1 ☒	RES-2 ☐	RES-3 ☒	RES-4 ☐
RES-5 ☒	RES-6 ☒	RES-7 ☐	RES-8 ☐
ACS-1 ☒	ACS-2 ☒	ACS-3 ☐	

Priority Area Actions Detail:

PHA-1 This project will provide critical data on the presence and potential risks of pathogenic *Vibrio* including *V. parahaemolyticus, V. vulnificus,* and *V. cholerae* in oysters that can aid health management agencies (e.g. Texas Department of State Health Service - TDSHS). Findings will be provided to TDSHS for consideration.

FWI-1. The monitoring of *Perkinsus marinus* can be used to validate adopted TCEQ Environmental Flows for Galveston Bay. We will provide and summarize pertinent antecedent flow conditions and water quality to evaluate inflow regimes and resulting infection levels.

FWI-2. The monitoring and examination of factors influencing the frequency and intensity of *Perkinsus marinus* in oysters directly relates to freshwater inflow research and management.

SPO-2 and PEA-2 We will host and/or present our research findings at a workshop/meeting at UHCL to gain input from invited TDSHS and GBEP staff, GBEP subcommittee members, TPWD, and oyster fishermen at the beginning of the project to explain goals, methods and data availability and access. In year 2 and 3, we will host or participate in a public workshop to present preliminary findings to the same audience and general public which will also be widely advertised. We will work with GBEP to secure the appropriate venue. During the study if high levels of Vibrio are detected we will immediately notify the TDSHS using mutually agreed criteria.

PEA-3. Background information and data generated by this project will be also used to generate classroom material for K-12 programs on oyster ecology, PFAS, Vibrio and Dermo, offered through GBF and EIH environmental education programs, and provided to teachers, and will be made available online through EIH and/or GBF.

SC-1 Information on Dermo levels will be provided to TPWD for ongoing oyster monitoring and management applications. In addition, data will be input into the Oyster Sentinel web site for use by GBEP status and trends, oyster fishermen, and the general public.

RES-1 We will be directly monitoring *P. marinus* a known biological stressor of oysters to determine status and trends and better refine the relationships of *P. marinus* and physical drivers.

RES-3 We will be monitoring physical stressors (freshwater inflow and salinity) and their effect on *P. marinus* levels in oysters and oyster condition.

RES-5 We will be monitoring human pathogenic Vibrio strains in oysters. Data will be provided to the TDSHS to address limits to seafood consumption.

RES-6. The proposed project will evaluate the effectiveness of best management practices (BMP) and make, and disseminate recommendations for updates to practices related to sun-curing oyster shells to be used in restoration efforts that reduce the biological stressor (Dermo) in native oyster reefs.

This project will increase access and add critical missing data to Galveston Bay Ecosystem Information (ACS). The results of the proposed work will be disseminated according to the timeframe and outputs by activity for the following actions:

ACS-1 Dermo infection rates in oysters, which have been identified as an ecosystem health indicator during the SB3 process, will be conducted during this study.

ACS-2 Data on *P. marinus* will be submitted to GBEP and archived at UHCL and the Oyster Sentinel database for access by other researchers at GBEP Status and Trends online database.

ACS-3 (Track Galveston Bay Plan Implementation) will be specifically noted in final project reports.

SECTION THREE: BIL PRIORITIES

Action Priorities
Proposals must address one or more of the following actions:

☒ Projects that support commercial and recreational finfish and shellfish monitoring for public health risks and or sustainability.

☐ Projects in support of management measures and watershed-based plans, such as
- Green infrastructure
- Watershed health; and
- Water reuse and conservation

☒ Habitat protection and enhancement

☐ Support for existing projects, such as:
- Follow up or expansion of habitat and water quality projects; and
- Continued maintenance or repair of habitat and water quality projects.

☐ Project assessments, such as:

- Habitat and water quality mapping gaps; and
- Pre and/or post – construction monitoring including habitat and species assessment/use/benefit, events, and general function.

Support Priorities
Proposals must address at least one supporting action developed by the subcommittees, but preference will be given to projects that are able to incorporate multiple supporting actions.

☐ Collaborating with underrepresented and/or under-resourced communities via having physical presence or connection to the targeted communities.

☒ Engages K-12 students and/or adults in hands-on, place-based environmental education.

☐ Diversifying strategic partners with environmental and non-environmental community organizations working within targeted communities.

☒ Monitoring and Research that:

- captures a meaningful, quantifiable measure of a response action taken;
- produces data applicable and transferable to multiple programs; or
- produce meaningful data that can be used for future implementation and management decisions.

Stakeholder Priority Detail:

[Please explain in detail how project addresses priorities selected. Attachments may be submitted via email in conjunction with this application.]

Data from the project will be presented to GBEP, TPWD, TCEQ and TDSHS at working group, public meetings, and regional conferences including the TCAFS, GERS, State of the Bay, and to organizations including GBF and Bayou Preservation Society upon request and at the previously described annual group meetings and workshops. Monitoring data will be classified by reef area, antecedent rainfall and freshwater inflow, presented in light of existing flow regimes, TDSHS harvest area classification, TCEQ waterbody segment, salinity, dissolved oxygen, and observed Dermo, Vibrio, and PFAS levels. A public non-technical report and fact sheet will be produced annually for distribution to the public at public meetings and for distribution through the EIH web site.

SECTION FOUR: BIL CONSIDERATIONS

Does the Project align with any EPA Areas of Special Interest?

☐ Reduction in nutrient pollution
☐ Water reuse and conservation
☐ Marine litter reduction
☐ Green infrastructure and resiliency

[If yes, please summarize how the proposal addresses EPA Areas of Special Interest.]

Build America, Buy America Act (BABA)
Build America, Buy America provisions only apply to awards over $250,000, and where more than 5% of the award is spent on iron, steel, manufactured products, and construction materials permanently incorporated into construction, maintenance, or repair projects. Under the law, construction materials exclude cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Will the Build America, Buy America Law apply to this application? Yes x No ☐
If yes, will you comply with the law or submit a waiver? Yes ☒ No ☐
Comments (if any):

The State of Texas and public universities are restricted from buying many products produced oversees and are encouraged to support domestic industries and only vendors approved by the state. All cooperators and subcontractors are local and found within Texas. We will only be buying products manufactured in the United States.

Infrastructure Investment and Jobs Act (IIJA) Signage
The recipient will ensure that a sign is placed at construction sites supported under this award displaying EPA logo and the official Building a Better America emblem and must identify the project as a "project funded by President Biden's Bipartisan Infrastructure Law." Construction is defined at 40 CFR 33.103 as "erection, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other improvements to real property, and activities in response to a release or a threat of a release of a hazardous substance into the environment, or activities to prevent the introduction of a hazardous substance into a water supply." The sign must be placed at construction sites in an easily visible location that can be directly linked to the work taking place and must be maintained in good condition throughout the construction period.

Does the proposal implement construction subject to signage requirements?
Building A Better America Brand Guide – Using the EPA Seal and Logo
Yes ☐ No ☒

Does the Project Address the Justice 40 Initiative?
NEP's have a target of ensuring that at least 40% of the benefits of investments from the five years of BIL funding flow to disadvantaged communities.
Climate and Economic Justice Screening Tool (CEJST)

Yes ☐ No ☒

Area examined – Galveston Bay, Seabrook, San Leon, coastal shoreline census tracts.

Since this project consists of primarily research and monitoring that benefits oysters and the oyster fishery directly or indirectly it provides benefits to the entire bay system including disadvantaged communities. Members of these communities purchase Galveston Bay seafood at local markets. Information on Vibrio and contaminants collected during this project will benefit them by providing TDSHS with current and timely data on these variables for issuance of advisories. Advisories can be posted at local markets at fishing access points and locally by TDSHS or by local health departments.

A significant concentration of local seafood markets that sell live oysters are found in Seabrook, Kemah, San Leon, and near Galveston Bay. Based on the use of the CEJST tool we examined these areas to determine if a large proportion of disadvantaged citizens were found in these areas (CEQ 2023). After visually examining the CEJST maps, we conservatively estimate the most (>70%) of coastal census tracts bordering Galveston Bay are classified as disadvantaged (CEQ 2023). So therefore better monitoring and information dissemination will benefit these target groups.

The PI works for UHCL. Approximately 42% of our student population identifies as Hispanic, officially making UHCL a Hispanic Serving Institution in Texas, with additional federal support for Hispanic students. Since we will be hiring graduate RA's for this project it will be highly likely that Hispanic students will be hired.

Does the Project Address geographies above the 80th percentile as identified in the EJScreen Supplemental Demographic Index?
Yes ☒ No ☐

[If yes, please identify geographies and summarize how the proposal addresses the selected demographics (% Low income, % Linguistically isolated, % Less than high school education, % Unemployed, % Low life expectancy.] As a quick screen of the potential amount of Environmental Justice we used EJScreen to examine potential environmental justice issues within shoreline congressional districts. The area considered was shoreline areas bordering Galveston Bay in areas containing oyster reefs or concentrated local seafood markets. Examination of this area indicated that approximately >75% of the shoreline congressional districts surrounding legal harvesting oyster producing areas and local seafood markets exhibited composite EJ Indices >80% percentile (EPA 2023 EJScreen query https://ejscreen.epa.gov/ mapper/index.html? wherestr= Galveston+Bay).

SECTION FIVE: GBEP EQUITY STRATEGY CONSIDERATIONS

Does the Project provide services to any Title I schools?
☐ Yes
☒ No

[TBD.]

Does the Project work with new, smaller communities/partnerships?
☐ Yes
☒ No

[TBD.]

SECTION SIX: PROPOSAL DETAILS

Project Summary:

The project team proposes to establish and conduct

1) Establish and conduct a comprehensive oyster pathogen *Perkinsus marinus* monitoring program to characterize the temporal and spatial distribution of Dermo disease in relation to freshwater inflow, salinity, water quality and seasonality
2) Conduct tracking *Perkinsus marinus* (Dermo) Infection in Sun-Cured Oysters: Informing Oyster Shell Recycling Programs in Galveston Bay
3) Identify and conduct monitoring of Vibrio species in harvested Oyster tissue prior to any processing to evaluate the distribution and possible sources of Vibrio in Galveston Bay.

Full Project Description (1,000 words or less):

[In 1,000 words or less, please provide a summary of the scope of your proposal.] 625
INTRODUCTION

The pathogenic protozoan, *Perkinsus marinus* or 'Dermo', is widely distributed throughout the oyster-producing waters of the Gulf of Mexico. Intensive Dermo infections have been associated with massive mortalities throughout the Gulf, especially during the summer, when high water temperatures and salinities cause stress (Pace et al 2020; VanderKooy 2012). Oyster pathogens have proven to be an excellent bioindicators (Trinity-San Jacinto BBEST 2009; Quigg and Steichen 2015). In order to continue to evaluate the influence of freshwater inflow, monitoring of freshwater inflow, salinity, temperature and Dermo should be conducted to evaluate implementation and effectiveness of SB3 rules and support adaptive management of environmental flow standards (TSJ BBASC & TSJ-BBEST 2012). The adoption of a monitoring program for Dermo in oysters is urgently needed. Data has not been collected since 2015 even though flow standards were adopted in 2012 (Silvy et al 2020; Oyster Sentinel 2023). Oysters are important to the ecological health of the estuary and human health since they can remove and concentrate red tide toxins, pollutants, and human pathogens. Humans who ingest these contaminated oysters are at higher risk of contracting serious illnesses, especially if consumed raw. Vibriosis is a gastrointestinal illness that can be life threatening and even fatal for people with liver disease, diabetes or a weakened immune system (Gula 2022). The 3 major tasks of the proposed study are listed below:

Task 1 - Tracking *Perkinsus marinus* (Dermo) Infection in Sun-Cured Oysters: to inform and develop best management practices for Oyster Shell Recycling Programs in Galveston Bay

Task 2 - Tracking *Perkinsus marinus* (Dermo) Infection in wild oysters to support adaptive fisheries management and state environmental flows.

Task 3 - Tracking Vibrio levels in wild oysters to inform adaptive public health management and examine the relationship of Vibrio and precipitation, freshwater inflow, season and classification of shellfish waters.

Task 1. Tracking *Perkinsus marinus* (Dermo) Infection in Sun-Cured Oysters

Sun-curing is used to minimize the prevalence of Dermo before reclaimed shells are returned to an estuary. There are currently no published, standardized curing procedures for restoration efforts to follow, however many groups sun-cure oyster shells for up to 6 months. The current best practices are based off of a study conducted by Bushek et al (2004) in South Carolina, which used oysters from a reef in Galveston Bay (Confederate Reef). The Galveston Bay Foundation (GBF), in partnership with the Environmental Institute of Houston at the University of Houston-Clear Lake (UHCL), and the University of Houston, secured funding through the Texas General Land Office Coastal Management Program to further explore the relationship of sun-curing and remaining Dermo. The proposal described herein will build on recently conducted work to demonstrate under more "typical" conditions of oysters that are encountered by recycling programs, without being shucked. We propose to conduct the study under more "typical" conditions of oysters that are included in recycling programs, without being shucked. The proposed study focuses on clear next steps to evaluate current recommendations and, if necessary, provide updated recommendations on sun-curing procedures for oyster recycling programs in Texas.

This project is a collaboration between the Environmental Institute of Houston (a research Institution), and the Galveston Bay Foundation (a non-profit, NGO) to conduct applied research and monitoring to directly inform oyster restoration efforts in Galveston Bay. The proposed work will address the following actions: RES-1 (Conduct Biological Stressor Monitoring and Research), and RES-6. This project will increase access to Galveston Bay Ecosystem Information (ACS)-The results of the proposed work will be d (Provide Access to Monitoring and Research Data – AC-2), and ACS-3 (Track Galveston Bay Plan Implementation

Task 2 - Tracking *Perkinsus marinus* (Dermo) Infection in wild oysters

Wild oyster collection will be conducted by EIH and TPWD using shallow draft boats, oyster dredges, and/or oyster tongs and/or by hand at a 5-10 targeted fixed index sites (1-2/tributary bay) to incorporate the influence of the natural salinity gradient and maximize detection of temporal trends (Figure 2). The 5-10 index sites will likely be established at sites historically monitored by previous investigators of Dermo (Oyster Sentinel 2023; Silvy et al. 2020). Sampling will be conducted at oyster reefs officially identified on

existing TPWD maps (Figure 2). This will result in a maximum total of 1,100 oysters (= 5 bays X 2 site/bay X 11 quarters X 10 oysters) collected by EIH.

Oysters collected from these sites will first be measured for various body mophometrics and condition indices will be generated using methods outlined in Pace et al. (2020) using RFTM (Ray 1966). Samples will be assigned an infection intensity value ranging from 0 to 5, with 0 indicating no infection and 5 indicating a heavy infection (Mackin 1962). Dermo prevalence will be calculated as the percentage of infected oysters. Weighted prevalence will be calculated as the multiple of Dermo prevalence and mean infection intensity (Powell & Kim 2015). The condition index will be calculated using three methods (Pace et al 2020).

Each sample examined for Dermo using RTFM will be split and also analyzed by genetic methods at the TPWD Perry R. Bass Marine Facility, in Palacios, TX using quantitative real-time PCR methods to detect Dermo (*Perkinsus marinus*). It has been shown that qPCR can detect small rates of infection than RTFM but both methods yield very similar trends and highly positively correlated (Culbertson et al 2012, Swinford and Anderson 2021, 2023; Swinford et al. 2021).

Task 3 - Tracking Vibrio levels in wild oysters

Oyster tissue will also be collected concurrently with Dermo monitoring and analyzed using the following protocol. Libraries of Vibrio isolates will be generated by enrichment of serial dilutions in alkaline peptone water followed by culturing on thiosulfate-citrate-bile salts – sucrose media, as described previously (Barrera-Escorcia et al 2016). Isolates will then be identified with matrix-assisted laser desorption – time of flight (MALDI-TOF) mass spectrometry system, MALDI-TOF systems provide species-level identification of microbes (Ahmad et al 2012, Sauer et al. 2008, Singhal et al. 2015) by pattern matching between sample and reference spectra (Lagier et al. 2015).

Latitude/Longitude (Optional):

Location:

Galveston Bay system including Trinity, Upper, Lower Galveston Bay, East and West Bays.

Other Plans Implemented:

The proposed project aligns and supports many of the following state and Gulf-wide plans and strategies.

The Texas Coastal Resiliency Master Plan: Aligns with the key "Ecological Resiliency Strategies", specifically R1-45: Galveston Bay Oyster Reef Planning & Restoration.

The Gulf of Mexico Alliance's Governor's Action Plan: Aligns with two priority issue items: Habitat Resources & Wildlife and Fisheries which focus on assessing status and trends, threats, and needs of priority wildlife species, which include Oysters.

Gulf Region Oyster Network Program: (Restore America's Estuaries & National Oceanic and Atmospheric Administration): Aligns with primary initiative: Oyster Shell Recycling and Restoration.

Finally, this project aligns with a number of projects supported by both corporate and individual donations through the GBF through their oyster reef restoration programs: 1) Oyster Shell Recycling, 2) Volunteer Oyster Gardening, 3) Volunteer Reef Restoration, and 4) Large-Scale Reef Restoration.

The project directly supports SB3 Implementation Work Plan for Galveston Bay (TSJ Stakeholder 2012) and adopted TCEQ environmental flow standards for Galveston Bay (TCEQ 2011).

The Gulf States Marine Fisheries Commission's The Oyster Fishery of the Gulf of Mexico, United States: A Regional Management Plan – 2012 Revision. Publication No. 202 (VanderKooy 2012). This interjurisdictional stock management plan, identified multiple research and data needs for state stocks of oysters including 13.1 "*developing a greater understanding of oyster population dynamics, reproduction, recruitment, growth, natural mortality, connectivity between populations*" One of the specific actions listed was "determining factors contributing to MSX and Dermo infection". The proposed research will provide critical information on environmental factors contributing to Dermo infection and oyster mortality.

Projects Map

Figure 1. Project Map illustrating locations of restaurants that participate in the Galveston Bay Foundation's (GBF) Oyster Shell Recycling Program, and local oyster retailers and distributors that may be used to procure oysters for use in the study. Aerial image of the GBF's Red Bluff Sun-Curing Site which will be used to house the experimental sun-curing piles

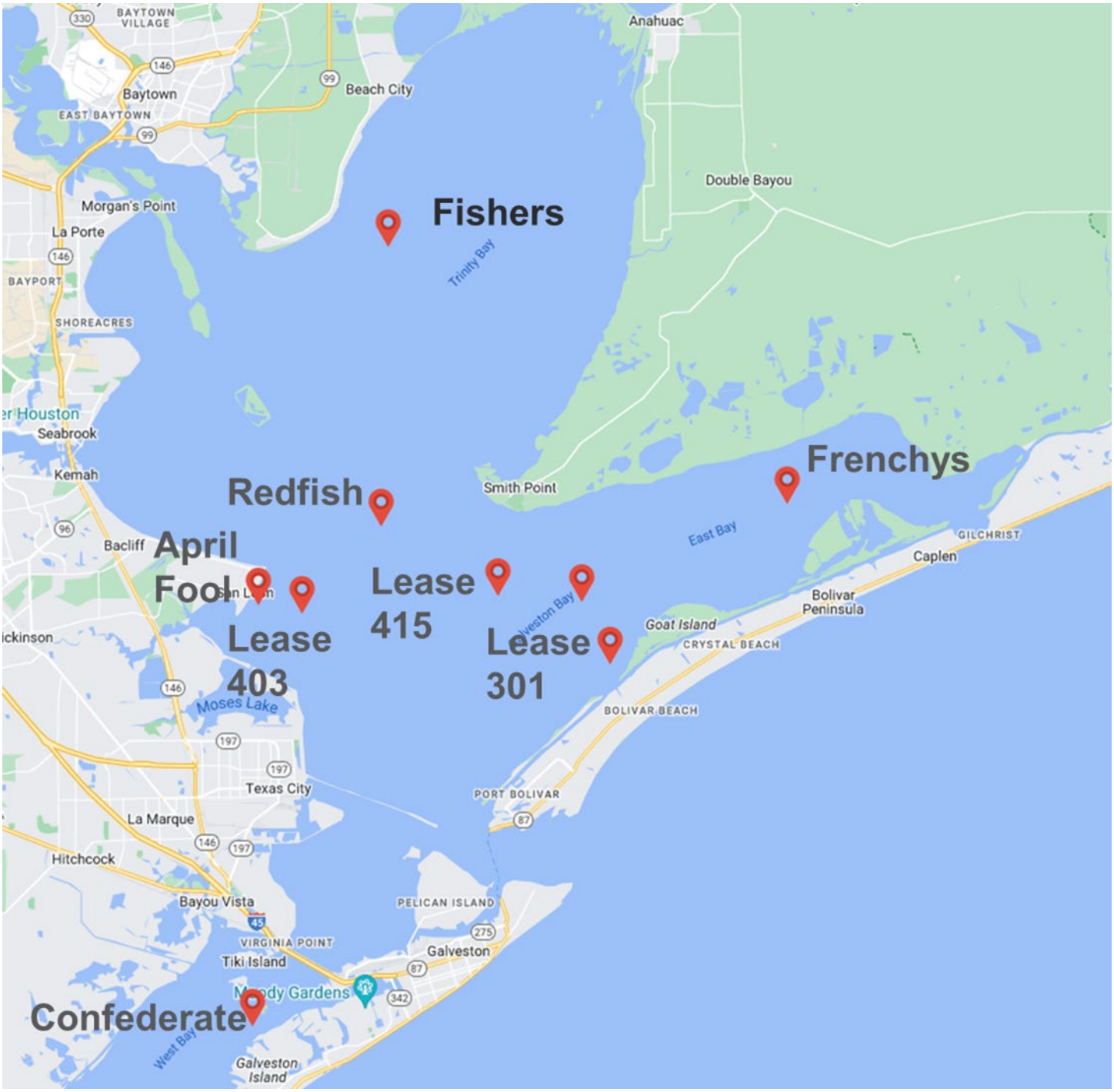


Figure 1.Potential index sites at public and lease reefs where historical Dermo monitoring has occurred https://data.oystersentinel.cs.uno.edu/organizations/uno/divisions/gulfscei/dermo/regions/galveston-bay (Source: Accessed 8/4/23).

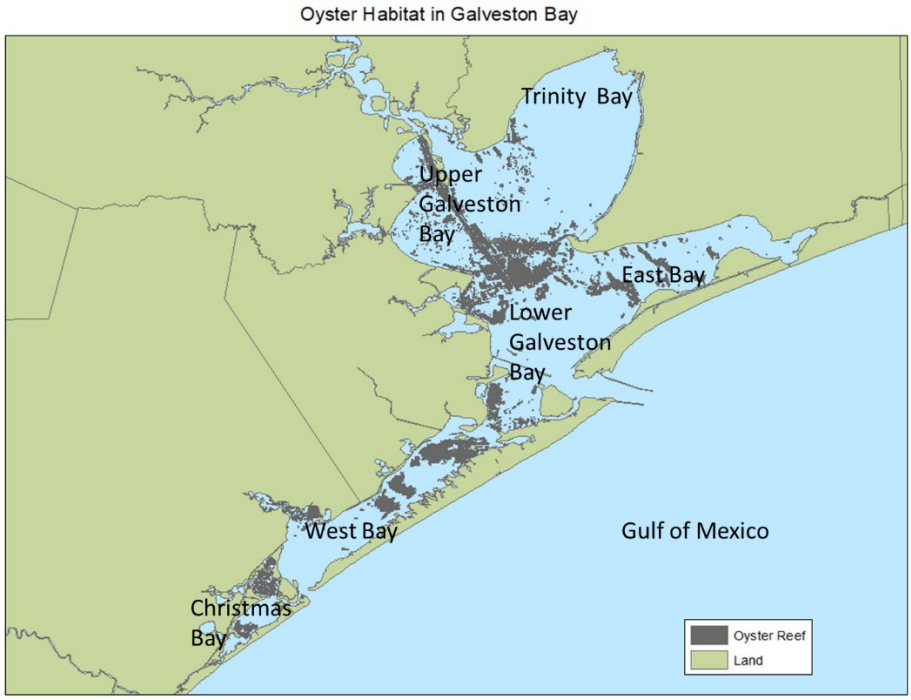


Figure 2. Project Map illustrating locations of oyster reefs in Galveston Bay that fall within the TPWD sampling frame. Note, Christmas Bay is closed to harvesting by TPWD.

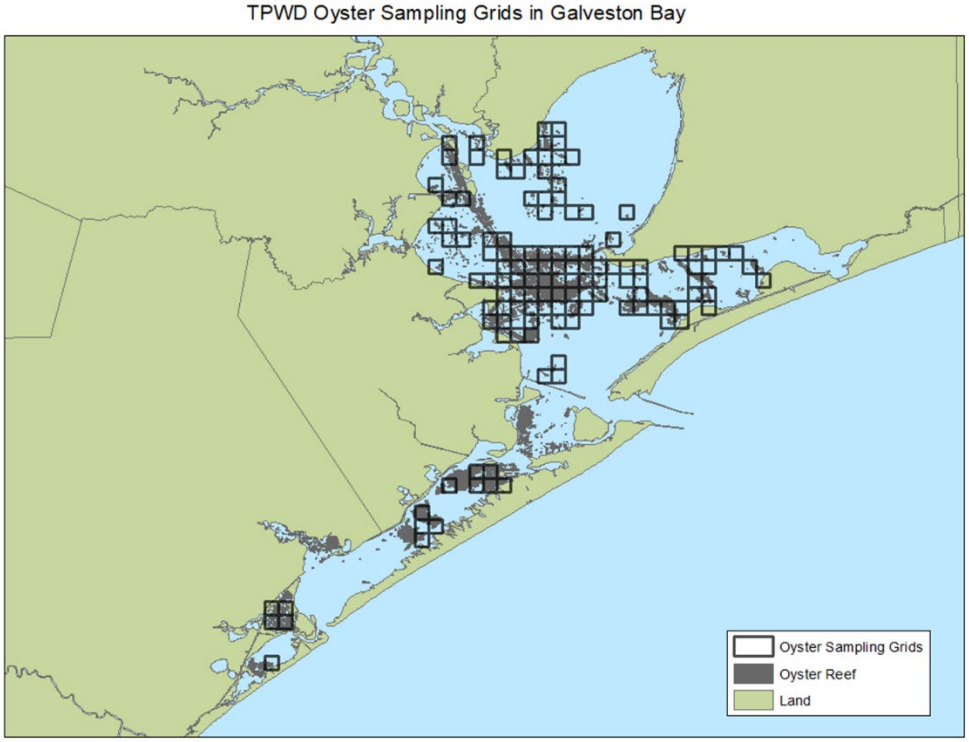


Figure 3. Project Map illustrating locations of oyster reefs in Galveston Bay and the sampling grid that is used by TPWD to randomly select sample sites each period (Martinez-Andrade 2018).

Supplemental Photos/Graphics:

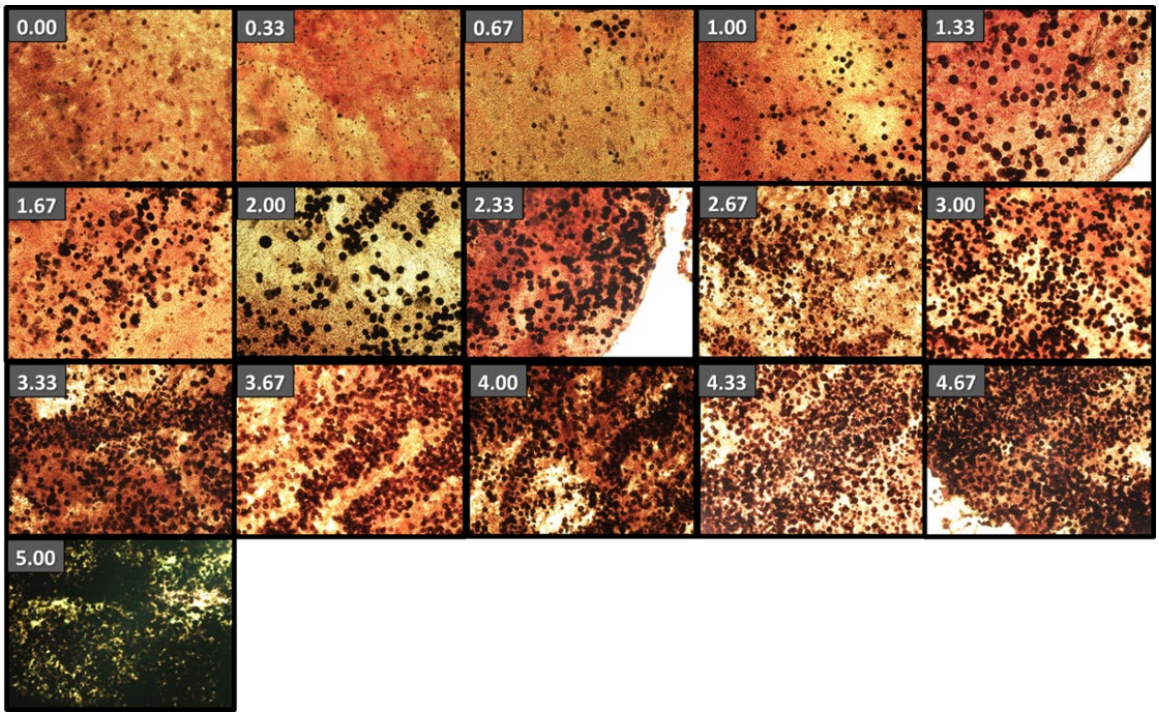


Figure 4. Examples of tissue pathology slides showing the range of Dermo intensity rating using the Ray's Fluid Thioglycollate Method

SECTION SEVEN: BUDGET DETAILS

BUDGET CATEGORIES:		Budget
a.	Personnel/Salary	329,694
b.	Fringe Benefits	57,170
c.	Travel	8,713
d.	Supplies	49,001
e.	Equipment	19,940
f.	Contractual	23,309
g.	Construction	0
h.	Other*(Tuition support for RA)	40,152
i.	Total Direct Costs (Sum a - h)	524,137
j.	Indirect Costs	102,090
k.	Total (Sum of i & j)	$626,241

*Other: If Budget Category "Other" is greater than $25,000 or more than 10% of budget total, identify the main constituents: Tuition support for graduate students.

Indirect Cost Agreement

Indirect Cost Reimbursable Rate: The reimbursable rate for this Contract is 22% of (check one):

☐ salary and fringe benefits
☒ modified total direct costs
☐ other direct costs base
If other direct cost base, identify:

This rate is less than or equal to (check one):
☐ Predetermined Rate—an audited rate that is not subject to adjustment.
☒ Negotiated Predetermined Rate—an experienced-based predetermined rate agreed to by Performing Party and TCEQ. This rate is not subject to adjustment.
☐ Default rate—a standard rate of ten percent of salary/wages may be used in lieu of determining the actual indirect costs of the service.

[Insert Indirect Cost Agreement or Attach as an Appendix if Applicable]

Please Submit Project Proposals (Microsoft Word Only – No PDFs) by August 25, 2023, to gbep@tceq.texas.gov

Appendix 2. Pertinent Literature

RE: Proposal: Guillen - Monitoring of Vibrio and Dermo in oysters in support of Natural Resource and Public Health Adaptive Management

Audemard, C., K. S. Reece, and E. M. Burreson. 2004. Real-Time PCR for detection and quantification of the protistan parasite *Perkinsus marinus* in environmental waters. Applied Environmental Microbiology 70:6611-6618. https://doi.org/10.1128%2FAEM.70.11.6611-6618.2004

Ahmad F, Babalola O, Tak H (2012) Potential of MALDI-TOF mass spectrometry as a rapid detection technique in plant pathology: identification of plant-associated microorganisms. Analytical and Bioanalytical Chemistry 404:1247-1255

Barberis C, Almuzara M, Join-Lambert O, Ramírez MS, Famiglietti A, Vay C (2014) Comparison of the Bruker MALDI-TOF mass spectrometry system and conventional phenotypic methods for identification of Gram-positive rods. PLoS ONE 9:e106303.

Barrera-Escorcia G, Wong-Chang I, Fernández-Rendón CL, Botello AV, Gómez-Gil B, Lizárraga-Partida ML (2016) Quantification of Vibrio species in oysters from the Gulf of Mexico with two procedures based on MPN and PCR. Environ Monit Assess 188:602.

Bower, S.M. (2013): Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: *Perkinsus marinus* ("Dermo" Disease) of Oysters.

Bushek, D., D. Richardson, M.Y. Bobo, and L.D. Coen. 2004. Quarantine of Oyster Shell Cultch Reduces the Abundance of Perkinsus marinus. Journal of Shellfish Research. 23:2, 369-373

Choi, K.-S., E. A. Wilson, D. H. Lewis, E. N. Powell& S.M. Ray. 1989. The energetic cost of *Perkinsus marinus* parasitism in oysters: quantification of the thioglycollate method. J. Shellfish Res. 8: 125–131.

Council on Environmental Quality (CEQ). 2023. CEJST 2023

Culbertson, J., J. Anderson, W. Karel and S. Ray. 2011. Validating a Quantitative Real-Time PCR Method to Detect Dermo (*Perkinsus marinus*) in Texas Oysters.

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August 18, 2023

Galveston Bay Estuary Program
Attn: M&R Coordinator - Cassandra Taylor
17041 El Camino Real, Ste. 210 Houston, TX 77058
e-mail: Cassandra.taylor@tceq.texas.gov; lisa.marshall@tceq.texas.gov

RE: Letter of Support: Guillen -Establishment of an Oyster Sentinel Program for Tracking *Perkinsus marinus* (Dermo).

Dear M&R Coordinator and Sub-Committee,

I am writing this letter of support for the proposal entitled: "Establishment of an Oyster Sentinel Program for Tracking *Perkinsus marinus* (Dermo) in Oysters of Galveston Bay" that is being submitted by Dr. George Guillen and his team from the Environmental Institute of Houston at the University of Houston- Clear Lake have developed this proposal in collaboration with TPWD (Christine Jensen-Dickinson lab and Joel Anderson –Perry R. Bass Marine Lab. The proposed work will provide the Texas Parks and Wildlife Department (TPWD) with critical data on Dermo infection rates and intensity in oyster reefs, and the relationship with freshwater inflow and resulting salinity. This information can be used to support science-based recommendations and best management practices for oysters in Galveston Bay. Data generated by this study will provide critical information on the status of the health of wild oysters, and will help stimulate the development of critical infrastructure to support ongoing oyster health monitoring.

Regional TPWD staff have been in coordination with the project team providing advice and a resource manager's perspective on the proposed research. TPWD looks forward to receiving data in the future to support agency management of oyster resources and fishery management.

Kelley Kowal
Upper Coast Regional Director
1502 FM 517 East
Dickinson, TX 77539
(281) 386-0677

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August 3, 2023

Galveston Bay Estuary Program
Attn: M&R Coordinator – Casey Taylor
17041 El Camino Real, Ste. 210
Houston, TX 77058
e-mail: gbep@tceq.texas.gov; lisa.marshall@tceq.texas.gov

RE: Letter of Support: Oakley – "Tracking *Perkinsus marinus* (Dermo) Infection in Sun-Cured Oysters: Informing Oyster Shell Recycling Programs"

Dear M&R Coordinator and Sub-Committee,

I am writing this letter of support for the proposal entitled: "Tracking *Perkinsus marinus* (Dermo) Infection in Sun-Cured Oysters: Informing Oyster Shell Recycling Programs in Galveston Bay" that is being submitted by Dr. Jenny Oakley from the Environmental Institute of Houston at the University of Houston-Clear Lake. The proposed work will provide the Texas Parks and Wildlife Department (TPWD) with science-based recommendations and best management practices for sun-curing recycled oyster shell before using for oyster reef restoration. Recommendations from this research will provide much needed information on reducing the risk of inadvertently infecting wild oysters and oyster mariculture operations with Dermo due to restoration efforts, while not unnecessarily delaying the use of the material.

TPWD staff have been in coordination with the project team providing advice and a resource managers perspective on the proposed research. TPWD looks forward to seeing the proposed outreach and a best management practices publication resulting from this project.

Sincerely,

Dakus Geeslin
Coastal Fisheries Deputy Director

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov